# Arvari Sub-State Site (Rajasthan) Biodiversity Strategy and Action Plan

Coordinating Agency: Tarun Bharat Sangh, Bhikampura

## Introduction

All life on the earth is part of one great, interdependent system, which interacts with and depends upon the physical and biological components of the environment. Biodiversity is the source of all living material used as food, shelter, clothing, biomass energy and medicaments used by human beings. Human being is benefited from other organisms in many ways, some of which they don't appreciate until a particular species or community disappear. Even seemingly, obscure and insignificant organisms can play irreplaceable role in ecological systems or be the source of genes or drugs that some day may be indispensable.

Our stakes in biodiversity are very high since India's economy is based on agriculture, animal husbandry, forestry and fisheries. In 1992, the UN conference on Environment and Development adopted a Global Convention on Biodiversity (CDB) to conserve biodiversity by all nations. A number of countries including India have ratified the CDB. To implement the provisions of the CDB, the Government of India initiated the process of preparation of National Biodiversity Strategy and Action Plan (NBSAP). It is being carried out at 5 different levels; local (sub-state), State/Union territory, Eco-region (inter-state), thematic and national. Arvari catchment is a sub-state site of *Rajasthan*.

This document describes the present status of the biodiversity of the Arvari catchment spread over about 72 villages of *Thanagazi* block (*Alwar*) and *Jamuwa Ramgarh* block (*Jaipur*) in *Rajasthan* covering an area of 503 sq. km and identify the factors causing deterioration of the biodiversity as per the assessment of the local communities, forest department officials, scientists, social scientists, development experts and investigating team and it includes suggestions for its conservation and improvement.

A Local Advisory Committee (LAC) consisting of 15 members drawn from different sections of the society was constituted for collection of basic information and preparation of Strategy and Action Plan. A number of meetings were organised at different places. In these meetings, besides the members of the LAC, knowledgeable local individuals, scientists working on the biodiversity related issues, local NGO, villagers, members of women's groups and *Arvari Sansad*, *panches* and *sarpanches* of local *gram panchayats* and local forest officials were invited to participate. Information about the present status of biodiversity in the region, problems faced by the people and possible suggestions for conservation and improvement of the biodiversity was collected in questionnaires specially designed for the purpose. A Field Survey team of nine members including local NGO field workers, knowledgeable local individuals, schoolteachers, employees of forest department, representatives of *Arvari Sansad*, experts of biodiversity (including field botanists and wildlife experts) and their services were taken for collection of information in the questionnaire. Detailed information was collected from 15 villages. Three villages, selected for case studies were *Bhaonta-Koylala* where community initiatives made success in conserving biodiversity in the region, *Samara* is a typical successful example of rejuvenation of forest through community efforts and *Kalsi-Jhiri ka Guwada*, a village suffering from excessive marble mining.

*Dr. Satish Kumar Sharma*, wildlife expert and official of forest department has done compilation of the published and unpublished research work available on the wildlife related to the area and *Mr. Ambuj Kishore* extending his assistance in the compilation of the literature from media. Subject experts and social scientists of forestry, wildlife, animal husbandry, agriculture, watershed, and medicinal plants were consulted to have technical details about different sectors of biodiversity.

## Profile of Arvari Sub-State

Arvari catchment lies in the *Thanagazi* block of Alwar district and partly in *Jamuwa Ramgarh* block of *Jaipur* district in northeast part of *Rajasthan*. This area is receiving less than 600mm rainfall annually. Once, River Arvari used to flow perennially but with the continuous existing drought conditions and due to depletion of Ground Water, it dried up and the whole Thanagazi block was declared as "Dark Zone" in Government records. Village community along with a local NGO, *Tarun Bharat Sangh* (TBS) have built around 250 rainwater-harvesting structures in 72 villages in the Arvari catchment over the last 20 years. These structures have replenished ground water and increased the water table of the wells enabling the Arvari back to life and make it flow most part of the year. The rivulet, *Arvari* originates in the *Thanagazi* and terminates into a big water reservoir *Sainthal Sagar*, built by erstwhile

*Jaipur* State in 1898 and its catchment area covers 72 villages of both the blocks in *Alwar* and *Jaipur* districts. The total area of Arvari catchment is about 503 sq. km. The length of the rivulet is 45 km. The area may be divided into two parts, hilly tracts and plains. The well-known *Sariska Tiger Reserve* is adjacent to the Arvari catchment and another important protected area in *Jaipur* district is *Jamuwa Ranmgarh* Wildlife Sanctuary, which is adjacent to the Arvari region on the southern side. Both protected areas have rich biodiversity. Thus, Arvari region becomes important for biodiversity conservation.

Mean relative humidity during rainy weather is 63% while average annual rainfall is around 620 mm. 90% of the rainfall occurs during monsoon months (July to September). The occurrence of erratic rainfall is a common feature.

Four major communities namely Gurjars, *Meena*, *Balais* and *Rajputs* are prominent in this region. The hamlets of *Gurjar* community are found in the hilly tracts because of their main occupation being animal husbandry. *Meena* is a scheduled tribe community and is primarily engaged in agriculture. The area belongs to two constituencies of State Legislative Assembly and two tehsils viz. *Thanagazi* in *Alwar* district and *Jamuwa Ramgarh* in *Jaipur* district. The vegetation of the area is generally characterized as thorny scrub and sub-tropical deciduous forests. There are mainly two types of ecosystems, one natural forest ecosystem and second agriculture ecosystem. These ecosystems have been considerably affected by the biotic factors. The natural forests are now, in different stages of degradation. A number of plant and wild animal species are declining whereas some new plants species are coming up. In agricultural fields, changes have taken place in the cropping pattern and water uses. Irrigation facilities are limited. In most areas, generally two crops – *Kharif* during monsoon season is raised under rain fed conditions; *Rabi* crops are grown where irrigation facility is available. *Bajra, Maize, Jawar, Groundnut, Sesame, Kali Jiri* and some pulses like *Mung* are the major *Kharif* crops. In *Rabi* crop, *Wheat, Mustard and Gram* (*Channa*) cultivation is a common practice in irrigated lands throughout the area but Tara-Mira (*Eruca sativa*) Barley and Gram are also grown in rain fed areas. Several hybrid varieties of Wheat are also grown. Vegetables like *Bhindi* (Lady's finger), *Gajar* (Carrot), *Muli* (Raddish), Brinjal, Tomato, Chillies, Cabbage, Cauliflower, *Kaddu*, *Kakree*, *Batatas*, Watermelon etc. are extensively cultivated in places where the irrigation facilities are available. Increased use of chemical fertilizers, high yielding varieties of crop seeds and use of insecticides and fungicides is being practised.

The colonial records (Imperial Gazetteer 1908) shows the area well wooded and well managed in the past. About 12% of *Alwar's* land area was covered with forest. Total forest products yielded a sizeable income for the State with bamboos listed as a particularly important product for the State. In addition to forests, numerous grasslands and woodlands were under State ownership and control, though these were often opened up for village use after State's needs had been met. After independence of the country, the control of *Panchayats* slackened particularly during the famine years in early fifties. In the mid 1980s, the area of *Alwar* district presented a near desertified landscape. Agricultural productivity was low, causing out-migration. The hillsides of the area were largely devoid of forest cover and severe soil erosion aggravated agricultural problems and degradation of natural vegetation. Further, the Central Ground Water Board determined that extraction of ground water in the area was greater than the recharge potential and the area was thus classified as a "Dark Zone".

The disintegration of the water harvesting system becomes significant in view of its central role and its re-establishment has played an important role in the environmental recovery in the *Arvari* basin. TBS activists feel that the decline in agricultural conditions was rooted in the state of decay of water harvesting structures. They hold that the loss of local control over natural resources was responsible for this. Similarly, forest cover and quality are believed to have declined as the state established control over forests and communities no longer felt a sense of ownership nor responsibility towards safeguarding these resources. Non-local agents of deforestation and mining operations, which enjoyed protection from the state, caused degradation in their own height and further alienated the local populace from their resource base. In nineties, with the introduction of the concept of JFM and launching of European Union supported *Aravalli* project, the forest have been re-established to some extent.

In 1986, the villagers of *Bhaonta-Koylala* built a huge anicut to catch the gush of rainwater from the surrounding hill-slopes from where the rivulet *Arvari* originates. This structure injected life into the rivulet *Arvari* by conserving rainwater. Since 1986, about 250 water harvesting structures have come up in 72 villages in the Arvari watershed for which community contributed about 33 percent of the total cost. These structures were collectively recharging ground water as was noticeable in the water table of the wells. This brought economic and ecological regeneration in *Alwar* district and a community owned system of natural resource management was evolved.

About 250 water bodies in the form of small and medium size anicuts, mud ponds (*johad*) and big reservoirs like *Jabbar Sagar* of *Hamirpur* village and *Sainthal Sagar* are now spread all over the *Arvari* basin. Some of these water bodies form wetlands of the area and they are quite rich in biodiversity and support a number of species of plants and animals of aquatic habitat. The livelihood of several people of the area is dependent on *Sainthal Sagar*, they take good *Rabi* crop in the catchment area and cultivate as cash crops. It supports a large population of Flamingos and other migratory birds. Some of these water bodies are under severe pressure in the marble mining area.

## Current (known) Range and Status of Biodiversity

Arvari basin has mainly three types of ecosystems and ecological niches viz. Forest ecosystem, Agriculture ecosystem and Aquatic ecosystem. As per classification of forest types, by Champion and Seth (1968), the forests of this region have three main categories:

- (5E1) *Anogeissus pendula* forests;
- 5B/C2 Northern Dry Mixed Deciduous Forests;
- 6B/C1 Desert thorn Forests.

The *Arvari* basin is located adjacent to the two protected areas viz. Sariska Tiger Reserve and *Jamuwa Ramgarh* Wildlife Sanctuary. Due to this reason also, the *Arvari* area becomes important for biodiversity. It also supports a large variety of wild animals like *Neelgai, Sambhar, Chittal*, Indian wild Boar, Indian porcupine, Indian Hare, Grew musk Shrew, Long-eared Hedgehog, Grey *Langur*, Rhesus Macaque (*Bander*), Leopard, Jungle Cat, Caracal (Syahgoh), Small Indian Civet, Small Indian Mongoose, Ruddy Mongoose, Grey Mongoose, Wolf, Jackal, Indian Fox, several species of snakes and local migratory birds. Species like Leopard, Caracal, Ruddy Mongoose, Wolf, Indian Fox, Stripped Hyena and Indian Wild Boar are rarely seen.

The successful community efforts such as Bhaonta-Koylala, Chaunshala-Padak-Chhapali and Samara have regenerated forest resources and revived wildlife in the area. The village common grazing land and some fallow lands in the past supported good growth of a number of palatable grass species such as Cenchrus biflorus, C.ciliaris, Acrachne racemosa, Desmostachya bipinnata, Apluda mutica, several species of Aristida , Eragrostis, Digitaria etc. Other important species in these lands are *Dactyloctenium aegyptium, D. aristatum, Heteropogon contortus, Sorghum halepense, Saccharium benghalense, S. spontaneum* and *Sehima nervosum*. As a result of past mismanagements, these lands are now either getting infested with thick stands of *Prosopis chilensis* or unpalatable weeds and grasses. Some sacred groves are having rich biodiversity and local people take care to protect some plant species. The productive potential of these lands is good and their proper management can improve them.

The major *Kharif* crops of the area are *Bajra, Maize, Jawar*, and pulses such as *Mung*, Oil yielding crop Sesame. *Kali jiri* is grown as cash crop in *Thanagazi* block and *moongphali* (groundnut) is grown in sandy plains of *Jamuwa Ramgarh* block. In *Rabi* crops, Wheat, Barley, Gram and Mustard are commonly grown. In the region, local farmers created and perpetuated gene pools by natural selection. The '*Jhakharana*' variety of *Bajra* (pearl millet) and *Dholi, Sathi* varieties of Maize, *Safed Lal* variety of Jawar is being perpetuated through natural selection. *Deshi* (indigenous) varieties of Wheat are still grown in the areas where adequate irrigation facilities are not available. The farmers prefer to grow local varieties of cereals for their family consumption because of their good taste.

A number of new improved and high yielding varieties of seeds developed for agriculture crops have been introduced in the area also. Introduction of these varieties substantially increased the productivity of crops. To maintain the productivity of the soil, the farmers have to put in chemical fertilizers as well as farmyard manure in good quantity. The use of chemical fertilizers, pesticides/ insecticides is increasing which is causing adverse effect on soil micro flora and fauna. This is resulting into degradation of the natural fertility of the land.

In some part of the *Arvari* basin, some species of fruit plants are grown such as Mango, *Amrood*, *Aonwla*, *Papaya* and *Nimbu*, which are having good food and economic value. Some cultivators have started commercial cultivation of fruit plants like *Aonwla* and *Nimbu*. Common domestic animals are buffaloes, cows, goats, sheep, camel and they make a major contribution in the economy of the people of the area. They not only provide drought power but also valuable manure for the agricultural fields and food for the people in the form of milk, milk products and meat. Dead animals provide skins and hides. People of the area generally maintain large number of cattle. The important breeds of cows are *Haryana* and *Mewati*. *Murrah* and *Surti* are amongst the good breeds of buffaloes. All people of the area rear goats, because of their hardiness and low maintenance costs. Important breed of the goat is '*Jakharna*'. This breed is found in *Jakharna* village of *Alwar* district. Sheep and wool make substantial contribution to the economy of the people. Some good breeds of sheep reared in the area are *Chokla*, *Nali* and *Malpura*. Generally, local breed of birds, *deshi-murghi* are reared by poor sections of the society for their own consumption.

## Statement of Problems related to Biodiversity

Main reasons for the loss of biodiversity in the forest areas are: biotic pressures, increased population and expansion of human habitations, excessive cutting of trees for fuel wood and furniture making and uncontrolled grazing by cattle adversely effecting natural regeneration of plants, deterioration of traditional social systems and cultural values for protection of sacred groves (*Orans*) and totem trees, politicization of *gram panchayats*, unscientific marble mining and introduction of exotic species. The wild animals have been suffering because of hunting and degradation of natural habitats. Unrestricted use of pesticides in agricultural crops is causing deaths of natural predators of agricultural pests. In recent years, increasing population of *Nilgai* (blue bull), is causing heavy damage to the crops of the villagers and alarming expansion of *Prosopis chilensis* is reducing growth of herbaceous species and adversely effecting the growth of indigenous species.

The production of indigenous/local varieties of agricultural crops has suffered significantly because of government policies of promoting the high yielding varieties of seeds along with chemical fertilizers and pesticides and providing irrigation facilities at subsidized rates. The production of local varieties of cereals has also been affected by change in food habits of the people and market demand and consumption pattern. Loss of domesticated animal biodiversity is mainly because of mechanization of agriculture, improved transportation facilities making the animal drought power secondary.

Major Actors and their Current Roles Relevant to Biodiversity and Ongoing Initiatives: The local society is considered as important stakeholder and plays an important role in the natural resource management and biodiversity conservation. Its different sections have different utilization patterns, conservation options and priorities about biodiversity. As perceived from the community interactions, there are ten major user groups on the basis of their relationships with the existing biodiversity. These user groups are Farmers, Pastorals, Fuel wood, Fodder and Green manure, Wild vegetable and fruit, Gum collectors, Herbal healers, Village priests, Labourers or seasonal migrants and Artisans. All user groups are related with agriculture and animal husbandry directly or indirectly as well as cultural, environmental, religious, subsistence and medicinal value of biodiversity.

An NGO, Tarun Bharat Sangh has been working for mobilising people of the area for their own resource management for the last 17 years and creating awareness towards biodiversity conservation of the area. With the support of TBS, local community initiatives have achieved exciting success in regeneration of forests, reviving wildlife and traditional system of water conservation. TBS, seeing the degradation of forests and lowering of the water table in the area, motivated the villagers to construct rainwater harvesting "*Johads*" around which life thrives and simultaneously protect the natural forests. These *Johads* got filled up with rainwater during monsoon and provided much needed relief to the villagers. Seeing success, a chain reaction started in the area. The villagers started making their own rules and regulations for village resource management and in several villages, people resolved not to carry any axe inside the forests. The forest cover has started reviving again and even the wild animals have also staged a come back. The wooded hill slopes and *Johads* collectively recharge the ground water in the area.

National Forest Policy enunciated by the Government of India, from time to time and Forest Act have played an important role in conservation of forests all over the country. The Policy of the Government of India (1988) lays emphasis on meeting the domestic requirements of fuel wood, fodder, minor forest produce and construction timber of the people living in the forests. The new policy emphasizes that these items or substitute materials should be made available at reasonable prices. This was a marked shift in the policy at National level in the management objectives of the forests. The shift was from meeting the commercial demands of the forest products and maximising the state revenue to meet the local needs of the people. Another shift was involvement of the local people in the protection and management of forests by constituting Forest Protection and Management Committees. The GOI, in pursuance of the new forest policy issued detailed guidelines for a massive people's movement for protection, development and management of degraded forests by involving the local communities on June 1, 1990. The externally aided projects for afforestation of Aravallis (Arvari is also a part of Aravallis) were implemented by involving VFPMCs under JFM programme in the state of *Rajasthan*. Because of the involvement of the local communities in all the stages, right from micro planning to the completion of plantation and its subsequent management, encouraging results have been seen. These afforestation projects have substantially increased the supply of forest produce from the areas and have led to an economic emancipation of under-privileged group especially women who have benefited from the increased supply of fodder, fuel and other non-timber forest produce.

The forest department is prersently-providing protection to wildlife and its habitats. Although a number of wild species are on the fringe of extinction in the area, still no research work is being undertaken to study their ecological status. Increase in the populations of some of the wild animals like Nilgai is causing problem to the farmers in the area.

The Agriculture department is emphasising on availability of quality and improved seeds of high yielding varieties to increase the production. However, the department is not in any way providing incentive to the cultivators for growing indigenous varieties of crops and other land races. Intensive agriculture with irrigation with tube-wells is lowering the underground water table in the area. In the *Arvari* basin, farmers are practicing agro-forestry by protecting the natural growth and regeneration of trees and shrubs on the field boundaries and planting saplings of trees like *Ardu* (*Ailanthus excelsa*) for fodder, *Neem* (*Azadirachta indica*), *Shisham* (*Dalbergia sissoo*), *Deshi babool* (*Acacia nilotica*) for multipurpose use. These trees provide additional income to the cultivators.

## Gap Analysis

India has a land based economy, so the importance of biodiversity becomes much more crucial for the sustainable development. The policy makers and those who are engaged in decision making at various levels have not fully understood the value of biodiversity conservation not only for better future generation but also for the present scenario. The basic problems such as poverty alleviation can be tackled through conservation of biodiversity and also to achieve sustainable development of bio-resources for future generation. Development of the area is generally associated with providing electricity, roads, irrigation etc. and the devel-

opment of natural resources like conservation of rainwater, forests and pastures generally gets a backseat. This is mainly because of the lack of informed vision at all levels. Although, Arvari catchment and the surrounding area is rich in biodiversity but has not been fully explored. No systematic surveys and ecological studies of threatened and endangered animals, impact of development activities and mining operations, effect of fertilizers used extensively in the area and pesticides, introduction of exotic species and community initiatives etc. have not been undertaken. Information about the status of medicinal plants, their productivity and exploitation is totally lacking.

Drought is a common feature in the area. The state government, in order to provide relief work to the drought-affected people undertake employment generating relief works, preferred construction of roads. They do not contribute much in combating the future droughts. Very low priority is given to the afforestation works and construction of rainwater harvesting structures. The importance of grasslands in the rural economy primarily based on agriculture and animal husbandry has not been properly visualised by the state. Community aspirations for its livelihood aspects are not given due weightage while visioning the development programmes by the government functionaries. A study of legal implications of community-based conservation (*Upadhyay 1999*) mentions that forests and wildlife laws in the state of *Rajasthan* have very few statuary provisions that facilitate community participation. The central constitutional amendment could provide direct involvement of local participation in management and preservation of natural resources but the *Rajasthanb Panchayat Raj Act* which followed the central legislation, does not give much power to the village institutions regarding management of local natural resources. There is a need to review the wildlife protection Act to provide for creation of protected areas with involvement of local communities and safeguarding their traditional rights over its benefits and also the need for an institutional structure for bringing the stakeholders together on a regular basis.

## Strategies Suggested to fill Gaps and Strengthen the Ongoing Measures

Addressing the socio-economic aspirations of the people is the only way to create personal stakes in the maintenance and sustainable use of the biodiversity. Strategies suggested are based on a system of decentralized governance in conjunction with CBOs, NGOs and State Departments. The functioning mechanism of the involved agencies in the decentralized model would be participatory, transparent and accountable to the local communities. Based on these assumptions and filling gaps, the specific strategies include:

- Creation of awareness, formation and strengthening community groups and building their capacity for dealing with biodiversity issues;
- Restoration of degraded forests giving high priority to natural regeneration;
- Improving nursery and agro-forestry practices;
- Increasing the productivity of indigenous species;
- Propagating cultivation of medicinal plants for local consumption and exploring market system;
- Eradication of exotic noxious weeds;
- Developing and improving grasslands;
- Improving habitat of the existing protected areas and strengthening the protection machinery;
- Giving top priority to forestry, construction and maintenance of water harvesting structures and pasture land development while taking up drought proofing and famine relief works. The biodiversity conservation interventions be weaved around conservation of water and livelihoods of the local people.

The strategy also emphasizes for agricultural biodiversity on ensuring government support in the form of minimum support price for cultivation of indigenous/land races relating to different crops, encouraging and educating farmers for producing Vermi-compost for enhancing organic farming and documenting traditional wisdom and skills of the people.

Mining in all ecologically sensitive areas to be stopped. An independent body to be constituted to assess the impact of mining on biodiversity and livelihood of the people and take steps to check its ill effects and ensure safe disposal of the overburden waste from the mining activity. Reviews of existing policies and regulatory frameworks relating to conservation of biodiversity be undertaken from the point of view of preservation of bio-resources and local livelihoods. Biodiversity to be made a part of school curriculum. Poverty alleviation programmes to focus on skill improvement of economically deprived people.

## Suggested Actions to fill Gaps and Strengthen Ongoing Measures

Based on identified gap and proposed strategies, actions have been suggested to enhance/strengthen community oriented ongoing measures supported by government as well as NGO. A total of 24 action plans have been proposed. Seeing the need of taking immediate steps to address key issues such as survival of wild life, livelihoods of inhabitants and combating drought situations 11 actions points have been recommended in the category of high priority and remaining points in the category of medium priority. Seven points are related to capacity building and empowering people's organisations such as *Arvari Sansad, Gram Sabhas* (*Lok Samitis*), Women's groups, JFMCs etc. for sustainable natural resource management and dealing with critical biodiversity issues. Next seven actions have been proposed to undertake assessment studies on various aspects of biodiversity and impact of various devel-

opment activities on livelihood of the people and ecology of the area and dealing policy and legal issues in the interest of the people. Eight actions have been suggested for formulation and implementation of development schemes for addressing people's livelihood and biodiversity conservation issues. Last two actions are to integrate biodiversity components in school curriculum.

## Operational Implementation of the Action Plans and Follow-up

The proposed Strategies and Action Plans would be implemented through collaborative efforts of several community-based organisations like Arvari Sansad, PRIs, Women's groups etc. and government departments. *Tarun Bharat Sangh*, a local NGO will have the core responsibility of capacity building of people's groups, orienting government functionaries in community base4d, participatory approach of natural resource management, overall coordination and monitoring of the implementation of the action plans.

For successful implementation of the action plans, TBS and government departments will jointly mobilise adequate financial resources to support the activities. Most of the activities will be implemented through *Arvari Sansad* and gradual process will be evolved to shift key roles and responsibilities from TBS to *Arvari Sansad* over a time of five years. The forest department would be an active partner in the entire process of the implementation of BSAP and also in the follow-up actions. Detailed implementation and monitory schedule for each action will be worked out in the beginning of the project by concerned agency.

# Bilaspur Sub-state Site (Chhattisgarh) Biodiversity Strategy and Action Plan*

Coordinating Agency: Tribal Development Society, Bilaspur

Jashpur BSAP has been prepared with a lot of efforts from experts having knowledge of the local area, its culture, biodiversity, forest components, planning process and the anthropological component. The region of Jashpur is blessed with varied vegetation and forest types which falls under 4 classes as defined by Champion and Seth system of classification. These can broadly be classified into 2 major types the Sal forest and mixed forests. These forests are wonderful abodes of rich floral and faunal diversity. During the past few decades the land use pattern, both agricultural and the wastelands has undergone a change which has more of less a negative impact on the local biodiversity. Other transformed practices which came post independence and caused a complete change in traditional crop portfolio thus leading to extinction of some indigenous varieties have also been highlighted in this document.

It also tries to identify the stakeholders of the biodiversity and their roles. It very clearly highlights the need and importance of gap analysis in the planning process, information and policy intervention and implementation. The objectives, strategies, action plans and the agencies who should implement these are also mentioned in the document. There are ten well spelt strategies which covers all the themes of biodiversity conservation. It includes expanding and improving the existing knowledge related to biodiversity, the need to bring into force the legal framework for conservation and equitable sharing, institutional interventions, interdepartmental networking and promoting indigenous health traditions through capacity building of local healers. As one of the beautiful and innovative approaches to conservation of herpeto-fauna of the area, (basically the Krait snake) the people have designed a strategy for Snake Park which would locally be called as Nag Lok (the abode of snakes). This snake park would also address the issue of using the venom for various therapeutic purposes as per traditions as well as to sell it, thus generating good amount of money as well.

Thus this document can boast of to be a complete information warehouse in the form of an educational and awareness template which has been prepared with the three objectives of:

i. To inventories the whole bio-resource.
ii. Prioritization of hotspots in the area, and
iii. Ensuring sustainable utilization with proper sharing of benefit

* A summary of only the Jashpur part of the Bilaspur BSAP was submitted

# Deccan Andhra Sub-state (Andhra Pradesh) Biodiversity Strategy and Action Plan

Coordinating Agency: Deccan Development Society, Hyderabad

## Introduction

### Background

The NBSAP has initiated several research studies in agro-biodiversity, of which the Sub State Plan for Agro-biodiversity in the Zaheerabad region of the Deccan is the most significant one. This study has the special character of being completely driven by the grassroots communities that are directly and negatively affected by the absence of biodiversity.

The area represented in this study is a part of the vast region of the Deccan plateau in the South of India. But, agro-ecologically, the area covered is the Zaheerabad region in the Medak District of Andhra Pradesh, through which runs the semi-arid tract hosting some of the poorest populations of the country and some of the most degraded farm areas in India characterised by laterite red soils as well as alluvial black soils. Because of their nature they host a wide variety of agricultural crops grown under rain-fed conditions. The diversity of this cropping system and its capacity to grow on highly infertile soils, without demanding water or external inputs, makes it uniquely significant for the survival of ecologically sustainable agricultural systems. The local populations call these crops *Satyam Pantalu* (**Crops of Truth**), a powerful imagery to signify the fact that these crops grow on practically no inputs at all, surviving on the available sub-soil moisture. This makes the study of this biodiversity based agriculture system so much more important.

### Objectives

The main objective of the Strategy and Action Plan (SAP) was to view agricultural biodiversity from the perspectives of the local farming communities. The SAP process ensured high participation by the local communities and the report is completely based on people's suggestions in planning a strategy for conservation and enhancement of their agro- biodiversity. The final plan, therefore, is mandated by the perceptions and arguments of the farmers of the region.

The objective of the SAP was also to include farmers from various cross sections, focussing on women and poorer sections of the farming communities, whose livelihood security is intrinsically linked to the ecological security of agriculture in the region.

### Methodology

To initiate the SAP process a Local Advisory Committee (LAC) was constituted with people from different sections comprising of small, marginal and big farmers; adivasi farmers; scientists; NGO representatives; experts in the subjects of agriculture and biodiversity; politicians and officers, representing agriculture, horticulture, animal and forestry departments in the government.

***In order to facilitate extensive consultations with dalits and other marginalised groups, and to amplify women's voices, a unique process was designed and executed. This process was the mobile biodiversity festival called JATARA organised by the Deccan Development Society which travelled through 62 villages of over a period of 32 days, beginning on January 14, 2001 and concluding on February 16, 2001.***

### Geographic Profile

The district of Medak falls under zone III and IV which are characterised by hot and dry summers and very mild winters. The mean annual rainfall ranging between 700 mm to 1000 mm covers 42-60% of mean annual evapo-transpiration potential of 1000-2400 mm. The moisture availability period ranges between 120 to 150 days.

The Net irrigated area in the district is 1,27,617 hectares, of which canal irrigation accounts for only 3.3 percent; the remaining irrigation is through open wells and bore wells.

### Cropping Systems of the Region

Zaheerabad region of the Deccan area still hosts enormous agricultural diversity in spite of the total extinction of a few varieties. On an average, each acre of farm especially those belonging to small and marginal farmers, hosts 8-10 varieties of a bouquet of

crops. Farmers describe the reasons for this huge diversity in terms of the capacity of the crops to:

- Provide diverse and nutritive food to the family
- Provide different kinds of fodder and feed to the live-stock.
- Improve the soil fertility.
- Result in effective utilisation of farmland.
- Make sure that under no conditions of unfavourable environment and climate , the whole crop is lost.

### Live stock

Next in importance to crop agriculture is the livestock wealth in the district. It consisted of animals used for production of milk and draught power in agriculture. According to 1993-94 census, the total live stock population included 5.12 lakh cattle,1.15 lakh buffaloes, 2.38 lakh sheep, 2.37 lakh goats and 0.35 lakh other. The cattle population has decreased in number from 5,95,163 in 1987 to 5,12,700 in 1993-94. The unpublished live stock census data for the current period further confirms this reduction in cattle population.

## Current (Known) Range and Status of Biodiversity

Three main statements made by villagers throughout the ***Jatara*** meetings can be interpreted as the villagers' perceptions about traditional crops. They include:

- Traditional crops are good for human health
- Traditional crops enhance soil fertility
- Traditional crops are good for cattle health

Kharif crops include: sorghum (*seven* varieties), pearl millet (*two* varieties), finger millet, little millet (*three* varieties), foxtail millet (*four* varieties), kodo millet, redgram (*four* varieties), horsegram, greengram (*eleven* varieties), blackgram, drysown paddy, field bean, cowpea, sunflower, and mesta, along with a range of vegetable crops such as spinach, ridgegourd, bottlegourd, bittergourd, brinjal, tomatoes and French bean.

Of these crops, many were identified by farmers as being on the decline, if not on the brink of extinction. Minor millets such as foxtail millet and finger millet have been fast disappearing from farmers' fields. Manchu korra, a foxtail millet variety that lives off dew, is no longer to be found in most villages.

*In the farming of this region cattle play a major role, and the use of cattle manure is seen by farmers as a major asset in the preservation of soil fertility. Several local breeds of bullocks, goats, sheep, and poultry are found on the Deccan Plateau. Amongst popular local breeds are the Deoni breed of cattle, the Osmanabadi goat, and the Aseel chicken.*

**The area under rabi jowar, out of which a particularly tasty roti is prepared has drastically decreased. This process is largely linked to the irrigation of black soils, and their subsequent conversion to cash crops such as turmeric, potato and sugarcane.**

## Statement of Problems Relating to Biodiversity

One of the biggest constraints identified by the farmers which they see as impeding the cultivation of traditional crops is the need for, and shortage of cattle. Without cattle, the revitalisation of the traditional agricultural practices and/or crops is practically impossible because farmers cannot obtain the necessary farmyard manure (FYM) needed to fertilise the land.

The major factors that contributed to this problem was farm mechanisation, which has extensively replaced bullocks with tractors and power tillers, reduction in the availability of fodder, reduction in the area of public grazing lands, and the non-availability of labourers to graze the cattle. *The Government has also discontinued cattle loans and has diverted these for farm mechanisation.*

***The reduction of cattle population has wider implications***. It had increased the dependency on chemical fertilisers, which in turn has led to erosion of soil fertility, and damage to soil structure. Because the rainfall is unpredictable and short, the fertilisers applied have critically spoiled the lands. In several instances, this has resulted in crop loss.

Health issues were raised throughout the meetings as a major concern. Villagers are aware of the high nutritional value of traditional crops. In their opinion, traditional crops and varieties, in addition to being nutritive, were curative for a wide range of health problems, which the modern medicine cannot deal with. Many of the traditional crops have medicinal value.

### Gender, culture and Diversity

The agrobidiversity in the Deccan is highly influenced by women both in the areas of conservation and wise use. Women have

shown extraordinary perspectives in the debates around yield and production vis a vis diversity on lands. There are many traditional practices which celebrate the intellectual leadership provided by women in agriculture especially in the areas of crop planning, biodiversity and conservation of germplasm.

Therefore the ***Jataras*** provided a special forum for women and encouraged them to voice their concerns in the public. An analysis of the more than 500 women's responses across 62 villages during the ***jataras*** highlighted a few issues that were particularly relevant to women.

The women cited a variety of significant factors that affected their efforts in pursuing traditional practices of agriculture. They perceive that the *nutritional, dietary and recuperative value of* traditional crops had offered a strong support to their health and that women's reproductive health was much better when they consumed traditional foods. This argument offers a special gender dimension to the cultivation of traditional crops.

Beyond the explicit concerns articulated, the ***jataras*** brought out very special cultural and emotional linkages between people and biodiversity. This was proof enough that biodiversity was not just a livelihood or ecological concern for people. It went beyond and embraced a range of cultural manifestations.

## Gap Analysis

### Gaps in Information

An information-gap divides the scientific knowledge that exists with the researchers, extension workers, plant breeders etc and the local knowledge-systems of the agrarian communities which form an integral part of their agriculture. It has been observed that there is a lack of awareness and understanding among the researchers, extension workers, etc about the benefits of crop diversity and the local solutions that farmers employ to combat pests or to increase soil fertility. Some of the important components of this wealth of knowledge are:

- Rotational and mixed cropping as a strategy for the preservation of soil fertility
- Inter-cropping as a means of protecting certain crops from diseases
- Diversity in cropping patterns as a means of managing climatic risk

*This information gap existing in the agricultural extension personnel, bureaucrats and farm scientists needs to be filled with suitable measures. A new perception on the biodiverse farming system from the farmers perspective needs to be inculcated in these sections of policy makers and implementers.*

### Gaps in Vision

While the farmers' vision has always encompassed long term security of their farmlands and the health of the humans and the cattle, the vision of the agricultural policy makers and associated institutions has been to reap a short term benefit. These two mismatched visions have created a wide gap in the understanding of the local agricultural systems.

Farmers have treated soils as Mother Earth and revered her as their own mother. This spiritual and emotional understanding of soil and agriculture is not understood by the administrators and scientists, who see soils as just a tool of production. The vision of farmers makes it possible for them to harmonise their agriculture with ecological imperatives, while the government-driven agriculture policies end up being ecologically destructive.

The government understands productivity as a single crop yield whereas farmers have always treated productivity as a system yield, based on biodiversity.

A number of uncultivated green leafy vegetables are collected by women from the field or its borders are a by-product of the traditional farming system. In some cases, this constitutes nearly 30% of all the nutrition of the poor. But this phenomenon has not been taken into account in the overall understanding of rural people's livelihood. The use of chemical inputs has led to a decrease in consumption of these leafy greens. Hence, the poorest sections of society are loosing access to free sources of vitamins and minerals.

The traditional diet has a strong medicinal component, with a range of cultivated and wild plants being used by people to remain in good health. Hence, the decline in crop diversity also means that people's self-reliance in terms of healthcare is jeopardised, because of an increased dependence on purchased drugs.

A wider debate on the definition of yield and productivity, unrecognised merits of traditional farming systems, traditional diets and their holistic nature needs to be initiated.

### Gaps in Policy and Legal Structure

Policy makers overlooked the fact that the exclusion of traditional dry-land crops from the Public Distribution System would lead to their decline. This also meant an increase in the area of fallow lands, since it became more expensive to grow millets rather than buy subsidised rice.

Credit was made available for crops that required irrigation [like sugarcane] in dry land regions, leading to the rapid depletion of groundwater tables whereas, ideally, measures should have been taken to preserve water resources in the region.

The new legislation on Farmers' rights, Plant Breeders' rights and the Protection of New Plant Varieties accords a low key acknowledgement to the role of farmers as breeders. This poses a risk that the farmers' ability to breed varieties according to their own criteria would be jeopardised. This would lead to an increased reliance on the formal breeding sector, which often does not address the seed needs of small and marginal farmers.

### Gaps in Institutional and Human Capacity

The role of women in the maintenance of crop diversity in their fields, seed jars and kitchens has not been acknowledged. by most players in the fields of agriculture and biodiversity management in government offices, research institutions and NGOs

The knowledge of farmers, particularly women farmers, about seed selection, preservation, storing methods, recipes and the like has been largely disregarded by institutions.

- Plant breeders usually fail to acknowledge the capacity of farmers to :
  - Define their own criteria for the selection of useful varieties
  - Preserve genetic diversity on farm in a more efficient and inexpensive way than any Gene bank.

## Required Actions to Fill Gaps and Enhance/Strengthen Ongoing Measures

- Supply of cheap rice through the Public Distribution System has been the single most cause of destruction of millets and sorghum in the farming systems. In order to correct this historical mistake, ***the Government must introduce jowar in the PDS system. This will open up a huge market for the traditional jowar- farmers of the Deccan, and rekindle interest in their own cropping practices y while enhancing biodiversity on their fields***.
- Another important effort towards creating new markets and regenerating the farming diversity is the *introduction of sorghum and millets in the diet system of the government hostels and the ICDS schemes*.
- A simultaneous action should be to recognise that the changing tastes of children have been caused mostly by aggressive commercial media campaign. *This needs to be reversed through an early education. Therefore, efforts must be made to put the issue of agro biodiversity and safe foods into the curriculum of schools and colleges*.
- The government, primarily, must handle this responsibility. *The high nutritional value of the traditional millets and sorghum must be made known to people through government media as well as through a well- organised campaign in the villages*.
- *The financial lending policy, which supports commodity crops like sugarcane, horticulture etc. must also be extended to the traditional biodiversity farming systems in the Deccan*.
- *The traditional farmers who grow a diverse variety of crops on their rain-fed farms must get insurance cover*.
- *Enterprises that support traditional crops should be set up. As a part of the rural processing industry development policy, small processing machines which can pound and dehusk small millets like foxtail millet, little millet and kodo millet must be set up in villages*.
- Since organic manure is the most critical component of this farming system, policies to increase cattle wealth in villages should be revived. *The lending institutions must understand this critical link between cattle availability and agro biodiversity and offer loans to farmers for the purchase of plough bullocks as well as milch animals.*
- *There is no farmers' organisation to care for millets and biodiversity , The emergence of such an organisation is a dire necessity for the farmers to be able to enjoy a sense of solidarity and a strong bargaining position*.
- *Success stories of farmers who are following traditional systems of cropping with good yields, of farmers who are cultivating traditional crops, which are on the verge of extinction, should be documented and in turn utilised for creating awareness in the farming community.*

# Munsiari (Gori River Basin) Sub-state Site (Uttaranchal) Biodiversity Strategy and Action Plan

Coordinating Agency: Foundation for Ecological Security, Munsiari

## Defining the Scope

Though fraught with some uncertainties that normally do accompany such large and orchestrated ensembles, there is no doubt that the process has generated some synergy between government departments, research institutes as well as non-government organizations working with people and with conservation issues. There are however, some larger questions that all of us must contribute the answers to.

There is a momentum and a seeming sense of common purpose, though obviously, divergent paths will become more apparent further down the line. Different actors involved in such processes will have their own perceptions of and values for biological diversity, different perceptions of what degradation means, and different priorities on what should be done. While this is understandable, even desirable in terms of representation on a broad-based discourse, how are such essentially discordant notes hoped to be synthesized? Can there be a synthesis, a commonly agreed upon and cohesive central narrative, or will various parts of the collage vie for weightage and priority? On the question of weightage, will there be a clear distinction between a stakeholder, and an interested party?

A 'crisis scenario' could well be the refrain of most Sub-state and State BSAP documents, and we can see the inevitability of this in such a process. Ours is. Not that describing the crisis would be constructing a myth, but because processes such as this also stimulate and present a renewed opportunity to institutions. The opportunity, for example, for self-perpetuation; sometimes through new initiatives, and sometimes through casting new guises to old agendas. This we know, is not new, especially when it comes to spinning the appropriate development phrase that is most current with and driving international development funding priorities. What happens on all these fronts, will perhaps define the utility of this process, and the direction it will take.

The Munsiari node had made a 'disclaimer' when it took upon itself to be a part of the BSAP process. It partly defines the scope of the exercise undertaken by us:

We have undertaken a widely consultative process to draw up a document that will:

a. Initiate a log of, and describe to the extent possible by us, the biodiversity of the sub-state area, i.e. the entire Gori river-basin,
b. Describe the major concerns and threats to the biodiversity of the valley and attempt to represent what is perceived locally, as well as our interpretation of the causes, and
c. Enumerate aspects where urgent and critical attention is required. Inputs as far as strategy is concerned will be substantial, but the exercise will not result in a Local Action Plan or project proposals thereof.

The document represents certain outcomes of the wide and sustained discourse with village communities over a time-span of a decade, and specific workshops and consultations held during the past year. Our understanding has been supplemented by analyses of the data that we generated for the purpose, and by relevant literature. It was essentially an interpretive exercise, a search for patterns and connections.

The reason why this node is **not** attempting to draw out an Action Plan under this process is because it anticipates the following:

1. It is considered possible, however difficult, to draw out action plans for projects, task-forces, bureaucracies and institutions that will 'implement' a plan in a project mode. It is quite another matter, to work with and evolve a commonly accepted plan between hundreds of village communities, for a common, jointly inhabited landscape, and the way they use it. Village communities are stratified, even within themselves, on the lines of caste, class, race and gender, and the complex political nature of resource-use and appropriation, is highly contested, even over generations. While individual village-plans, and even village-cluster plans are possible, they are only practically possible in time-frames and spelt-out activities under project-modes. The more fundamental dimensions such as changes in land-use, changes in patterns of land-holding and tenure, inequitous

resource distribution, are one set of complex considerations of a political nature. The resolution of divergences in the wider circles of identification - of 'global' commons as in the valuable Protected Areas, in the many mutually incompatible use and exchange-values imputed to biodiversity, and the compulsions that arise from failing livelihoods, we feel, cannot be planned for under a process such as this. At least not locally. And certainly not in the time-frames envisaged.

2. The causes of the major problems in the river-basin are a reflection of much larger pervasive phenomena; those that emanate from outside the valley, or from those historic administrative events that have resulted in the existing property holding patterns, both private and the Commons. While local communities can plan how they could respond in terms of coping, there is little they can do alone to change the situation. The increasing conflicts amongst themselves as well as the law with regard to natural resource use, is the compulsive fallout of failing livelihoods. For them to plan how they will be good boys and girls henceforth would be entirely irrelevant, unless there is a manifest and larger political commitment to try and change the factors that are driving them down this spiral. This is nowhere in sight. A local plan of how to respond to these larger political phenomena that affect their lives would perhaps entail a process of evolving a wider perspective on what is going wrong, who are the players, and who wins and who loses. This is a highly political process, and one without a time-frame. The project team, or the Gori basin BSAP node feels that this is quite beyond it, and practically outside the scope of this exercise for them.

3. The absence of a process that could have led to establishing a *locus standi* or mandating the FES team to assume the role of conducting such a fundamentally political planning process with the communities in the first place. In the second, there was neither a mandate for FES to articulate or represent such a plan on behalf of communities, to an abstract *Sarkar* or others, from whom there was no manifest committment to the communities so involved, that there would be the kind of engagement they need.

However, the Local Action Plan apart, the exercise most importantly, begins to log and to describe the very valuable biodiversity of the area, and the factors affecting the lives and well-being of all who dwell there, and to attempt to elevate this area on the state and national conservation agenda.

This process has been undertaken and the document been prepared as a team effort by the FES Team at Munsiari. Most of the people in the team were born and have lived in villages within the river valley for much of their lives.

This document is written in the hope that it will contribute to the policy discourse as well as to efforts on Biodiversity conservation. That we need to conserve the richness and diversity of Nature, there is no doubt; for ethical reasons, for maintaining ecosystems, for material and economic benefits to people, and for maintaining evolutionary processes[1]. But as a wise woman put it, and I paraphrase, we need Nature, in all her diversity, "to look for answers to questions we have not yet learned to ask."

## The Landscape

The Gori river basin is located in Eastern Kumaon, in the state of Uttaranchal. The Gori river is a tributary of the Kali and the river basin forms part of the upper catchment in the Indian territory. The coordinates are 70°45' to 81°5' E Longitude, and 29°5' to 30°10' N Latitude. The basin is bounded by the international border with the Tibetan Autonomous Region of the Peoples' Republic of China in the north, and by the river Kali in the South-East, which constitutes the border with the Kingdom of Nepal.

We are looking at a river basin that is 120 km long, (the actual river is about a 100 km) and roughly 25 km wide, that covers an area 2240 square kilometers. This is about 4% of the area of the State of Uttaranchal.

This river basin would make an interesting, if most unusual component landscape of the NBSAP process. About 1439 square kilometres or 64.24% of the entire basin is under village commons (FES GIS data), lands that are administered by village forest councils or Van Panchayats. Another 8.71% is under Reserved Forests, which include portions of such valuable Protected Areas such as the Nandadevi Biosphere Reserve, a World Heritage Site, and the Askot Wildlife Sanctuary. The Askot Sanctuary, though lower in profile, is being discovered to be almost unmatched in the range of ecosystems and biological diversity that it represents[2]. About 347 square kilometres of area in the Gori basin, that is classified as Civil and Soyam Land, falls under the Askot Wildlife Sanctuary. A sum of all these - village commons, Reserve Forests and Civil and Soyam under the Sanctuary area- makes almost 88% of the entire area of the basin as Protected Areas, both by village communities, as well as the State. Significantly, 1891 square kilometres or about 96% of these protected areas are in one large contiguous swathe.

Because of the great compression of Life-zones in a small geographical area, this valley presents a diversity of landscape and ecosystems that would be difficult to find contained in an equivalent area. From about 590 metres above sea level at Jauljibi, at the confluence of the Gori with the Kali, to 7434 metres a.s.l at the summit of Nandadevi East.

To add to the diverse conditions that such a range of altitudes produce, is the area's special biogeographic location on the east to west (longitudinal) transition zone of the flora and fauna of himalaya, and its proximity to Tibet, that enables it to share characteristic elements and affinities of all three. Further, in the north-to-south axis within this area, is another layer that compounds the diversity of conditions, and that is the existence of the three (latitudinal) zones of the Trans-Himalaya, the Greater-Himalaya, and the Lesser-Himalaya. All three transitions represent distinct habitats.

## The People and Their Economy

The valley being described is relatively narrow and steep, rendering little land suitable for agriculture. Of a total land area of about 2248 square kilometres, only about 102 square km or just 4.54% of the area is cultivated land. For about 43,542 people in 8647 households, who live in 171 villages in the valley, highly fragmented holdings in this 4.54% of land do not suffice even for subsistence. Roughly about half the foodgrain requirements of humans and their livestock are met from local agriculture.

The per capita cultivable land in the basin surprisingly, is 0.23 hectares, which is higher than the state and national per capita availability. Land-holding patterns are looked at in more detail in the chapter on agriculture. Suffice it to say here that the marginal and scattered holdings here are far insufficient to even meet subsistence requirements, and local populations therefore have no choice, but to depend so heavily on their surrounding forests and alpine grasslands, for animal husbandry and for extractive use.

The animal holdings far outnumber the human population of about 43,542[3] in this river basin. Cows and buffaloes number above 39,000, and sheep and goats, yet another 19,000[4] odd animals. Their existence is essentially biomass based, and they must rely heavily on their landscapes for their pastures, hayfields and fodder, and for fuelwood, fibre, and timber. Animal, bird and fish food, as well as seasonal pickings of shoots and tubers and honey only supplement their food sources marginally.

The economy is essentially agriculture-based, and their agriculture and animal husbandry is forest-dependent. The majority of the land holdings are small and marginal, and they are highly fragmented between successive generations. It is largely a subsistence economy that is propped up by money-order remittances by those who manage to land jobs elsewhere, notably the armed forces, and a few government jobs.

There exists at the other end of the spectrum, an almost aboriginal tribe of negrito-mongoloid people called the Banraji or Banraut. They live deeply embedded in the sub-tropical forests of the lower Gori and Kali river valleys, and have had little to do with mainstream settlements. Their numbers are not reliably censused, but are less than two thousand today, and with their entire range now being designated the Askot Musk Deer Sanctuary, (the subsequent Supreme Court order of February 2000, which prohibits even the removal of dead-wood or grass from all protected areas) their way of life has been rendered illegal.

Their interactions and exchange with the farming communities in the past included their catching and selling fish from the rivers, and bartering vessels made from the wood of Oogenia, and turned on water-run lathes. They were especially sought after for the excellent grindstones they prepared for water-mills. All this has changed today. The felling of Oogenia for wood is prohibited, and water-mills are progressively falling to disuse due to diesel-run mills. The Banraji has now taken to selling head-loads of wood as fuel to the bazaar at Jauljibi. They are sometimes also hired as labour for the extraction of wood or valuable herbs, and paid in foodgrain. Their social organization is basic, unstratified, and tribal, if there ever was one.

## A Brief Description of the Biodiversity Values

### Habitat and Community Representation in Flora

As described earlier, the special location of the basin in the east to west (longitudinal) transition, enables it to share biodiversity elements of both the eastern and the western Himalaya. The significant features of the habitat and community representation are:

1. While the basin shows a predominance of typical west himalayan forest communities, (like the Chir pine and west Himalayan Oaks) it also represents the western-most limit for the occurrence of East Himalayan communities such as *Tsuga* and *Macaranga*.
2. The great vertical altitudinal gradients, from 600 m to over 7000m yield an exceptionally high habitat and community diversity such as:
   a. Habitats ranging from subtropical *shorea robusta*, to alpine meadows.
   b. The basin posses more than 85% of the reported forest communities of Kumaon, in the West Himalaya.
   c. The occurence of *Tsuga dumosa* and *Macaranga pustulata* communities in the basin and the adjoining one of the Darma river are exclusive for the entire West Himalaya.
   d. A very large portion of the basin falls under alpine conditions, about 53.9% (FES GIS Data), and while it is characterized by

moist alpine habitats in the Greater Himalaya band, it is also represented by dry alpine habitat in the Trans Himalaya sections of the basin. Representative elements of both conditions are therefore present.

3. The forest communities of the Gori basin are representative of 7 (64%) forest formation types of the Himalaya. (J.S.Singh and S.P.Singh)
4. The forests in the basin contains pioneer, seral and climax stages, and represent diversity of species, age diversity, and structural composition.

### Species Richness and Life-form Diversity

The range and habitat and community representation yield a rich species diversity. The inventory of vascular plants lists the presence of over 2359 species (angiosperms 2258 spp, 891 genera, 170 families, Gymnosperms 7 spp, 7 genera, 4 families, and of pteridophytes 94 spp, 38 genera, 25 families). The list contains 2359 spp, 936 genera and 199 families. Bryophytes: 201 spp, 91 genera, 27 families, Hepatic flora: 60 spp, 34 genera, 21 families, Lichens: 49 species. As apart from angiosperms and gymnosperms, the lists are indicative. They are, however, well-considered and cautious lists that are based on initial collections. They are far from exhaustive and we may allow for variations, but mostly positive.

The Mycoflora of the valley is, to all appearances, extremely rich. There has been no documentation so far for the Gori basin. However, in 2001, the FES team initiated a listing and documentation of the macro mycoflora of the basin, and in one season was able to collect and identify 132 specimens to genus. The list is very rudimentary, and verification is being sought from BSI, and is therefore not presented here. The sub-alpine forests of *Betula utilis* and *Abies spectabilis* were found to be by far the richest in mycoflora.

The distribution in life forms indicate the presence of 209 trees, 284 shrubs, 1427 herbs and 268 ferns, 202 mosses, 49 lichens, 60 liverworts, and at first listing, 132 macro-fungi. The species richness does vary across the great elevational range, with its maximum diversity in the alpine life-zone (3500 to 5500 asl). Among taxonomic groups, species richness in the family Orchidaceae (120 species) is exceptionally high, and represents 62.5% of those found in Kumaon (Y.P.S.Pangtey, S.S.Samant and G.S.Rawat) and 50.8% of the entire Northwest Himalaya.

No detailed documentation of the faunal species richness by academics is available today. Preliminary listing by G.S.Rawat and S.Sathyakumar, as well as by the FES team lists the presence of 29 species of mammals, and 225 bird species.

### Biological Integrity and Sensitive Elements

Over 40% of the representative floristic elements present in the basin are native, or Himalayan in origin. It has been found that richness and relative dominance of native species, in all growth forms, increase significantly with elevation, and in a landscape where over 60% of the area is under high elevations where plants can grow, the area is rich in native elements. This is significant in view of the fact that biological integrity been accorded the status of the most comprehensive norm in conservation, and native species populations with their natural interactions in naturally structured communities are considered as the best indicator of such integrity.

With nearly 21% of its flora (234 near-endemic and 24 endemic) representing Himalayan endemics, conservation efforts require to be given high priority.

In the biological integrity and sensitive elements in the fauna of the basin, over 80% of the representative mammalian fauna fall under various protected categories. Twelve of these are listed as endangered Himalayan taxa. The area is also home to three critically endangered bird species: the Satyr tragopan, the Monal pheasant and the Cheer pheasant.

Over and above considerations of species sensitivity, the critically important habitats and communities that exist in the basin require mention. While considering the cumulative biodiversity values, the sub-alpine Timber Line Zone (TLZ) of the Panchachuli sub-basin and the Ralam sub-basin, both constituents of the Gori river basin are identified among the ten top-ranking priority sites in the Western Himalaya[5]. Even amongst the top ten, these two sites score the highest uniqueness scores in terms of naturalness, endemicity and use value of biodiversity elements. In terms of biological integrity or nativity, these areas support a high proportion of native plant species- trees and shrubs 100% and herbs 70%[6]. In view of the overall value of the West Himalayan TLZ in maintaining the regional pool of biodiversity, and in view of its sensitivity to anthropogenic influences, the existence of these most unique sub-alpine sites in the Gori basin certainly present this landscape to be prioritized for conservation, and for conservation oriented development strategies.

## Other Important Chapters in the Document

The other significant aspects that have been described in detail and analysed for their dynamics are the agriculture in the area, the trade in wild animal and plant parts, the river ecology, mining in the area. Forest and land related policies in the region are looked

at, as are State Protected Areas. Importantly, there is also a chapter analysing the commons in the Gori basin, being the largest and most significant land tenure arrangement on the landscape.

## Strategic Considerations and Recommendations

While there are numerous actions that require to be taken at various levels by different actors, this document will confine itself to recommending to the Government, both the State and the Centre, a few strategic actions. Those that we consider the most vital. We are making no attempt to come across as 'practical', whereby we suggest only the relatively easily do-ables, or speak of those processes that are already underway and require to be scaled up, or be better coordinated. Those, in any case, will be suggested by the various other Sub-State, State and Eco-Regional BSAP documents. While those are important too, we feel that our contribution to the larger planning process would be more valuable, if we confine ourselves to focussing on the more critical and clear imperatives from our area, however complex in feasibility they may be. Those that will have the most far-reaching effects, both on biodiversity conservation, and on the well being of forest-dependant communities in the region. A prioritization not based on ease of achievement, but more on criticality, and on logical sequence.

We first need to get something out of the way. Such analyses as those made in the document, and some of the recommendations as we are about to make, cannot be based, other than at an abstract principle level, on local consensus. Yes, the process was widely consultative, and is reflective of close to the ground 'reality', but one that, by its very nature, will not be commonly held by mutually opposing interests today. Whether local or non-local. The recommendations call upon the government to make certain basic redistributive changes, not just re-arrange the furniture. In all such changes someone will stand to lose, and someone else will stand to gain, and the wishes of the majority here is not even the point. Such changes in policy and law have been made by the State before, but have not been based on majoritarian consensus in the past either. They have been based on wider, more 'universal' considerations of political economy, and sometimes on wider notions of natural justice. The abolition of Zamindari for example, or the proscribing of slavery, or of untouchability. Or setting in place legal provisions for equal property rights to women, or the issue of Reservations for certain sections of the society are other examples. Though none of the recommendations proposed here are anywhere close to being so radical, we need to agree that any action that seeks to change existing property regimes (whether of the state or of the commons) cannot choose consensus at the local level, as validation for its *locus standi*.

These recommendations are clearly not easy to translate to action. They would require, among other things, an absence of cynicism in the bureaucracy, and a far-sightedness to be able to push these further to the legislative arm of the government, the politicians. Some of the changes being suggested will obviously not be possible through programmes and projects, but would require to be legislated for. The politicians, in turn, would need to take bold decisions that look beyond narrow constituency dictates, or immediate political mileage, but act with longer-term considerations in mind. Are we asking for too much, and are we in risk of sounding pedantic? We think not. Governments have in the past taken such actions, and we need to prevail upon them, with hope, to do so again.

### Recommendation 1

**The State Government should undertake a broadbased and transparent process of redrawing the boundaries and redistribution of rights in Village Forests to Van Panchayats in the Gori basin, as indeed, in other parts of the frontier areas of the State. Redemarcation of some Reserve Forests would also be required.**

In the Gori basin, about 64% of the total area is under Village Forests. One village, Milam for example, that is inhabited only seasonally, and by 14 households, has over 847 square kilometers of land as its village commons. 442 square km within the watershed, and 405 square kilometres in two other adjoining watersheds. Put together, this is larger than some nations; two and a half times the size of the Maldives for example, and over four times the total area under Reserve Forests in the basin. Just one village. While a good third of this may be permanently snow-bound, there is no earthly reason why one village should own so much land that it will not use, and cannot govern. The closest village to Milam, that is Panchu, has absolutely no land as a Village Forest, just as another 25% of villages in the Gori basin do not. While this is a somewhat extreme example deployed for the sake of illustration, there are many villages in the basin with hundreds of hectares as Village Forests, some even hundreds of square kilometres. As described in the chapter on the Commons, there seems to have been no administrative basis for the devolution of land to Van Panchayats that took into account village size, number of people and livestock, extent of agriculture, altitude and aspect of the land that determined type of yield, or aspects of mutuality or equity between neighbouring villages. Customarily perpetuated inequalities held good under the noble hold-all of customary use.

This highly skewed distribution of land for village forests has set the stage for interminable and increasingly serious conflict between villages. Predominantly Shaukha and Barpattia villages for example, that constitute approximately 29% of the households in the basin, own 91% of the Van Panchayat holding, which is approximately 56% of the total area of the basin. Ofcourse, many of

these are very poor households too, and a simple distinction on the basis of caste will not serve to guide any action in this regard. Nor is such holding correlated to greater degradation per se. However, increasing scarcity in the minimum requirements of fuelwood and fodder, on the one hand, and the increasing demand for high value 'commodities' of plant and animal parts by the global market on the other, has greatly heightened competition and conflict. Systems of mutuality are visibly breaking down, and costs of watch and ward, as well as recurrent litigation has already reached unsustainable levels. Destruction and degradation on village commons due to such conflict are rapidly increasing, and what this can mean to a landscape where 64% of the land area is under such governance, should be obvious.

Reserve Forests within the basin comprise about 195 sq km or just 8.71% of the total area. We know that the basis of deciding and delineating areas to be put under Reserve Forests during British occupation; which is when areas in this basin were classified as Class I (broadleaved mixed oak forests, which were then given to Van Panchayats) and Class II Forests (comprising conifers and other commercially valuable timber, which were then designated Reserve Forests) was not on practical considerations such as selection on the basis of forests being distant from villages, and their not being under customary use, or even for the biodiversity values they contained, but quite simply, on the basis of whether they contained timber of commercial value then or not. We are not speaking of areas later put under Sanctuaries and National Parks yet, we are speaking of just the land under Reserve Forests. While this may have been a rational basis for a colonial government, it is clearly not relevant today. Not if the conservation of valuable biodiversity is a prime consideration, nor if the practical feasibility of governance, keeping local subsistence needs in mind, is necessary.

In the Gori basin itself, Van Panchayat areas, which are Protected Areas governed by village communities (the IUCN considers this a valid category of Protected Areas too), plus Reserve Forest areas plus the Civil Land that falls under the Askot Wildlife Sanctuary together comprise almost 80% of the basin, as Protected Areas. Of this, about 88% is contiguous, or in one large swathe, which in turn is contiguous to other such Protected Areas in adjoining watersheds. We need to remind ourselves here that despite this, the people of the basin have a larger per capita availability of agriculture land (0.23 hectares), than the rest of the state (0.13 ha), higher than the rest of the Himalaya (0.16 ha), and even higher than the per capita of the country (0.20 ha).

This large and continuous configuration, it would seem, is most unusual, and valuable in terms of a landscape approach to ecosystems management. Just looking West, is the adjoining Nanda Devi Biosphere Reserve, which by itself would add another 1000 square kilometers or so to this swathe (after excluding the approximately 500 sq km already in the buffer area in the basin). To the East is a similar area in the Darma, Byans and Chaudans basins, which we are in the process of mapping and estimating. By all accounts, this large area, and similar areas along the Greater and Trans Himalaya zones in Uttaranchal, comprise the most valuable frontier forests of the State. By frontier forests we mean large contiguous tracts of natural forests[7] that would have special significance and interest from the biodiversity angle. These areas clearly need to be looked at differently, planned for differently, and administered differently from the lower hill areas and the plains areas of the state. This may be stating the most obvious, but an exercise in Zonation of different areas of the state is called for, and one that is incorporated into a comprehensive Land-use policy for the State, that will prioritize for and govern the different intensities of use of the entire landscape.

The central guiding consideration here should be the biophysical dictates of the particular landscape under reference. The reapportioning of land for village forests may turn out to be highly complex, and even undermine their productive capacity if done purely on simple numerical considerations. Some 'resources' like water, like fish or wildlife that are not in a fixed location, are not easy to apportion or parcel (and this is not being suggested here). While land and forests seem much more divisible, they are themselves the product of the interaction of the many components of the larger ecosystem they are located in. They would cease to produce some of the products and benefits if we divide them into smaller, exclusive parcels, which may then be put under exclusive management strategies. This is a critical consideration if it is important to manage them for their goods, but also for their ecosystem services, in terms of moisture regimes, soil protection, water and local climates and diverse habitats. Nature would be more divisible into parcels where it is more uniform in its treatment of the landscape, such as the plains. In high mountain ecosystems, where there is a great compression of life-zones yielding an immense diversity of ecosystems, and where the use of this diversity is shared seasonally amongst many communities, both human and animal, it may be imperative, if the productive capacities are to remain unhindered, to leave them unparceled and manage them in large units.

Leaving natural systems unparceled, and managing them in larger integrated units, would greatly enhance and multiply the scope for maintaining or the building of biodiversity. For the Munsiari basin, which contains some of the most valuable frontier forests of the state, almost all of it being in one contiguous swathe, this would make absolute sense. So what are we proposing here?

We are proposing that the government:

a. **Consider re-allocation of land for Van Panchayats in the basin**, in view of the highly skewed distribution at present, which is leading to increasing and unresolvable conflicts already described. The government would need to undertake, with appro-

priate partners, a **process** to work out a rational and equitable basis for the re-allocation of land for Van Panchayats in such areas. Important considerations in such calculations could be the size of the village, the human population and some projected increase, the livestock population, the nature of agriculture and the extent of dependence on forests for nutrient cycling, and ofcourse, aspects of customary use, but in the context of workable sharing arrangements with other neighbouring villages.

In view of what we have just said about the undesirability of apportioning small parcels of the **resource** for exclusive use and management by individual villages in high mountain areas, the government would need to consider ways by which the forests and landscape can be managed in larger, unparceled units. While many threatened but valuable and biodiversity-rich areas would need special and prioritized protection regimes, some Reserve Forest areas adjoining villages could be considered for graded levels of protection, where there is no other option.This could be done by the apportioning of rights, priveleges and responsibilities in these larger patches, which may include Reserve Forest areas, that would ensure that local communities have enough and equitable access to forests for their subsistence needs. It would also enable a multitude of bi-lateral and multilateral sharing arrangements to be revived, which would enable them to share a wider landscape, and more diverse benefits. Importantly, it would also decrease the need for every village having to cope by themselves with crippling costs of watch-and-ward and litigation against neighbouring villages, due to increasing conflicts between them as a result of insubstantial and highly contested forest areas. Small groups of villages within sub-watersheds, two villages, perhaps three, could share rights on different forests and grass-stands at different altitudes and aspects, the way they sometimes do informally even today. But do so as a matter of right, in conjunction with the responsibility to collectively protect and manage. These combinations cannot be predicted numerically, or generalized upon, and would need to be worked out for each set of neighbouring villages, depending on the resource availability, and the combinations possible. Many villages could remain exclusive users too, if they are so located.

As complex as such an exercise sounds, and as complex as this may actually be, dealing with the issue in this manner would only be coming to terms with the complexity of the challenge already at hand. While it has been suggested[8] that single villages should have single Van Panchayats, or they won't work, such conclusions were perhaps drawn from the lower hills, where villages are relatively much larger, and where the hills are small and fall within a single life-zone category; where ecosystems are more uniform, and interactions not as varied and critical. In landscapes that yields such biodiversity as the Gori basin, this conclusion cannot apply. The people that inhabit the Gori basin have, in the past, come to terms with this complexity, and have adapted to it with much wider and plural orbits of identification, and multiple layers of use by themselves. Milam village for example, had families migrating up to it from 14 different villages. Panchu village had families migrating up to it from as far-away watersheds as Dharamghar and even Bageshwar (this is at least seven stages or days away, for those who come with their herds of sheep). Martoli village from as far as Pharsali. They still do, and own and run their common Van Panchayats too. Graziers have customarily come from distant watersheds, and still do, even from as far as Himachal Pradesh. Maple knot collectors still come from as far as Humla in Nepal. So what is being suggested, is only an extension of the adaptation mechanisms of the local people here in the past. An adaptation that we believe they are capable of making again.

While the government needs to own and initiate such an exercise, it is amply clear from what we see around us, that such a complex and **difficult** process would need all the help it can get. To expect the government to be capable of doing this on their own would be unreasonable, for the situation that exists today is indicative of how the government actually works at the micro level in the first place. Be it said here that neither would any other other agency be able to administer such a task on their own. There is an enabling role that government must play in this process, and there is a role civil society institutions can play, be they the Van Panchayats themselves, the PRI institutions, perhaps NGOs and motivated individuals.

b. There would, in places, be a need to **re-demarcate and re-allocate areas for Reserve Forests**. As described earlier, the basis for reservation of a particular forest area in the past was on the basis of it containing commercially valuable timber. This is no more a prime consideration. If the conservation of valuable biodiversity is now the prime consideration, the state would need to relook at areas of high and valuable biodiversity, areas that are in need of special protection, or those that form critical corridors or habitat for threatened or endangered species, and prioritize them for protection. Many such areas presently fall within the many Van Panchayats that have hundreds of hectares, even hundreds of square kilometers under Van Panchayats. Both large tracts of alpine and permanently snow-bound areas which they will be unable to administer in any case, other than rent-seeking from graziers and medicinal plant collectors. After setting aside sufficient land for the needs of each village, and prioritizing those areas that are most distant from villages, a reserving of the remnant area could be undertaken.

Conversely, areas that are presently under Reserve Forests, that are close to villages and subject to heavy pressure from proximate villages who do not have sufficient areas under village forests, may be considered for either handing over to Van Panchayats, or allowing **rights** to a certain intensity of use by a few specific communities. All this ofcourse, keeping in view biodiversity values contained in the area, and its configuration with proximate human communities and their subsistence needs.

## Recommendation 2

**The government should undertake a comprehensive land-use zonation exercise for the state, and prioritize areas for conservation oriented development.**

It is proposed that the government undertake a zonation of different areas and ecosystems present in the state. That is take stock of and ascribe biodiversity values to what is existing, and undertake to prioritize different areas for conservation, and for different intensities of use by proximate human communities. We propose that like the Gori basin, the entire area under the Greater and Trans himalaya regions along the border be recognized for the frontier nature of the natural ecosystems, the process of severe degradation in these areas be taken cognizance of, and the area prioritized for conservation-oriented development. Just as a uniform policy was impractical and unacceptable for the plains and the hills when Uttaranchal was a part of Uttar Pradesh, similarly, a uniform policy for the terai and the lower hills would be as impractical and unsuitable. These areas must be looked at and planned for differently.

a. The according of priority and a special Conservation status to the area, and specific sites in particular, could be on the basis of the growing scientific recognition of the unusual richness and value of the biodiversity that is contained in the area, and in view of the severe degradation that it is presently subject to. The unusual configuration of large patches of contiguous protected areas, both by the state and by communities, and the value of such areas in biodiversity conservation need to be formally acknowledged by the according of such a status. Specific sites suggested for the government to consider are the Chiplakot range, the Panchachuli sub-basin (Pyunshani, Uttari and Dakhni balati gadhs), Ralam sub-basin, Kwalgang sub-basin, and the Lapthal area for a Fossil National Park.

b. **It is also recommended that the area be planned for differently in terms of the kind of development to be promoted by** the state. We speak of ourselves as a developing nation, as if we were in some kind of puberty. Worldwide, development and deforestation have been parallel and linked processes[9]. A principal strategic task, therefore, is to find alternatives that 'delink' development from deforestation. The feverish pitch that the medicinal plants trade and the discourse around it has acquired, is cause for concern. The accelerated rates of collection from the wild as witnessed in the Gori basin, is highly deleterious, and entirely unsustainable. The players involved in the medicinal plants and animal parts trade in the Gori basin are local extensions of a global trade, and such expanding trade, as elsewhere, commonizes the costs, while privatizing the profits[10]. State policy in this regard requires to adopt the **precautionary principle**, which tells us that "under conditions of uncertainty, it is rational strategy to minimize excessive, accelerated and irreversible damage to natural eco-systems, which would restrict our future options in natural resource management[11]."

**Alternate livelihoods options need to be strengthened**, both by government and non-government agencies. Traditional and diversified agriculture needs to be encouraged for food security, and for self-reliance. It is seen that in villages where there is more intensive agriculture, therefore more labour-absorption, the dependence on collection of plant and animals parts from the wild is significantly less. However, while labour-absorption is important, in the longer-run, the scale must be regional, or else if the particular family or community finds more remunerative options, we see that they will move to it, while at the same time employing someone else (poorer families, or nepali migrant labour in the basin) to do the less remunerative or more dangerous tasks.

The government would require to invest more money for infrastructure and staff in the area. The kind of investments that would be most helpful would be those used to build basic infrastructure in the area that can enable the diversification of livelihood options. Infrastructure for schools, especially enabling better quality teaching staff, that would enable students from the area go out for seeking higher education or employment on an equal footing. Better healthcare and medical delivery services, and infrastructure that can help enhance the quality and scale of local enterprise: small and widely dispersed wool-carding facilities for example, and reliable electricity supply. Employment assurance programmes such as the JRY do have a significant labour-absorption effect, especially for the old, and those who are otherwise unable to get employed for labour in the village, but not all of it is positive. The present trajectory seems unfailingly headed (perhaps 'sustainably') towards dependence on aid from the government.

A part of helping provide for alternative livelihoods options, would be **attending to the very poor quality of education facilities** in such areas. In Munsiari area, about two out of three students fail every year by the time they get to class 10, their first Board Exam. After having started with the English alphabet in class 6, and barely one class a day, they are expected to appreciate poetry in archaic 16th Century English, by Henry Wotton for example, who speaks of 'princely love and vulgar breath'. Ofcourse they fail their exams, year after year, and take to desperate illegal options, or lose all self-esteem and search for livelihoods as minions in the plains. The armed forces and the paramilitary was, in the past, a frequent option for these bright and strong young men who were readily taken. Not so today, and for reasons hardly worth mentioning here. Corruption at the induction stage itself.

There is a huge deficit in the number of teachers required in terms of posts created, and the actual number of vacancies filled. For example the Girls Inter-College at Namjala that has 18 sanctioned posts for teachers, has only 5 teachers in attendance. 72% of the posts lie vacant. In the Government Inter-College for both boys and girls 11 of the 32 sanctioned posts lie vacant. The area is remote, and teachers consider being posted here as a punishment posting, which it often is. They do have the option of 'legitimately' proceeding on indefinite leave, upto five years even, and meanwhile sorting the problem out. Most teachers with children also get themselves posted out to larger towns by the time their children are in high school, in order to be able to provide their own children with better schooling facilities. This leaves the schools in the remote areas like the Gori basin always understaffed, with posts vacant, teachers absconding, and those that are still there, often in a deep sulk.

The possibility of sustaining the livelihoods of a growing population in such high mountain areas is extremely finite, and unless the coming generations have some chance of getting out into the larger economy and competing on a reasonably equal footing, the situation will only lead to more intensive commodification of their landscapes, and in a manner where the local has no control and is relegated to the lowest rung of the division of labour. The Government would require to commit itself to some radical changes in the prevailing system, and to set in place special systems and priorities for such remote areas where the valuable biodiversity is under increased threat due to failing livelihoods.

## Recommendation 3

**Recommended that the government undertake a Land Settlement in the area.**

While this may not be critical, it would greatly assist the government in its administration of the area. It has been about 40 years since the last Settlement, and looking to the state of the land records for villages in the Gori basin, it seems it is well overdue. Conducting a Land Settlement now would help the government:

Undertake the cadastral mapping of large areas that are presently unsurveyed by the cadastral system, and unmapped. As can be gauged from the Landsat Image attached, a very large proportion of the basin leads up to permanently snow covered and high mountain areas. These areas have been mapped thoroughly by the SOI, but are very grossly represented on village cadastral maps, and the area recorded wrongly in the patwari records. For all villages whose boundaries lead up to the high iced-out ridges, and this includes all the alpine villages (who own more than half the area of the basin), there is a rough doodle denoting the ridge-line, and a note that says that the village boundary is *himalaya tak*, or uptill the snow ridge, and as per the Survey of India maps. The corresponding area on the *Khatauni* records only a miniscule fraction of the area. It is no wonder that phenomena such as Milam village owning 847 square kilometers in three watersheds goes un-noticed, and only a fraction of it appears on the *Khatauni*. There would be a huge difference between the total area listed on the Z.A and Non Z.A Khataunis of the district (after adding Reserve Forest areas), and the total area as per the SOI. This is the case with many villages, and an exercise that brings cadastral maps in consonance with the SOI maps would greatly help the state administer the area, as well as villages in the resolution of disputes of boundaries, which abound.

The opportunity could be used to computerize all the Land Records after Settlement, which would help make them more accessible, and their administration and use more efficient. Similarly, since mapping technology has taken such great strides over the past 40 years, and we have such a range of technologies at hand, the Settlement process could be used as an opportunity to digitize and make accurate and readily usable maps for all villages and Van Panchayats. The present scenario on this in the Gori basin, as it must be in other remote areas, leaves very much to be desired.

The Settlement process could also attempt to undertake consolidation of land holdings in villages where people are keen to do so. The government of Uttaranchal has already taken some good initiatives on this in the past, and a wider process of Settlement could precipitate a much wider acceptance of this very necessary process.

## Recommendation 4

**Recommendations regarding Van Panchayats and their interface with time-bound government programmes.**

Favourable state policy seems almost a pre-condition for the successful governance of natural resource commons. There are, however, some important aspects of existing government programmes that are structurally and fundamentally inconsonant with the conception of what a commons is, and these are being flagged for consideration by the state government.

While it is the role of the government to lay the policy and legislative basis, (in order to effectively be the enabler and arbitrator for the rational distribution and democratic functioning of village commons), the actual management decisions and day-to-day governance of it should be entirely in the hands of a village institution, whether formally registered or informal. The provisions of the

latest Uttaranchal Village Forest JFM Rules 2001 have some provisions that seem contrary to this, and that require to be reconsidered by the government.

a. The government has done well to remove from Rule no. 3.2. clauses such that make the Panchayat Forest "subject to the supervision, direction, control and concurrence of the Divisional Forest Officer..". However, such control is still implicitly retained through various clauses. Now this displaces the notion of a commons altogether. It displaces the essential characteristics that define a commons; the elements of community and location, of mutuality and of collective. Many of these imply a political process, and an approach to community that is based on a shared ecological and moral conception of the commons[12]. Not that it exists in all the villages here, but these elements do variously characterize some of the better run Van Panchayats, and which must be worked towards for better governance. The astigmatism in perspective here seems to stem from losing sight of the Van Panchayat as a long-enduring institutional arrangement of choice, that is opted for precisely because of its lack of dependence on the state, and its ability to yield democratic self-governance, on the one hand, and the overlay of JFM, which today is a government project.

   In the running of a project it may be important to be predictable in terms of activities to be undertaken and the expenses such activities will entail, and therefore annual plans are essential. Project administration then requires various tiers of bureaucracies, for fiduciary regulation, and to ensure compliance right till the village level. A set-up that would otherwise be entirely superfluous to a village institution that has successfully governed its commons for decades, where intensities of protection and the investment thereon change from time to time, but where all other 'investment' is in the form of regulation or restraint. This equivalent of a 'management plan', can be found implicit in ongoing use and regulation practices of any Van Panchayat. Programmes like the JFM are presently being funded for 5 years at a time, and like any good time-bound project, would hope to have spent their money and done their job, and the intervention become redundant at some point. In view of this, changing the entire institutional arrangement of the Van Panchayat (Rule 3.2 specifies that any for any Van Panchayat who opts for funding under JFM, the Van Panchayat Rules will cease to apply) is likely to create an institutional gap, an inconsistency and even a lack of continuity that could pry loose the stability of the village commons.

b. The application of serious political concerns to projects, programmes or policy structures in a cosmetic manner or for form's sake, can do serious harm to the credibility of the cause itself. Often project proposals and programme structures include elements that may be most current on current on international funding agendas. This could range from 'poverty alleviation' to 'capacity building' to 'women in development' and so on. All of these are ofcourse relevant to work with Van Panchayats, but would only happen in a substantial, organic way if it were internalized sincerely. While there is often a real intention to do so at the senior levels, and at inception, the reality when translated in the field can be quite contrary. The case of increasing the participation of women in the governance of Van Panchayats is one such that needs attention.

   The government issued instructions to Van Panchayat Inspectors to organize Women's Van Panchayats as they also did, to encourage villages to elect women Sarpanches (Council Heads) to Van Panchayats. The villages were told that if they did so, they would be eligible for special fund allocation for their Van Panchayats. The invitiation to play the game was clear, and so some villages are playing. Often wives and relatives of entrenched power centres have been put up as the face (the progression of the *Pradhan pati* is even more pervasive where seats are reserved in Panchayat elections), and in five villages where exclusive Women's Van Panchayats have been constituted, both in the Gori basin and the slopes of the Kali basin, the situation is quite bizarre. Exclusive Womens Van Panchayats (which surely must stultify the notion of a commons) have been constituted in villages that already have existing Van Panchayats. These are in addition to the existing ones where everyone has a right, and they are, all five of them, less than 2 hectares each. Should we just look at these as harmless embelishments to a programme, or may such attempts actually drive misplaced conclusions (that many are rearing to jump to) that women and competent governance don't match?

c. Institutional overlaps set the stage for recurrent differences and conflict, seriously affecting local governance. This is borne out by experiences worldwide. The Uttaranchal Village Forest JFM Rules have provisions for the constitution of District Level Advisory Committees and Range Level Management Committees. These comprise the DFO and his nominees, the Zilla Parishad Adhyaksh or the Block Pramukh at different levels, nominated NGO representatives, and nominated women Gram Pradhans. While this may be a desirable and inclusive step that could help in the 'steering' of a government programme or project, or to include Panchayat participation in any project, it seems misplaced for running or administering ongoing village institutions, especially when someone from outside the village is given the **power** to direct a Van Panchayat. This is significant especially in the prevailing context of high contestation and conflict between villages in Van Panchayats, as well as the strong political party affiliations of the district and block level Panchayat representatives. The additional power to influence the granting or withholding of government funding to a Van Panchayat depending on compliance at various political levels, is another important consideration.

It is recommended to the state government that it considers keeping a clear distinction between any such committee it may wish to constitute at an **advisory level** for helping **steer** the administration for any of its **projects**, and between ongoing institutional arrangements (Van Panchayats) for the governance of village commons that have much wider temporal horizons than projects, both past and future. Such overlaps at the village level are not required, and could dismantle the very pillars of the commons. The challenge is to balance the State's role as 'actor, arbitrator and guarantor of public good'[13], while creating enabling conditions for the democratic self-governance at the village level.

### Recommendation 5
**Regarding the Banraji tribe.**

The magic illusion of a better life in the progressively urban settlements at the margins of the Askot Wild Life Sanctuary may inevitably hold many of the Banraji in thrall. We (in FES) have not yet engaged with the Banraji at this deeply political level, or been through any process that mandates us to represent what kind of future they may wish to choose. The purpose of mentioning them here is to bring the plight of these forest people to the policy forming and legislating environment, and underscore the fact that the Banraji were ridden rough shod over during the Notification of this area as a Musk Deer Sanctuary, by omitting any reference to them or their needs in the first place. The blanket ban of the Supreme court requires to be revisited, and wherever possible, specific orders require to be worked out for such situations where the largely benign presence of the aboriginal Banraji tribe require to be protected.

The State Government is presently in the process of negotiating a redemarcation of the boundaries of the Askot Musk Deer Sanctuary with the Ministry of Environment and Forests at the Centre. This is partly because over a hundred villages, both in the Gori basin as well as those of Darma and Byans, and all their agriculture land and their Van Panchayats are presently included within the Sanctuary (which makes restrictions like the ones imposed by the Supreme Court in February 2000 impossible to implement), and perhaps also because the Sanctuary is imposing impediments to 'development' activities such as Hydroelectric Projects planned along the two rivers. We recommend that the Government recognize the existence of the Banraji in any new Notification that will follow, and take measures to protect their frugal dependance on the forests they dwell in.

## The Role of FES, the authoring instituion

The Foundation for Ecological Security (FES) is involved in ongoing projects related to biodiversity conservation and to the governance of natural resource commons in the border and high altitude districts of the state. This exercise was in the natural flow of our ongoing work, and will serve to inform and give sharper focus to work we will take up ahead. The various logs will be progressively built upon, subject to deeper analysis and shared with partners in conservation, and wherever possible, as inputs to policy processes. The advantage of our long-term and intensive presence on location will be built upon and shared.

The FES would be willing to work with the government, if it so desires, as one of the partners in the complex task of planning with village communities for the re-apportioning, and working out combinations of rights on village commons, and in the planning of the different intensities of use-regimes and conservation, in the frontier areas of the state.

The FES has also undertaken, an extensive exercise in mapping and analysing the extent and configuration of all Van Panchayats, all Reserve Forests and all Protected Areas in five districts of the State of Uttaranchal that contain high mountain areas that fall within the Greater Himalaya and the Trans Himalaya. While this area has been studied to be the richest in biological diversity in the State, as indeed in the Western Himalaya, many Van Panchayats in this high altitude region, who actually own and govern an overwhelming proportion of this area, have not been actually surveyed and mapped. Neither have Van panchayat areas been mapped in their configuration with the State Protected Areas and studied for the value of their assemblage. The exercise conducted in the Gori basin so far has yielded very significant information which is contrary to what the State has on their Revenue records. This is because much of this area has still not been surveyed under the cadastral system, and neither has there been any synthesis with the SOI mapping regime. FES is being facilitated in this exercise by the State Government. Fieldwork is underway and the findings will be presented to the government, and to efforts at understanding and conserving the valuable biodiversity of the Himalaya.

## Notes

1. Summarized by Inskipp 1992.
2. Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile protected areas. Ranbeer Rawal and Uppendra Dhar.
3. Dissagregated figures for the villages in the basin from the 1991 Census, plus 10%.
4. Figures collated by FES, since the Livestock Census gives aggregated figures for a Tehsil, and does not account for movement of transhumant livestock from other valleys.

5. Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile protected areas. Ranbeer Rawal and Uppendra Dhar.
6. Protected Area Network in Indian Himalayan Region: Need for recognizing values of low profile Protected areas. Ranbeer Rawal and Uppeandra Dhar.
7. The Economics of Deforestation: The example of Ecuador. Sven Wunder 2000.
8. Towards Sustainable Forestry in the U.P. Hills: N.C.Saxena. ODA 1995
9. The Economics of Deforestation: The example of Ecuador. Sven Wunder 2000.
10. Garret Hardin
11. The Economics of Deforestation. Sven Wunder again.
12. Ecological Identity and Commons. Mitchell Thomashow
13. Jael Silliman and Ynestra King: Expanding Civil Society, Shrinking Political Spaces: Dangerous Intersections 1999.

# Kachchh Sub-State Site (Gujarat) Biodiversity Strategy and Action Plan

Coordinating Agency: Gujarat Institute of Desert Ecology, Bhuj

## Biodiversity Values (Wild and Domestic)

Kachchh, the second largest district of the country with a total landmass of about 45650 sq km, falls in the arid tract of the country. In countrywide bio-geographical classification system, the district is considered as a separate biotic province, highlighting conservation significance of this region at national level. The region supports a rich diversity of habitats including some of the best patches of natural thorn forests; vast stretches of grasslands and savannah including one of the Asia's largest contiguous grassland tract in Banni; about 400 km long coastal areas along the Gulf of Kachchh support many important habitats including largest mangrove forests in the entire Western Coast and many small and large creeks and sandy beaches and mud flats; globally unique saline deserts of Great Rann of Kachchh (GRK) and Little Rann of Kachchh (LRK); and several seasonal landlocked wetlands.

Around 650 floral and 800 faunal species were reported so far from the region, many of which are globally rare and threatened species. Wild Ass in LRK is the most proud possession of the region. Similarly, the grasslands around Naliya are globally unique as it supports population of three globally threatened bustard species - Great Indian Bustard, Houbara Bustard and Lesser Florican, in a single location. Some of other rare and threatened species include the wolf, caracal, chinkara, desert fox, longeared hedgehog, ratel, desert cat, spiny tailed lizard, desert monitor lizard, olive ridley turtle, green turtle, dugong, common dolphin etc. The region is considered as one of the key stepping stone for the large number of migratory waterfowls during the winter. Wetlands like Chhari Dandh in Banni, and many water bodies in GRK and LRK provide habitats for large number of waterfowls. The region is also well known for one of the largest congregation of breeding population of Flamingoes.

Although, there is no systematic documentation on the diversity of crop varieties and livestock breeds in Kachchh, there are many local varieties of Jowar, Bajra and many other minor millets are still cultivated and preserved in dryland farming sector. Similarly, there are many descriptive and non-descriptive breeds of livestock which include: Vaghiari and Gardi cattle; Sindhi or Kundi buffalo; Hamia goat; Patanwadi and Kachchhi Marwari sheep; Kachchhi camel; Sindhi and Kachchhi donkeys; Taaji hounds etc.

## Livelihood Linkages

In Kachchh, there are four major livelihood sectors, which have strong linkages with the biodiversity- dryland farming, pastoralism, coastal fisheries and NTFP collection. Unequivocally, these sectors are the lifeline of the rural Kachchh and affect the life of *khedut* (the farmers), *maldhari* (the livestock keepers) and *machhimar* (the fishermen). The NTFP collection is a common practice from almost all the section of the rural society, but it has much more meaning and value to the landless poor. Among these sectors, dryland farming and pastoralism are vulnerable to high levels of climatic uncertainties and thus economic risks. Both the dryland farmers and nomadic pastoralists are traditionally countering this vulnerability by maintaining the biodiversity in their associated systems. The coastal fishermen and NTFP collectors, on the other hand, although not seriously facing such risks, yet their entire livelihood base depends heavily upon the diversity and their interactions.

## Threats

- According to a latest report, about 3478-km2 area of the district is covered by exotic woody species – *Prosopis juliflora*. Grasslands and other grazing lands are the worst affected areas. In Banni, grasslands were reduced by about 20000 ha during 1980s. Almost similar area under prime wildlife habitats in different PAs were also converted into *P. juliflora* bushlands.
- Recently, there were construction of many ports and jetties along the coastal tract. The clearing of mangrove and dredging of creeks are the two major impacts of such developmental activities in the coastal area. These ultimately affect, to a larger extent, the marine diversity and fish productivity and thus impinge upon the livelihood of the fishermen communities.
- The Gulf of Kachchh is known as breeding and nourishing ground for diverse fish and prawn species. Recently, there is a significant increase in the number of mechanized boats and trawlers operating in the area, both of local and outside fishermen, and thus doing excessive fishing and destroying fish stock by catching even juvenile fish stock.
- One of the major set-back to the conservation efforts of this region was caused by denotification of more than 300 km2 area of Narayan Sarovar Sanctuary (NSS) for opening the doors for mining industry in the area. Also, mining activities around many

important conservation areas resulted serious fragmentation of habitats, which are otherwise critical for continuity of gene flow of many long ranging animals (like wolf).

- Some of the grassland areas in Abdasa taluka are critical breeding habitats for the Great Indian Bustard and Lesser Floricans. Most of these grasslands are open and without any proper management regime. Consequentially, these grasslands are facing conversion and encroachment for cultivation, jeopardizing conservation of these birds.
- The salt industries alter the water quality in the creeks and also modify natural water channels. The effect of these changes is very pronounced in prawn fishery near Suarajbari creek. Such modifications also have negative impacts on the breeding habitats of Flamingoes. The expansion of salt industry within Wild Ass Sanctuary (WAS) has serious impacts on wild ass population.
- In some parts of Kachchh, sheep/goat lifting by wolves are frequent and maldharis in retaliation kill the wolves. Farmers are also facing the menace of crop raiding by wild animals like wild boar and neelgai and more seriously by the wild ass around LRK areas. In certain cases, even feral pigs are also causing serious damage to the crops.
- As happened in other parts of the country, under the policy of green revolution, in Kachchh also there is intensification of agriculture practices. As a result of this, the HYV are promoted by Govt. agencies. At the beginning of new millennium, in Kachchh a total of about 6800 quintals of hybrid seeds were sowing and many indigenous crop varieties have been lost from the region.

## Major Initiatives

- In order to protect and conserve the biodiversity values of the arid region four wildlife sanctuaries were created, which may be highest at a district level in the entire country.
- ***In order to fill gaps in basic knowledge regarding the biodiversity of the area, many efforts are going on from different institutions – local to national level. The focus of these studies includes grasslands, mangrove, rare and threatened species, Banni region and all the PAs.***
- In order to channelize the resources of NGOs towards common developmental goals, a network of grass-root organizations was founded, popularly known as 'Abhiyan'. Currently, about 30 Abhiyan member organizations joined their hands in various activities in about 350 villages.
- Kachchh Mahila Vikas Sangathan (KMVS) is an NGO working among poor rural women towards their total empowerment. KMVS is working in 4 talukas and about 150 villages of Kachchh, with a total women membership is about 6200.
- Indo-Canadian Environment Facility (ICEF) has recently launched a program to create models for community based management and sustainable utilization of mangrove resources around the Gulf of Kachchh. Similarly, there are efforts to regenerate the grasslands in Banni with community involvement. A few attempts have also been made to develop community owned fodder-banks in few villages of the district.
- In order to promote sustainable agriculture practices in Kachchh through organic farming practices, Kachchh Sajeevkheti Manch (KSM) has been initiated a few years back. The KSM is developing a network of irrigated and dryland farmers who are interested in organic farming practices. For a better market to organic farm products, KSM regularly organizes the producer-buyers meetings in different part of the district.
- After the earthquake, many new initiatives have been taken which have strong bearings on natural resource management. A few important initiatives include: (a) UNDP and the Government of Netherlands has set up a Kachchh Ecological Fund (KEF) to support and facilitate programs towards long-term ecological recovery of the region. (b) Prime Minister Office (PMO) has supported an ambitious Drought Proofing Project (DPP) in Kachchh. The DPP largely focus on the issues of drinking water, fodder and livelihood in about 300 villages of the district. (c) Abhiyan with the support from UNDP has created a network of centers (popularly known as 'Setu'- the bridge) to facilitate information flow between community and project implementing agencies. At present about 400 villages are covered under the network of Setus. (d) Many international NGOs and donor agencies have initiated many natural resource based livelihood support programs.

## Major Gaps

- Most of the Government departments, including those who are dealing with natural resources and the other major players of economic developments like industries, do not have any appreciation to the fragile ecosystems and limited but otherwise important natural resources of Kachchh.
- Within PAs most of the developmental activities are not allowed. People living within PAs consider this as a clear disincentive in conserving the wildlife and thus feel detached with the entire PA based conservation program. Also, PA system mainly focuses on the conservation of wild biodiversity. There is complete ignorance on conservation of domesticated diversity such as indigenous crop varieties or livestock breeds within human habited PAs.
- The dryland farmers' vision has always encompassed biodiversity driven integrated, long-term security of farmlands. The inability of the government agencies to understand this complex vision of farmers has resulted most of the state policies becoming anti-diversity. Similarly, the food security assured by the traditional dryland farming systems has never been really pushed-up by the government.
- Of late, participatory conservation approach has been advocated a lot, however, there is no legal framework, which could pro-

vide long-term 'tenure right' to the community on the regenerated/conserved resources. Lack of such legal framework can in fact rob the entire regenerated resource by powerful players like industries, government or corporate sectors.

- There is no regulatory mechanism for fish catch in coastal areas. There are no fishing guidelines either, for use of fishing equipments like mesh size, size of trawler etc. A draft fishery related bill is long pending with the government.
- Unlike, other occupational groups, pastoralists (the maldharis) do not have any forum at district level to discuss and plan various issues related to livestock and grazing land management.
- In the industrial sector, most of the community-industry interface revolves around the labour. The industry is not trained to work jointly with community in resource management sectors. There is complete lack of awareness among the industries on progressive approaches like JFM.
- There is a serious lack of models and packages for dryland farmers to diversify their income sources through various economically vibrant mixed cropping options like agro-forestry.
- *P. juliflora* is considered as a serious problem to the overall ecological integrity of the district by larger section of the society and want to eradicate the species. However, no systematic and organized efforts have been made in this direction at Government, NGO and Community level.
- Kachchh has a strong tradition of livestock breeding and some regions of the district like Banni and Pachchham are still following this breeding program traditionally. However, there is no support program for this. Rather Animal Husbandry Department grossly overlooked the opportunities and imposing tailor-made high-yielding livestock-breeding programs in the region.
- The District Planning Board is grossly unaware about the various biodiversity related issues of the region. There is no method exists that advise the Board on the need of biodiversity linked programs and funding, especially the livelihood related ones, in the annual and 5-year plans.

## Proposed Strategy and Action Plan

### Expanding and Improving Knowledgebase on Biodiversity

1. Need to develop short, medium, and long-term perspective research/study plan covering different aspects of biodiversity. [M, I]
2. Systematic documentation of traditional knowledge system through Community Biodiversity Register especially related to methods of farming, crop-breeding, grazing regulation, livestock breeding, fishing, ethnobotany and other natural resource management. [H, I]
3. Develop a GIS based Kachchh Land Resource Information System (KLARIS) [M, M]
4. Create a systematic, finer-scale network of weather monitoring stations, especially to collect rainfall and evapo-transpiration data. These data can be used in various natural resource planning and management. The network can be supported under Setu. [M, I]
5. Initiate village level livestock census at annual basis, instead of current five yearly operations. The entire census exercise can be linked with the network of Setu. [M, I]

### Conservation Programs Centered on Flagship Species

On the lines of national level projects, in order to develop a comprehensive biodiversity conservation plan, project GIB, Wild Ass, Chinkara and Flamingoes can be initiated. These are flagship species for major habitat types of Kachchh. [M, M]

### Landscape Level Planning for Biodiversity Conservation

Three major landscape units can be identified for detailed conservation planning: (a) parts of Naliya-Lakhpat-NSS-Mata-no-Madh and hilly tract of Nakhatrana are suitable for conservation of both wild and domesticated diversity (b) the landscape of Ranns (LRK and GRK) and Banni should be planned to focus the wildlife conservation especially the large number of migratory waterfowls, flamingos and wild ass. (c) a disjointed landscape unit can be identified in Pachchham, Khadir and Vagad for conservation of crop and domesticated diversity. [H, M]

### Enhancing the Role of Women in Biodiversity Conservation

1. Considering the substantial knowledge base and role of women on the seed selection and preservation, a network of seed banks of local varieties centered on women can be initiated in some villages of Pachchham, Abdasa, Lakhpat and Khadir areas. Such seed banks will help in dissemination of local varieties of seeds to other areas including those, which are adopting organic farming. Also, women centered grain distribution system need to be promoted to ensure long-term food security at household level. For this, women centered '*grain* (*Anaj*) *bank*' of local crop varieties need to be promoted in different parts of the region. [H, I]
2. Need to initiate a medicinal plant conservation program centered on women, with the major focus on revitalization of traditional health care practices and nutritional support. To begin with, this program can be initiated in 10-15 villages in Pachchham, Khadir, Abdasa and Lakhpat regions, due to their remoteness. KMVS can take lead role in this effort. [H, I]

### Control of Prosopis Juliflora for Ecosystem and Community Benefits

1. ***Need to reduce the density of P. juliflora plants and directed the growth of plants to tree form. While converting more number of shrubs into trees enhances the economic value of the plant, it also promotes the growth of grass. [H, I]***
2. Need to promote P. juliflora management through collective community efforts by giving them some short and medium-term economic incentives. One such major incentive would be to manage P. juliflora as 'buffer' biomass for collective drought proofing. [H, I]
3. Need for complete removal of P juliflora from ecologically sensitive and biodiversity rich areas including PAs like WAS and NSS, and grasslands etc. [H, I]

### Enlarging the scope of partnership of different stakeholders

1. ***Develop newer models of natural resource regeneration and rehabilitation, including biodiversity conservation through promoting innovative ideas from the communities. These proposals can be given financial support and experimented through short and medium term projects. [H, I]***
2. ***Need to support a sea-turtle conservation program with the involvement of fishing communities especially those living near the potential stretch between Mandvi and Bhambhdai. Capacity building of the fishermen to run the hatchery and releasing the hatchlings into sea are the key elements of this program. [M, M]***
3. ***Need to develop models to support community conserved prawn fisheries near Surajbari and in other coastal tracts. The especial focus need to be given to Pagadiyas (poor fishermen), operating mainly in the intertidal regions. [H, I]***
4. ***Need to promote models to support non-consumptive values of the biodiversity through community driven ecotourism in the western part of Kachchh. Awareness and capacity building for community are the key elements of this program. [M, M]***
5. Need to develop models of joint 'Rakhal' management (JFM) with the involvement of maldhari communities and forest Department. Such management approach need to be centered on the grass production. [H, I]
6. Need to promote community enforced grazing rules in the region, backed up by sound scientific information base. Delineation of different grazing potential zones and promotion of a 'maldhari sangathan' are the key elements for such program [H, I]
7. Support to traditional livestock-breeding activities in areas like Banni and Pachchham. [H, M]
8. Need to support regeneration and restoration program of hills of higher biodiversity values, like Kala Dungar, Dhinodar, Roha, Nanamo etc., with the participation of village communities. The program can be undertaken with JFM like approach. [H, M]
9. Need to organize 'Pashu Mela' (Livestock Fare), after the rainy season, to provide larger market access to the maldharis. [M, M]
10. Need to involve security forces in many of the conservation related programs. Organization of short-term awareness program, mangrove conservation, eradication of *Prosopis juliflora* from ecologically sensitive areas, joint patrolling (with fishermen) against illegal trawler fishing are the key elements of such participation. [M, M]
11. Need to enhance the role of industrial houses in Kachchh in biodiversity conservation programs. Constitution of a Trust like body; contribution of minimum 1% of annual turnover of industries for natural resource management activities in the trust; involvement of community in compensatory afforestation program in the line of JFM; and orientation program on biodiversity and other natural resource related issues are the key elements of this program. [M, M]

### Strengthening of PA Network

1. Formalities for final notification of all the four PAs need to be completed quickly. [H, I]
2. For effective management, all the PAs need to resort zoning schemes, as suggested in recently published reports: in WAS a salt manufacturing zone need to be separated; status of grasslands around GIB Sanctuary need to be improved through community participation; wildlife rich areas in NSS need to provide higher degree of protection and priority for management. [H, I]
3. Ensure dispersion of wild animal population by maintaining the habitat contiguity. For instance, regulated mining activities around NSS and construction of bridges at few points in Sardar Sarovar canal passing through WAS, are important for wildlife movement. [H, I]
4. Need to include a few important wetlands under PA network. Chhari Dandh in Banni, Kori Creek and a few small coastal stretches should accord higher conservation status. [H, M]
5. In order to bring the community in mainstream of conservation within PAs, and to reduce their alienation from BD conservation, there is a need of many support actions to improve the economic bases of community living inside PAs, without changing the basic resource use pattern. Interventions like milk collection centers, mobile veterinary hospital, provision of seeds of local crop varieties, micro-credit facilities through SHG etc. can be taken up in the PAs. [M, M].

### Enhancement and Restoration of Agro-biodiversity

1. Since organic farming and agrodioversity are closely linked issues there is a need to support ongoing initiatives like Kachchh Sajeevkheti Manch (KSM). [H, I]
2. Documentation of local and wild relatives of different crops and livestock breeds [H, I]

3. Some of the locally lost varieties need to be located from state or national level seed (gene) banks and revive their cultivation in farmer's field. [H, I]
4. Need extensive education and awareness campaign to enhance the understanding of long-term consequences of loss of local seed varieties; role of dryland farming in ecological sustainability of the region and concepts and benefits of organic farming. [H, I]
5. Documentation of success stories of farmers who are practicing traditional systems of cropping, organic farming, breeding of indigenous livestock breeds etc. Create awards and rewards systems for the farmers for more diverse farms, cultivation of indigenous varieties of crops, adoption of organic farming, innovative crop protection techniques, livestock breeding etc. [H, I]
6. In order to promote cultivation of local crop varieties, the seeds should be available to the farmers in time, and for that introduction of some mobile seed outlets may be supported. This can be linked with already discussed women run 'seed banks'. [M, M]
7. Need to develop models of mixed cropping in rainfed farms with seasonal and perennial 'useful underutilized native plants (UNP)'. This can fetch the farmers some income during the non-cropping period of the year. In order to make good profit, good extension service and market linkages need to be developed for such non-agricultural products. [H, I]
8. Need some support for value added products from agriculture and UNPs. So low cost technology need to be developed and promoted for small-scale plant processing units through group credits (like through Self Help Groups). [H, I]

### Formulating Policy and Legislative Frameworks

1. In all the natural resource related decision-making bodies (both of government and community based) women's representation should be at least 33%. [H, I]
2. The ownership of large tract of grasslands adjoining LBS, should be transferred to Forest Dept and they should manage these grasslands as joint effort with community. [H, I]
3. There is a need of policy change in PA conservation for giving adequate attention and support to agro- and domesticated biodiversity conservation within PAs. [M, M]
4. All the community based resource regeneration programs need to be backed up by some legal framework (like signing of MoU between the community and relevant authorities) to stop the diversion of such regenerated resources for any developmental and industrial activities. [H, I]
5. Targets in compensatory afforestation programs should redefine to promote the 'community-industry' partnership. Targets can be redefined to indicate the actual success of such joint efforts e.g. number of MoU signed, or the number of beneficiary groups involved in the program (similar to JFM). [M, M]
6. Develop all the forest and PA management plan through a consultative, bottom-up approach. Similarly, all the government departments associated with natural resource management should follow similar bottom-up approach of planning exercise. All the planning documents should pass through well-informed public hearings. [H, I]
7. All major developmental projects should follow the recommendations of a Regional Environmental Planning. Since, till date there is no REP, it needs to push forward. [H, I]
8. There is a need to initiate some program support for the children of pastoral communities, similar to the nature of tribal welfare program. Under this program, maldhari children should be provided free education, health care, and vocational training etc. through state sponsored and NGO run schools. [H, M]

### Human Resource Development for BD Conservation

1. Need to create a cadre of 'Rural Experts' in different natural resource related sectors. These experts will essentially emerge with the development of different community based conservation models. [H, M]
2. The field staff of forest department should be oriented and motivated for participatory work, through regular trainings and exposure trips and rewards/awards. Also, need to build technical capacity of forest guards for collecting basic ecological data for monitoring purpose. For this, some simple but important habitat and wildlife related data can be identified and collected through forest guards. In order to develop good rapport with the communities, Forest Dept. should hire the services of communication experts, preferably women, to initiate process of consultation with communities. It would specially address the gender and equity related issues in the planning exercise, which is normally ignored. [H, M]

### Mobilizing Education and Awareness Programmes

1. In order to improve the educational and awareness level of stakeholders in general, following programmes can be taken up: mobile-biodiversity mela can be organised covering large part of the district; create botanical gardens and live-museums with insectaries, aquarium, aviary and snake parks; preparation of identification keys for plants and animals in vernacular language; include a detailed chapter on Biodiversity in Kachchh District Gazetteer. [M, M]
2. Need to set-up a state-of-art herbarium and documentation center. For effective dissemination of information, an ENVIS center can also be set-up. [M, M]
3. Ensure the availability of all the relevant socio-economical and bio-physical data in public domain. [H, I]

## Overall Institutional Mechanism for Coordination and Implementation of Suggested Actions

Majority of suggested actions and programs can be coordinated and implemented through a multi-layered, decentralized institutional arrangement. Such an implementation framework will work at two broad levels (i) to prioritise the programs and coordinate with different government sectors and also to garner financial support and (ii) to implement the program at ground level. Following are the key elements of the suggested arrangement for implementation of Kachchh- BSAP:

- At the state level, there is a need to allocate some funds to create a Gujarat Biodiversity Conservation Fund (GSBCF).
- At district level there is a need to create a body (say Kachchh District Biodiversity Board, KDBB)- the apex institutional body to prioritised and coordinate the district level actions through a Policy Core Group (PCG). The PCG should mainly be a stakeholders' body with the representative form different communities, NGOs, institutions, industries and government departments, chaired by the District Development Officer (DDO). The PCG should have a minimum of 33% women representatives.
- KDBB will have two major functional units: (i) Community Conservation Initiatives (CCI) and (ii) Biodiversity Support Network (BSN). While the CCI will largely promote the biodiversity linked livelihood support programmes, the BSN will initiate those programs which have long term impact and give a direction to the biodiversity conservation programmes in Kachchh through education, awareness, research, and monitoring related activities.
- The KDBB will be linked to the District Planning Board. Three members from PCG will be nominated in the District Planning Board who will carry forward the various proposals on biodiversity conservation and include them in the district level annual and 5-year plans.
- KDBB will also create a 'Kachchh Biodiversity Conservation Fund (KBCF)', with a share from GSBCF and other collateral funding from outside sources such as UNDP, GEF etc. and contribution from corporate sectors and NRIs etc (similar to Kachchh Ecological Fund). The fund will be utilised to support CCI and BSN programmes. Tentatively, 65% share of KBCF will be earmarked for CCI and 35% will go to BSN.
- The programmes with technical and financial sanctions will be finally implemented through various development support networks like Abhiyan, KMVS, GUIDE, Setu, etc.

The letters within bracket [ ] showed the priority and the time frame for suggested actions. The first capital letter indicates the Priority of the suggested actions (L= Low, M= Medium, H=High) and the second capital letter indicates the Time Frame to initiate the suggested actions (M= Medium i.e. after 2 years, I= Immediate i.e. within 2 years).

# Karbi Anglong Sub-State Site (Assam) Biodiversity Strategy and Action Plan

Coordinating Agency: Aaranyak, Guwahati

## Chapter-1

**Introduction:** This document on Biodiversity Strategy and Action Plan is made for Karbi-Anglong, Assam, India, which is a district council constituted under the sixth schedule of the Constitution of India. The strategy evaluates the key determinants of geology, geomorphology, soils, climate and human activities that have helped to shape the biodiversity of Karbi-Anglong. It also examines the threats, problems and opportunities related to biodiversity conservation and its sustainable use.

**Objectives:** The salient objectives of the initiative are : 1. Assess the current status of biodiversity in Karbi-Anglong and identification of threats, 2. Promote conservation and sustainable use of the biological resources, 3.Promote awareness and dissemination of information amongst government departments and the public for realizing peoples' involvement and participation in conservation activities, 4. To prepare an action plan on natural resource management and long term conservation of biodiversity in Karbi-Anglong, 5. Promote cooperation between all stakeholders including government, public institutions, social and economic groups and the masses, 6. Incorporate principles of restoration, conservation and sustainable use of biodiversity in planning and execution of sectoral and cross-sectoral policies.

**Scope:** The document tried to cover the following aspects : *Natural ecosystems,* 2. *'Wild' species and varieties, 3. Agricultural ecosystems* , 4. Domesticated species and varieties

**The Process:** NBSAP Karbi-Anglong Sub State site has started just after the June, 2000 national meeting at New Delhi. Meetings and discussions were held among various stake holders in key locations for understanding the biodiversity conservation initiatives, the problems and prospects, to documents the gaps and to get the peoples view on the subject. Meetings of Local Advisory group and various informal sittings with the villagers were the key process of this initiative. Meeting with government authorities were held at regular intervals to note their views.

All discussion was in two folds. First the identification of the gaps of knowledge and problems related to biodiversity conservation and the second was preservation of existing knowledge and documenting the probable thoughts and ideas towards preservation of biodiversity in Karbi Anglong.

Most of the villagers have expressed that they have first time discussed such topics, which they think is very important and necessary for sustainable use of biodiversity of Karbi Anglong.

**Profile of the Area:** The Karbi-Anglong district holds the central geographical location in Assam and extends from 25°32' to 26°37'N and 92°09' to 93°53'E. It is the largest district in Assam with an area of 10,434 sq km and accounts for 13.3% of the total geographic area of the state. About 85 percent of the district is covered by hills. The current population of Karbis is 6,62,723 as per 1991 census and current population density is 64 per sq km. The climate of the area is sub-tropical monsoon type, generally with cool and dry winter and hot and wet summer. The temperature ranges from 4°C in winter to 34°C in summer. The rainfall varied from about 800 mm in Diphu-Kheroni area to 2800 mm in the northern slopes. The mountain wall of the Meghalaya plateau and Barail range has made Diphu-Kheroni area a zone of rain shadow, receiving the lowest rainfall in the whole of North-east India.

## Chapter-2

**Land Use and Land Coverage:** The major land use land cover categories that are identified in Karbi-Anglong district are as follows: Build Up Land 0.01 %, Build Up Land 13.97 %, Forest Land 43.64%, and Shifting Cultivation land 42.38 %

**Plant Diversity:** The plant diversity in Karbi-Anglong is mainly sub-tropical. The salient tree species are *Amoora wallichii, Emblica officinalis, Spondies mangifera, Chikrassia tabularis, Tetrameles nudiflora, Alianthus grandis, Artocarpus chaplasha, Terminalia myrio-*

*carpa, Melia azedarch, Michellia champaca.*

**Bamboo:** Karbi-Anglong is very rich in bamboo species diversity and bamboo defines a major portion of the economy of Karbi Anlong. Till date, the scientific study conducted by the forest staff have found nine species of bamboo while local karbi people have reportedly found 13 different varieties of Bamboo. Some of the salient species of bamboo found in Karbi Anglong are *Bambusa arundinacea, Bambusa balcooa, Bambusa pallida, Bambusa khasiana, Bambusa tulda, Dendrocalamus hamiltonii, Dendrocalamus patellaries Melconna baccifera*.

**Animal Diversity:**

**Mammals:** Salient mammals of Karbi-Anglong are – Asian elephant, royal bengal tiger, leopard, marbled cat, Indian bison, Himalayan black bear, Sambar, Barking deer, hog deer, Hoolock gibbon, Assamese macaques, Pig tailed macaques, stumptailed macaques, Slow loris, serow, Flying squirell etc.

**Birds:** There are about 400 species of birds in Karbi-Anglong as per data collected by members of Aaranyak and also work done by Dr. A.U. Choudhury. The salient birds of Karbi-Anglong are – Wreathed Hornbill (*Duabanga sonneratoides*), Rufous-necked Hornbill (*Aceros nipalensis*), Great pied Hornbill (*Buceros bicornis*), Indian pied hornbill (*Anthracoceros malabaricus*), Peacock Pheasant (*Polyplectron bicalcaratum*), White winged wood duck (*Cairina scutulata*), Blyth's baza (*Aviceda jerdoni*), black francolin (*Francolinus francolinus*), hill partridge (*Arborophila torqueola*), etc.

**Forest Types:** As per the State of Forest report 1999 of Forest Survey of India, Dehradun, 6044 sq. Kms. of the district are under dense forest cover while 2776 sq. kms are under open forest cover. The important forest types found in Karbi Anglong District are : 1. Moist semi-evergreen forests (2BC 1/b and 2 BC) , 2. Moist Mixed Deciduous forests (3C/C 3b) , 3. Riverine Type, 4. Miscellaneous type with scattered pure or mixed patches of bamboos.

**Administrative set up for Conservation:** In pursuance of O.M.No. :HAD. 57/95/309 dated 31-12-1996 from Govt. of Assam, the administrative control of forest department has been transferred to Karbi Anglong Autonomous Council while role of the State Government has become advisory in nature (it would be useful to give a short description on the composition of this Council, how it is formed, etc). Three territorial forest divisions coordinates various activities in Karbi Anlong.

**Legal Status of Forest Land:** Though a large part of Karbi Anglong District is covered with thick forest cover but the legal status of notified forest area is as under: 1. State Reserved forests:- 1962.06 Sq. Kms. 2. District Council Reserved Forests:- 1011.26 Sq. Kms. 3. Proposed Reserved Forests:- 1317.01 Sq. Kms.

**Creation and Development of Protected area for Wildlife Conservation:** Karbi Anglong is rich in varied wild life. Though rich in varied fauna, Karbi Anglong District was not having any sanctuary or protected area. It was during 1999-2000 that the Council Authority was apprised of the Govt. of India Norms wherein at least 4% of the geographical area must be notified as Wildlife area. At present already 4 sanctuaries have been notified viz. **Nambor Wildlife Sanctuary , East Karbi Anglong Wildlife Sanctuary, Karbi Anglong Wildlife Sanctuary , Garampani Wildlife Sanctuary** , covering an area of 360.86 sq. Kms., which roughly forms 3.49% of the district geographical area. Besides, Marat Longri Wild life Sanctuary covering an area of 451.87 sq. Kms has also been proposed.

## Chapter-3

**Agricultural Biodiversity:** The Karbis of the hills are mostly cultivators. Around 1,25,920 people in Karbi-Anglong is involved in cultivation of which 1,22,689 belonged to rural areas and 3,231 belonged to urban areas. They cultivate land on shifting basis always moving in search of fertile soil exhausting the earlier one by several doses of cultivations. Agriculture is the main stay of the tribal population of the districts. The traditional method of cultivation is the slash and burn, commonly known as *jhuming*.

Rice covers an area of 1,25,936 hectares which is about 90 percent of the food grain areas, and coverage of H.Y.V. paddy is 81,540 hect. (about 65 percent of the total rice area) which greatly contributes to the total production.

Among oil seeds, rape and mustard is cultivated in 20.49 thousands hect. of the total oil seed area of the district. The average productivity of rape and mustard during 1995-96 was 715 Kg. per hect. which was comparatively high to the average of 514 Kg. per hect. of national average. The total production of 15.02 thousands tones was achieved in 1998-99 against 13.62 thousands tones in 1994-95.

Horticulture in the hill region also plays an important role on the tribal economy of karbi anlong. Similarly, spices are grown extensively under commercial basis. Spices include ginger, turmeric, chili, garlic, onion and coriander in recent years. Likewise, the common tuber crops grown in the district are potato, tapioca and sweet potato.

**Shifting Cultivation:** Shifting cultivated areas have been deviated into current and abandoned shifting cultivation areas. Shifting cultivation areas includes all those lands, which are used for *jhum* during the current year. The area under this category has been estimated at 63,125 hectares. Abandoned shifting cultivation area refers to those lands, which were used for *jhum* during previous years. The area under this category is estimated at 3,60,760 hectares.

**Crop Land in *Kharif* Season:** The satellite image examined by Assam Remote Sensing Application Centre (ARSAC) has revealed that the cropped areas are confined to the old alluvial plains along the Jamuna, Kapili and Dhansiri rivers. Almost the entire area is under paddy cultivation. The area under this class has been estimated at 1,31,287 hectares.

**Crop Land *Rabi* Season:** These kinds of areas are confined to only to the canal irrigated plains of Jamuna, Kapili and Dhansiri rivers. Mustard, sesamum and vegetables are the main crops cultivated during Rabi season in the district. The area under Rabi crop has been estimated at 1,25,157 hectares. The entire area under these crops lies in the double-cropped area.

**Double Cropped:** It was clearly evident from the study of two season data that the most of the double-cropped areas are located in the plains of Jamuna, Kapili and Dhansiri. The area under this category has been estimated at 1,25,157 hectares.

**Domesticated Biodiversity:** The livestock and Poultry Population in Karbi-Anglong are as follolows: Crossbreed Cattle 12,521 Nos., Indigenous Cattle 5,15,699 Nos., Buffalos 45,369 Nos., Goats 1,20,468 Nos., Fowls 5,02,451 Nos., Ducks 73,988 Nos. The Karbi people also do the all Seri cultural practices viz. Eri. And Muga cultivation.

## Chapter-4

**Culture and Biodiversity:** The cultural affinity of karbi Anglong with nature has been noticed much often with the karbi people. The conservation of biodiversity has been practiced in Karbi Anglong by the people through maintenance of sacred groves, exclusively managed and protected by the local people . The Karbis who practice *jhuming* or shifting cultivation very often shift their villages to new *jhum* sites which might be 10 to 20 kms away from the present site.

**Karbi House:** ***As usual like any tribal tribal houses in India the Karbi Houses are also build with biodiversity products and materials.***

Of course, the traditional housing pattern has more or less been abandoned by the Karbis. Instead of having raised bamboo platforms, the houses are constructed on grounds.

**Festivals:** All festivals in Karbi Anlong are related to biodiversity product. Among the festivals observed by the Karbis, mention may be made of the "Chojun Puja" or "Swarak Puja" ;"Rongker"; "Chokk-eroi"; "Hacha-Kekan","Chomangkan" , etc. While the former four festivals are socio-religious in nature and the letter is a social one.

## Chapter-5

### Strategies and Action Plan for Karbi Anglong

**Problem Statement:** In Karbi Anglong very little scientific effort was made to enhance the biodiversity conservation movement nor from Government side nor from any NGOs. But a "lots of efforts have made to destroy the biodiversity from various angles" said a local enthusiastic villager. Mainly over exploitation of biodiversity products for industrial purposes and human animal conflicts defines the biodiversity conservation movements in Karbi Anlong.

**Major Actors in Relating to Biodiversity Conservation:** The support from Political parties seems to have the major role in the whole process of biodiversity conservation. Being a autonomous hill district Karbi Anglong District Council has a major role in any kind of biodiversity conservation movement. The Karbi Student's Organisation has another important role to play in the process although same has not pout the biodiversity issues in top of their agenda. Next important actor will be the District Administration. Forest Department of Karbi Anglong has to play a special role from planning to action level of all biodiversity conservation movement. Diphu College, which is situated in the district head quarter of Karbi Anglong can be made center of all conservation education campaigns.

## Strategies and Actions Suggested by Various Groups:

1. **Bamboo Conservation:** Over exploitation of Bamboos must be stopped.
   **Responsibility:** Forest department.

2. **Horticultural Development:** Establishment of horticultural farm should be encouraged to local Karbi people. Farms should be established in the abandoned jhum lands.
   **Responsibility:** Forest department, DRDA, NGOs working in rural development, Women's group.

3. **Sericultural Development:** Immediate steps should be taken to encourage Sericulture among the Karbi women groups and also to individuals with government help
   **Responsibility:** Govt. of India, Deptt. Of Sericulture, NGOs working for rural development.

4. **Animal Husbandary:** To encourage the practice of animal husbandry for economic upliftment of the people, efforts need to be taken to practice the keeping of local indigenous piggery and chicken firm by the Karbi youth groups.
   **Responsibility:** Deptt. of Veterinary sc., DRDA.

5. **Medicinal Plants Conservation and Wise Utilization:** Medicinal Plant garden should be established in all major towns of the district. Responsibility: Forest Department, Agriculture Deptt., NGOs working on Health and Traditional Knowledge issues, Women's group, Cooperatives on micro enterprises.

6. **Involvement of Political Bodies:** Involvement of local political bodies is must for converting all strategies into actions. Since about 6-7 members from various political parties are elected from the district to the Assam Assembly, even the speaker of assembly could convene the all party motivation camp related to biodiversity conservation.
   **Responsibility:** Speaker of Assam Assembly, Chief Executive Councillor of District Council, NGOs, Press.

7. **Inter Departmental Cooperation:** Cooperation between various Government Departments can be achieved through regular discussion among all biodiversity related departments.
   **Responsibility:** Forest Department, District Council Chief, Deputy Commissioner, Local member of Parliament, Local MLAs.

8. **Involvement Of Women In Decision Makings:** Women involvement is very poor in decision-making processes in Karbi Anglong. This need to be considered as basic priority.
   **Responsibility:** District Council Chief, Deputy Commissioner, Women's Organisation, Human Right Commission, NGOs.

9. **Reduction Of Man-Elephant Conflicts:**
   **Responsibility:** Forest Department, Local MLAs, Local M.P., District Council Chief, NGOs.

10. **Handicraft Development:**
    **Responsibility:** DRDA, Forest Department, Women's group, Handicraft institutions, Deptt. of Industry.

11. **Effective Management of Forest Areas:**
    **Responsibility:** Forest and Police Department, NGOs, Scientific and Social Institutions, Finance Department.

12. **Restoration of Degraded Forest Areas:**
    **Responsibility:** Forest Department, Police Department, NGOs, Scientific Institutions, Local people, State Planning Commission.

13. **Monitoring and Research on Biodiversity:**
    **Responsibility:** Forest Department, Scientific Institutions, NGOs with scientific background,

14. **Human Resources Development:**
    **Responsibility:** Forest Service College, Scientific Institutions, NGOs, Assam Public Service Commission,

15. **Tourism Development:**
    **Responsibility:** Assam Tourism, District Council, Forest Department, Indian Tourism, Press, TV.

16. **Public Participation In Biodiversity Conservation:**
    **Responsibility:** Educational Institutions, NGOs, Forest Department, Local Social leaders, Press, Film Makers.

**The Project team suggested five broad strategies for biodiversity conservation in Karbi Anlong.**

**Strategy 1:** Involve District Council association with NGOs: Actions...1.Form an executing group for various strategies, 2. Form a separate monitoring group for various strategies, 3. Always discuss with local bodies before taking any developmental projects, 4. Give technical and financial support

**Strategy 2:** Involve Women in decision making bodies: Actions....1.Promote sericulture,2.Establish medicinal plant garden, 3.Promote weaving .

**Strategy 3:** Establish Market links: Actions...1. Sale product through Govt. outlets in various parts of the country, 2. Promote ecotourism, 3. Establish a "Model Karbi Village".

**Strategy 4:** Raise the Education level : Actions...1. Establish more educational institution,2.Bring outside expert with good incentives to these institute, 3.Bring more rural women to these institute with various free facilities, 4.•Teach Biodiversity Conservation Education as a compulsory subject

**Strategy 5:** Strict Law Enforcement Actions..1.Ensure Biodiversity Protection with formal NGO monitoring, 2.Training of Law enforcement authorities for various Biodiversity Conservation Laws, 3.Training of local advocates for various Biodiversity Conservation Laws

## Gap Analysis

Gaps were seen and documented in between the actors who are directly involved in the conservation process and the group who has knowledge regarding the conservation process at local level.

# Ladakh Sub-State Site (Jammu & Kashmir) Biodiversity Strategy and Action Plan

Coordinating Agency: Ladakh Ecological Development Group, Leh

Situated at the confluence of two of the world major bio-geographical realms, the pale arctic to the North and the Indo-Malayan to the South, and despite extreme climatic conditions, Ladakh is endowed with a diverse fauna and flora, both wild and domesticated, with high percentage of endemic species, indigenous varieties and breeds. Within India, Ladakh constitutes the bulk of the Trans-Himalayas, one of ten main bio-geographic regions in the country, distinguished by highly evolved life forms, including a variety of aromatic and medicinal plants, several wild relatives of domesticated plants (barley, gooseberry, garlic.) and animals (four species of wild sheep and goats) and a charismatic mega-fauna, still preserved its entirety, unlike in most other parts of the world (Wild Yak, Tibetan Wild Ass, Antelope and Gazelle, Snow Leopard, Brown Bear, Wolf, Wild Dog, Black-Necked Crane, Bar-Headed Goose). Ladakh is a repository of vibrant traditions and indigenous knowledge which have evolve in harmony with its natural wealth.

For these reasons, Ladakh has been selected as one of only eighteen Sub-State sites in the country, for which implementation of a biodiversity Strategy and Action Plan (BSAP) is deemed imperative in view of impending environmental threats. These threats, brought about by rapid and often unsustainable modes of development as well as dramatic increases in human and livestock population, have resulted in significant losses in biodiversity affecting both natural and agro-ecosystem. Several species of medicinal plants, wild trees and shrubs have become endangered due to over-collection and habitat degradation. Indigenous Juniper, Willow and Poplar woodlands, have been reduced in numbers and distribution and largely replaced by plantations of faster growing exotic species. Several local crop varieties (wheat, barley) and breeds (e.g. sheep), have also been displaced or become extinct following the introduction and widespread use of exotics, High Yielding Varieties and crossbreads. At least four local varieties of Apricot, a tree indigenous to Ladakh and neighbouring regions, are under threats. Rare and endemic species of wild fauna such as the Black - Nacked Crane, Tibetan Gazelle and Antelopes, Wild Yak, Great Tibetan Sheep, have been pushed to the brink of extinction under the pressure of uncontrolled activities such as overgrazing, poaching and tourism. Such erosion of the natural resource base poses a major challenge to the long term development and prosperity of Ladakh. However, large scale environmental degradation and biodiversity loss is a relatively recent phenomenon in Ladakh. There are thus good prospects to mitigate these threats if effective biodiversity conservation and sustainable development steps are taken rapidly and decisively. This is the rationale for the elaboration of a Biodiversity Strategy and Action Plan for Ladakh Sub-State.

Ladakh BSAP forms an integral part of a major Project of the Ministry of Environment and Forests, the National Biodiversity Strategy and Action Plan (NBAP) undertaken throughout the country over the past three years. Execution of the Project, funded by the Global Environment Facility (UNDP), has been entrusted to a Technical and Policy Core Group coordinated by an NGO, Kalpavriksh and administered by a private concern, Biotech Consortium India Ltd. A series of planning documents are being produced under the Project which focused on the conservation of India's biodiversity, the sustainable use of its biological resources and the promotion of equity in access to and benefits accruing from them.

This unique endeavour is part of the world wide effort for biodiversity protection, initiated at the Rio Summit of 1993 with the adoption of the Conservation on Biological Diversity by almost every country on earth. This treaty commits each signatory country to develop national strategies, plans or programmes for the conservation and sustainable use of Biological Diversity.

In Ladakh, a major local NGO, Ladakh Ecological Development Group (LEDeG), has been entrusted with the task of coordinating preparation of the Sub-Plan. To this end, from early 2001 onwards, LEDeG has conducted a series of meetings, workshops, field level interactions... involving all main stakeholders and focusing on key aspects of biodiversity protection. These include:

- Conservation, indigenous knowledge and sustainable use of biological resources. The main emphasis has been laid on medicinal plants, Seabuckthorn (Hipophae sp), a widespread indigenous fruit bearing bush with important nutritional and commercial potential, natural grassland, woodland and wetlands and protection of local races of cereals, fruits crops and livestock:

- Conservation of wild fauna diversity ;

- Balancing conservation needs with controlled tourism and infrastructure development.

The consultation process culminated in a series of workshops held in Leh from October to December 2002 during which a detailed Biodiversity Strategy and Action Plan was elaborated.

## Current Biodiversity Initiatives

**Several Initiatives to Conserve Ladakh Biodiversity** are currently being attempted by different stakeholders.

### Local Communities

Local communities in different parts of Ladakh are endeavouring to protect the biodiversity of their region, often in association with NGOs. Prominent among these efforts are-pledge taken by the people of Tso Moriri region to protect their lake as a sacred gift for a living planet, - the registration by the same community of a local conservation trust with WWF support, - the construction of predator proof corrals by village communities of Hemis National Park with support of the Snow Leopard Conservancy and - the formation of the Indus Tsesta Lulu Society to promote sustainable use of Sea Buckthorn by local women living in the main Sea Buckthorn growing belt.

### Government

Government initiatives include:- the designation of Lake Tso Moriri as a wetland of international importance under the international Ramsar convention, - the incorporation of the same lake and other wetlands in Ladakh protected area network - the forest department proposals to establish high altitude medicinal plants conservatories and - the wildlife department proposal to streamline and significantly increase compensation packages for local farmers in cases of livestock predation.

### Armed Forces

Ladakh main Army Corps has issued strict environmental codes of conduct and established eco-cells in different parts of Ladakh to focus on environmental concerns and act as an interface with other biodiversity stakeholders.

### NGOs

A strong environmentally oriented NGO sector has taken a number of initiatives aimed at biodiversity conservation and ecologically based development.

WWF has been conducting a major initiative for protection of Ladakh high altitude wetlands since 1999. The objective is to develop a strategy and action plan for conservation of the wetlands rich biodiversity involving the local communities at every stage. Result already achieved include the declaration of Tsomoriri as a Ramsar Site and the establishment of a local conservation trust committed to protection and sustainable development of the region. WWF further plans to introduce eco-tourism certification schemes for tour operators and assess development programmes, policies and institutions from an ecological stand point.

As part of its snow leopard conservation initiative, the Snow Leopard Conservancy, (SLC), is providing technical and financial support to local communities of Hemis National Park, to render livestock corrals predator proof, train local herders to improve day time guarding and promoting children environmental education. At the same time SSC is promoting skill training in community based tourism, in order to enhance local income, reduce dependency upon livestock and thus help to alleviate grazing pressure.

Other than biodiversity per se, Ladakh Ecological Development Group (LEDeG) main initiatives focus on promoting renewable energy and appropriate technologies, ecologically based agriculture, environmental education and women empowerment.

### Research Institutions

As part of its Ladakh conservation initiative, the Wildlife Institute of India (WII) is carrying out research on Ladakh flora and fauna, with a focus on biodiversity rich areas, endangered species, impact of human use and human - wildlife conflicts. WII is actively engaged in local capacity building, providing training in management planning for protected Areas, wildlife monitoring techniques etc. Its latest initiative, in collaboration with IUCN and ICIMOD, is to promote appropriate rangeland management policies for Ladakh, balancing the needs of local herder communities and wildlife conservation goals.

Recent initiative of the Sher-e-Kashmir University Regional Agricultural Research Station include vegetation surveys and compilation of herbarium for different parts of Ladakh and *ex situ* cultivation of indigenous trees and shrubs in its arboretum.

The Field Research Laboratory (FRL) of the Defence Research and Development Organisation is focusing several of its research programmes on biodiversity including:

Field studies and *ex situ* cultivation of medicinal plants – developing propagation techniques and fruit processing of Sea Buckthorn, and *ex situ* conservation of local horticultural varieties (mainly apricot and apple).

## Gap Analysis

Important Gaps Exist in the Knowledge of Ladakh biodiversity, the threats it is submitted to and means for its long term protection.

1. There are critical gaps in the knowledge of the range, distribution and status of habitats, landscapes and ecosystems and of species and races within them.

   Information is specially lacking in the case of endemic, rare and endangered medicinal plants, indigenous crops and breeds, wild ungulates and lower taxonomic groups like non-vascular plants and invertebrates. Such data is critically needed to develop appropriate conservation plans. Also severely lacking is detailed quantified information on the impact on biodiversity of recent developmental activities and socio-economic changes such as the introduction of modern agricultural technologies, infrastructure development, tourism, armed forces establishments, dramatic rises in human and livestock population, urbanization.

2. There is a general lack in availability and dissemination of biodiversity information, translating in turn into a lack of awareness of the importance of biodiversity amongst the main stakeholders and the general public. This is most evident in: the poor showing of indigenous biodiversity in school curricula – the extent of banned activities and extractive uses taking place inside Protected Areas for want of clear delineation and ignorance of existing regulations and - the absence of any facility which could act as a repository of biodiversity information and research findings concerning Ladakh.

3. Major gaps exist in biodiversity conservation management both inside and outside Protected Areas (PAs).
   - PA management deficiencies derive from: their very large size (up to 5000km) – the lack of clear delineation and zonation, - mismatch between PA coverage and threatened species distribution and between strict protection categories (National Park, Wildlife Sanctuaries) and actual land use (livestock grazing, tourism, military use...) – the lack of trained staff and - the absence of management plans.
   - There is no statutory protection for biodiversity rich areas such as wetlands and natural woodlands situated outside PAs and a misguided emphasis on *ex situ* rather than *in situ* conservation as regards in particular medicinal plants and local crop varieties. Community Conserved Areas such as grazing reserves are not officially recognized mostly due to the absence of clear tenure rights.

4. **There is insufficient understanding of the inherent value of biodiversity, and of the importance of sustainability in biological resources use amongst all major stakeholders. This is reflected in the precarious status of Ladakh natural habitats and wild species, mainly due to over collection and destructive harvesting techniques (medicinal plants and Sea Buckthron barries), reclamation for forestry and agriculture, poaching etc. Similarly the displacement or extinction of several local varieties and breeds and the lack of adaptive research aimed at harnessing their genetic potential denote a lack of interest and knowledge of the value of local races amongst development agencies and research institutions.**

5. The general emphasis on (eco-tourism) the new development mantra of line agencies, NGOs and research institutions alike, denotes a lack of awareness and understanding of the serious impact that the fastest developing industry in the world can have on biodiversity areas and the socio-culture fabric of society.

   Though eco-tourism is a form of the industry respectful of the environment , the common vision and thrust of the main stackholder remain to increase the flow of visitor to biodiversity rich and environmentally fragile areas, develop ancillary infrastructure such as roads and way site facilities and generally development these areas as premier (eco-)tourism destination, all of which have important detrimental effects on biodiversity.

6. Critical gaps exist in both availability and implementation of effective policies and regulations in such key areas as: conservation of biodiversity outside Protected Areas(PAs) – conservation of local crop varieties and breeds, - infrastructure development in PAs and other biodiversity areas,- detrimental activities like biota collection, trade in wildlife products, sale of fossils and artefacts, dumping of waste – trans-boundary collaboration between Ladakh and neighbouring Tibet to protect endangered species and exchange information and germplasm of local local crops and breeds – community participation in biodiversity conservation including legal provision for security of land tenure and establishment of Community Conserved Areas.

7. There are important gaps in institutional and human capacity building at most levels:- community based organisations lack

capacity and support to protect their biodiversity assets and develop eco-tourism management skills... – there is no single functionary or facility within the administration (LAHDC) with overall responsibility for biodiversity conservation – with over 17000km if protected Area to manage, the wildlife department is grossly under-budgeted,-staffed,-equipped and trained for the task. – agro-horticultural agencies and research institutions lack R&D capacity to conserve indigenous domesticated biodiversity and develop improve races based on the utilization of local genetic traits – there is a lot of interest in but no capacity for eco-tourism and for monitoring/regulating tourism at either departmental or tourism industry levels.

8. Insufficient co-ordination between stakeholders combined with the multiplicity of government agencies dealing with biodiversity protection seriously hamper conservation and enforcement.

## Strategy & Action Plan

**Based on the Gap Analysis** outlined above, the main stakeholders and other major actors have jointly elaborated a set of conservation strategies and an action plan designed to translate these strategies into actual biodiversity protection on the ground. For ease of operation, the plan clearly spells out by whom, when and where the agreed actions are to be implemented as well as financial requirements.

**Strategy:** Improve Ladakh Biodiversity Knowledge Base

- Build up the knowledge base of Ladakh biological diversity, its characteristics and status, current uses, threats and conservation needs through compilation of thorough inventories and in depth field studies:
- Conduct biodiversity oriented research and monitoring with a special focus on threatened habitats, species and races and traditional knowledge systems.

**Action:** Research institutions, concerned line departments NGOs local communities.

**Strategy:** ***Promote Conservation and Sustainable Use of Wild Plants and Local Domesticated Crops and Breeds.***

- Protect biological resources, such as medicinal plants, wild fodder crops, Sea Buckthorn, through establishment of Community Conserved Areas/Protected Areas and awareness and capacity building of local communities:

- Protect domesticated biodiversity (local crop varieties and breeds) through support to local farmers for *in situ* conservation as well as *ex situ* cultivation, germ plasm conservation, selective breeding and building up the capacity of concerned department and research institutions for adaptive research aimed at harnessing the genetic potential of local races.

**Action:** LAHDC, concerned line departments, NGOs, research institutions, community organisations, industry.

**Strategy:** ***Enhance Protected Area Network and Ensure Community Participation in Management.***

- Upgrade the conservation status of biodiversity rich areas including natural grasslands, woodlands, wetlands and threatened species within them, by incorporating them in the PA network and establishing Community Conserved Areas (CCAs) where local communities can develop a real stake in conservation;

- Improve management planning by evolving co-management strategies through community empowerment and building up the wildlife department managerial capacity in terms of human resources, skills and equipment:

- Clearly declineate and rationalize PA/CCA boundaries focusing on prime habitats and threatened species distribution and abundance.

- Promote the adoption of flexible PA categories such as Biosphere Reserves which allow for graded protection of different parts of the landscape and sustainable resource use in consonance with existing land use.

**Action:** Wildlife and forest deptt., local communities, WII, WWF, SLC and other NGOs

**Strategy:** ***Reduce Threats and Impacts on Biodiversity***

- Enhance wildlife and habitat protection through control of extractive uses and effective prohibition of destructive uses such as encroachment on wildlife feeding and breeding territories, biota collection and poaching, dumping of waste and off road driving.

- Minimize human-wildlife conflicts by: building the capacity of local communities for improved livestock management and protection – enhancing alternative livelihoods opportunities such as community based tourism and improving wildlife depart-

ment compensation policy pertaining to livestock predation.

- Develop and implement a clear policy to strictly limit and control infrastructure development in biodiversity areas including natural grassland & woodland, wetland & agriculture land. Promote the systematic use of Environmental Impact Assessment prior to any developmental intervention including introduction of exotics in the environment.

**Action:** LAHDC, line departments, local communities, NGOs Armed Forces and Police.

- Encourage community based and eco-friendly forms of tourism as a means to minimize impact on biodiversity and promote greater community control and more equitable returns to local people. To this end:- regulate camping and infrastructure development – improve pack animal and waste management in tourist areas – support the formation of community based tourism and conservation organisations and - provide training to local communities in wildlife/nature guiding skills, camping and home stay management , local food production handicrafts:

- Enhance biodiversity conservation and management capabilities through training and awareness programmes aimed at key stakeholders including youth and women folk, tour operators and staff, tourist and development agencies. Evolve environmental codes of conduct to be applied by the stakeholders:

- Improve coollaboration of the armed forces with other biodiversity stakeholders. To this end: Step up biodiversity awareness campaign directed at the forces, provide training in conservation and monitoring and conduct joint surveys in remote/border areas regularly patrolled by forces.

- Promote sound environmental policies, which acknowledge and strengthen the role played by local communities, women in particular, in biodiversity conservation. Ensure as part of these policies, security of tenure for pastoral communities;

- Promote institutional capacity building to ensure coordination between stake holders, efficient enforcement of biodiversity protection and dissemination of information. To this end: Organize regular stakeholder meetings to review BSAP implementation and share research findings, - develop a policy for trans-boundary collaboration with neighbouring Tibet for wild and domesticated biodiversity conservation, - incorporate biodiversity conservation in LAHDC, Act and create a facility, within LAHDC or a suitable NGO, to act as repository of biodiversity research, including traditional knowledge, conducted in Ladakh.

**Action:** LAHDC, line department community based organisation NGOs, research institution, armed forces and police.

# Lahaul Spiti & Kinnaur Sub-State Site (Himachal Pradesh) Biodiversity Strategy and Action Plan

Coordinating Agency: Department of Tribal Development, Shimla

## Introduction

Biodiversity or Biological Diversity is the variability within and between all microorganisms, plants and animals and the ecological system, which they inhabit. It starts with genes and manifests itself as organisms, species, populations and communities, which give life to ecosystems, landscapes and ultimately the biosphere. Biodiversity provides a fundamental base to the mountain agriculture and to the overlap economic systems. It is the source of resiliency and regeneration, necessary for sustainability of agricultural systems. It is the ultimate basis for local self-sufficiency, and a global asset, bringing benefits to people in terms of material welfare in more ways than we realize.

District Kinnaur and Lahaul-Spiti of H.P. have been ideally chosen as one of the 17 NBSAP Sub-State Sites because of its uniqueness of climate, geography, topography and habitation not only in the country but also in the whole world. According to census, the area of Kinnaur district is 6,401 Sq. Km (10.31% of the state) while the area under Lahaul and Spiti district is 13,835 Kms (24.85%) of total area of Himachal Pradesh, thus covering 35.16 percent of total geographical area.

The climate of this area can be categorized into spring, autumn, summer and winter seasons. Natural springs and rivers get frozen in winters. Lahaul valley and Pir-Panjal ranges experience heavy snowfall throughout the winters almost for six months, while Spiti has very less precipitation during winters. Even, this lowers the mercury level to -40° C. However, a temperature of -20° C is normally observed. Summers are associated with strong winds (40 to 60 km/hr) causing dust storms. Quite high diurnal temperature variations during day and night are observed in summer season. The excessive ultraviolet and infrared radiations coupled with strong chilly winds turn the exposed parts of skin to black.

Both the valleys are, indeed, star studded with enormous rivers and rivulets. The main amongst the numerous rivers in Lahaul being Chandra river which originates from Chandra Tal near Baralacha and extends downward upto Tandi, the other river is the Bhaga which originates from Suraj Tal opposite Baralacha and meets Chandra at Tandi and beyond Tandi the two rivers amalgamate into Chandra Bhaga or Chenab river, adding numerous rivulets on the way until they leave the district at Thirot Nallah to Zangi and onwards to Pakistan and ultimately immortalizes itself into the Arabian Sea. In the Spiti valley, as the name indicates, the main river is the Spiti, which originates from the heights of Kunzum La and swells on its way with numerous rivers and rivulets joining it. The other famous river joining is the Pin River, which has its source near Bhabha pass and ultimately Joins Spiti river from the right side. From the left side the rivers that join the Spiti river are Lingti, Gumto and Prarchu.

Objectives of the Sub-State Site Biodiversity Strategy and Action Plan are inventorization of existing species of wild animals and plants in the area. Medicinal and aromatic plants needs top priority and to provide successful and economically viable alternatives to attract people for conservation of biodiversity.

## Problems Relating to Sub-State Site Biodiversity:

- Destruction of habitats due to deforestation and excessive landslides as a consequence of construction of large hydroelectric projects, roads and buildings.
- Due to extreme and prolonged winters, heavy demand for fuel wood takes toll of existing vegetation, shrubs, bushes and perennial species along with their roots.
- Unscientific and overexploitation of medicinal and aromatic plants results in creating blanks and poor regeneration.
- Lack of knowledge and appreciation of the importance of biodiversity existing in the area (people have knowledge only about the plants, which they use for one or the other purpose).
- Excessive grazing by domesticated and migratory animals during spring and summer season.

- Overexploitation of important medicinal and aromatic plants/herbs for pharmaceutical industries.
- Fading cultural practices of biodiversity conservation such as community regulations on high altitude grasslands and ban on mass harvest of certain medicinal plants before seeding.
- Inadequate infrastructure for vocational as well as higher education, research and training relating to biodiversity.
- Deep-rooted religious and rigid traditions hampering adoption of new innovations.
- Lack of awareness on biodiversity access and benefit sharing.
- Lack of mechanisms to deal with emerging challenges of Intellectual Property Rights (IPR) issues and genetically modified organisms.
- Poor efforts towards promotion of sustainable livelihood like providing economic incentives to the community leaders now engaged in potato and Apple co-operatives. These leaders otherwise, may take a lead in promoting sustainable utilization of resources and conservation of biological diversity.
- Propagation of monoculture in the form of plantation of Salix and Poplars which is detrimental as the existing and well-adopted species remain neglected namely; Juniperous, Betula, Chilgoza, Deodar and Kail etc.
- Use of chemicals in the form of fertilizers, pesticides, fungicides, insecticides etc. in agriculture land posing threat to the biodiversity.

## Ongoing Biodiversity Initiatives in the Sub-State Site:

A large gamut of biodiversity friendly programs such as desert development (DDP), watershed development, afforestation, plantation, soil and water conservation, pasture development, fishery, yak breeding etc. are going on in this Sub-State Site. Some of the ongoing biodiversity related initiatives being carried out by different sectors are as follows:

- Afforestation under DDP in Spiti and Pooh region is continuing for about 20 years.
- Afforestation by State Forest Department under Joint Forest Management Scheme.
- Under the Non-timber forest product scheme (CSS) being run in Spiti, the forest department is conserving the M&AP species and some species are being planted in gap plantation areas wherever irrigation is possible.
- About 50 hectares of forestland in Spiti is being planted every year under *Hippophae* (Seabuckthorn) and about 50,000 seedlings have been raised in nurseries for future plantations.
- Wild animals are fully protected under the Wild Life Management of Pin Valley National Park and Kibber Wild Life Sanctuary areas. As a result, the population of Snow Leopard, Blue Sheep, Ibex and Tibetan Wolf etc. has shown significant improvement over the last 3 years.
- Efforts are being made by Dr. Y.S. Parmar University of Horticulture and Forestry to produce seed and planting material of high altitude medicinal and aromatic plant species having great demand from drug industries in its herbal garden at Rahla, District Kullu.
- Research is being carried out for regeneration of Chilgoza and Junipers species.
- Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan, H.P. have also standardized propagation techniques for Seabuckthorn by complete screening of germplasm, propagation technology through cuttings, seeds, roots and suckers, The estimation of biomass production, nutritional value oil, seed oil and post harvest technology for pulp, jam, squash, hard drinks etc. have been standardized.

## Gaps, Strategies and Actions for Conservation of Biodiversity in Sub-State Site

| S. No. | Issues | Strategies | Actions | Responsibility |
|---|---|---|---|---|
| 1. | There is lack of information and awareness among the stakeholders about importance of biodiversity both wild and domesticated (existing vegetation and cultivated crops including pseudo cereals) medicinally/ aromatic herbs, traditional knowledge about plant uses. | • Inventorization of existing vegetation, crop cultivation, herbs and cereals (including pseudo-cereals).<br>• Identification of resource persons and thematic groups.<br>• Holding of workshops and awareness camps. | l Preparation of inventory<br>l Construction of educational material<br>l Preparing programme schedules for training and workshops for specific target groups. (teachers, students and stakeholders).<br>l Steps to associate local women and weaker sections for conservation of biodiversity. | – UHF,<br>– HPU,<br>– HPKV,<br>– SCSTE,<br>– TDD,<br>– NGO's |
| 2. | Unscientific methods of harvesting medicinal and aromatic plants and poor control on contractors for medicinal plants collection resulting into loss of biodiversity. | l Standardization of post harvest technology in terms of drying, grading, packing, storage, fumigation and transportation of the agriculture/horticulture produce.<br>l Benefits of value additions.<br>l Propagation of medicinal and aromatic plants on scientific basis.<br>l *in situ* and *ex situ* development and conservation of medicinal/ aromatic plants. | l Study of existing pattern of grading packing and storage of horticulture and agriculture produce.<br>l Returns on value addition.<br>l Collaboration with IHBT Palampur and Herbiculture farm, Jogindernagar for scientific propagation and harvesting of medicinal/ aromatic plants.<br>l Introduction of latest technology in pre and post harvesting activities. | – FD,<br>– UHF,<br>– TDD,<br>– PRI's,<br>– NGO's,<br>– MM<br>– SCSTE |
| 3. | Lack of knowledge about the importance of sustainable minor forest produce (NTFP) development and related research. | Research and development activities initiated to disseminate knowledge about the importance of NTFP. | Develop computerized information system with regulated access. | – UHF,<br>– R&D Inst.<br>– FD<br>– SCSTE<br>– PRI's,<br>– NGO's<br>– TDD |
| 4. | Lack of adequate funds, facilities, trained manpower, long-term research plans, sand appropriate extension facilities are the causes of tremendous technologies gaps. | • Recasting of tribal sub plans for creation infrastructural facilities<br>• Capacity building of man power<br>• R&D and extension of appropriate technologies. | • Channelization of funds out of tribal sub plans for infrastructural development.<br>• Programme for Capacity building of manpower.<br>• Carrying our R&D activities.<br>• Extension of technologies to the targeted areas. | – UHF,<br>– HPKV,<br>– TDD,<br>– MoEF,<br>– SCSTE,<br>– FD |
| 5. | Poor co-ordination amongst development plan executing bodies, local communities, and research and academic institutions is adversely affecting biodiversity conservation initiatives. | • Brining about effective coordination in various Line Departments, Research Institutes and the stakeholders. | • A specific Action Plan to ensure coordination and co-action amongst the Line Departments, various research institutions with the association of stake-holders.<br>• To identify the gaps for poor coordination. | – UHF,<br>– HPKV,<br>– R&D Inst.,<br>– Panchayats<br>– FD,<br>– HD,<br>– AD<br>– Ayur. Dept.,<br>– SCSTE,<br>– LC<br>– TDD. |

| S. No. | Issues | Strategies | Actions | Responsibility |
|---|---|---|---|---|
| 6. | Transformation from joint families to a nuclear family system leading towards erosion of traditional knowledge base. | To document traditional knowledge base at local levels in the area. | Documentation of traditional knowledge based on livelihood, lifestyle and culture | – UHF,<br>– HPKV,<br>– HPU,<br>– NGO's,<br>– PRI's,<br>– SCSTE,<br>– LC,<br>– M M |
| 7. | Use of subsidized chemicals in the form of fertilizers, pesticides, fungicides, insecticides etc. in agriculture lands is also causing a great threat to biodiversity. | • Check/stop excessive use of chemicals in the form of fertilizers and pesticides/ insecticides/fungicides.<br>• Biofertilizer use and organic farmingto be popularized/practiced in the area. | • Enhance the use of organic fertilizers and biofertlizers.<br>• Capacity buildidng of stakeholders for use of organic farming and biofertilizer use in the area. | – UHF,<br>– HPKV,<br>– NGO's,<br>– PRI's,<br>– AD<br>– HD<br>– SCSTE,<br>– TDD |
| 8. | No mechanism to deal with emerging challenges of Intellectual Property Rights (IPR) issues and Genetically Modified Organisms. | Mechanisms to be established for emerging challenges of IPR's in the Tribal areas. | Documentation of newly emerging challenges such as IPR's and GMO's. | – UHF,<br>– TDD,<br>– IARI,<br>– HPKV,<br>– R&D Inst.,<br>– Panchayats<br>– SCSTE |
| 9. | Inadequate efforts to biodiversity enterprise based enhancement for improvement of quality of life of local communities. | Exploration and identification of biodiversity based enterprises. | • Identification of biodiversity based enterprises. | – Panchayats,<br>– NGO's,<br>– R&D Inst.,<br>– HPU |
| 10. | Lack of control over landuse for the benefit of the society. | • Identification and inventorization of landuse both for government and private.<br>• Enforcing scientific land use through appropriate legislation. | • Application of alternative scientific landuses keeping in view government policies.<br>• Study of existing legislation and there usefulness in this context.<br>• Effective control of soil erosion due to wind and water. | – TDD,<br>– FD,<br>– SCD,<br>– PRI's |
| 11. | Destruction of habitat due to the construction of large hydroelectric dams, roads and buildings had lead to excessive landslides causing a great threat to biodiversity. | Environment impact assessment to be done before taking up any development programmes in the area namely; construction of roads, buildings and establishment of hydroelectric power projects. | Environment impact assessment for establishment of Hydroelectric dams, roads, buildings other development projects to be carried out before undertaking any development in the area. | – MoEF,<br>– FD<br>– TDD,<br>– PRI's,<br>– PWD,<br>– HPSEB,<br>– TDD,<br>– NGO's |
| 12. | Due to extreme and prolonged winters, heavy demand for fuel wood takes toll of existing vegetation, shrubs and perennial species along with their roots | Fuel wood, coal and kerosene, LPG arrangement to be done in bulk and non-conventional energy resources to be utilized in the area. | • Effective mechanism to be developed for use of non-conventional energy resources.<br>• Solar passive housing technology popularization for construction of Govt./ private buildings. | – Himurja,<br>– HPSEB,<br>– TDD,<br>– DCS,<br>– UHF,<br>– SCSTE |

| S. No. | Issues | Strategies | Actions | Responsibility |
|---|---|---|---|---|
| 13. | High rate of soil erosion due to wind and water in cold deserts, flash floods in rivers in Kinnaur and Lahaul leads to biodiversity loss in the area. | • Control of soil erosion.<br>• Protection and conservation of glaciers.<br>• Introduction of improved and conducive varieties of shrubs and grasses. | • Establishing cause and effects of soil erosion.<br>• Application of effective measures to check/control soil erosion.<br>• Plantation of conducive varieties of shrubs and grasses at strategic places. | – FD,<br>– NGO's,<br>– SCSTE,<br>– HD,<br>– UHF,<br>– HPKV<br>– IARI,<br>– ICAR |
| 14. | Low precipitation in the form of rain during spring and summer and early snowfall hampers seed development and proper growth and development of plants. | • Strengthen watershed irrigation facilities.<br>• Programme to be properly executed and managed by involving local communities based upon their needs. | • Plants which require less water (xerophytes) to be identified and grown in the area under afforestation programme.<br>• R&D to be carried out for development of improved agricultural seeds. | – FD,<br>– HD,<br>– TDD,<br>– R&D Inst.,<br>– UHF,<br>– HPKV,<br>– LC |
| 15. | Excessive grazing by domesticated and migratory animals during spring and summers also cause a great loss to biodiversity in the area. | Controlled grazing to be practiced keeping in view the carrying capacity of the area for the animals and livestock at local levels. | • Controlled grazing as per the carrying capacity (location specific) for regulation/ management of grazing lands/pastures.<br>• Assessment/estimation of carrying capacity of pastures/ grazing lands. | – FD,<br>– Panchayats,<br>– M M,<br>– TDD,<br>– FD |
| 16. | Landslides due to flow of glaciers sweeps away the landmass along with the vegetation cover is also causing loss to the biodiversity. | Control glaciers sweeping the landmass along with vegetation in the area for check on loss of biodiversity. | • Research to be initiated to check the flow of glaciers around inhabitations in the area.<br>• To demonstrate control of glaciers around the villages.<br>• Capacity building through training local people for controlling/combating glaciers. | – SASE.<br>– GSI,<br>– MoEF,<br>– SCSTE,<br>– TDD,<br>– Local Communities |
| 17. | Diversion of glacial water from the open towards agricultural fields leads to poor growth of species growing in such areas. | • Making effective use of glacial melt water in the agricultural/ horticulture fields of the farmers.<br>• Demonstration of water storage technologies. | • Storage tanks to be constructed in which water heating through use of non-conventional energy sources to be utilized for maintaining the temperature for irrigation in the cultivable fields in the area.<br>• Popularization of irrigation through bamboo technology. | – IPH,<br>– SCSTE,<br>– TDD,<br>– Himurja,<br>– LC |
| 18. | Extreme variation in diurnal as well as seasonal temperatures, strong velocity of winds, low oxygen content in the air, heavy influx of infra-red and ultra violet rays and presence of coarse, highly porous, immature sandy soil are also responsible | • Efforts should be laid for introduction of local varieties (indigenous), which can withstand the harsh conditions at the respective areas.<br>• R&D to be initiated for development of grasses species/varieties which can | • Identification of species (exotic) as well indigenous for plantation in the area.<br>• Development of improved varieties from local grasses for introduction in the area through R&D. | – UHF,<br>– HPKV,<br>– IHBT,<br>– FD,<br>– LC |

| S. No. | Issues | Strategies | Actions | Responsibility |
|---|---|---|---|---|
| | for low productivity and loss of biodiversity. | withstand extreme variation in diurnal as well as seasonal temperature. | | |
| 19. | Transformation from diversified animal- crop system to a system of monocultures of Apple/Pea/ potatoes keeping just jersey cows as compared to a variety of traditional livestock assemblage leading towards unrecoverable erosion of local genetic breed and cultural diversity. | • To grow and popularize multiple crops for different agricultural production system.<br>• Facilitate the conservation of indigenous breeds of livestock resources.<br>• Encourage people for maintaining local biodiversity.<br>• Provide incentives to the local people for traditional farming. | • Local people to be encouraged for maintaining mixed cropping pattern and discouraging monoculture in the area.<br>• Traditional crops cultivation to be popularized for maintaining the local biodiversity.<br>• Lay down policy/legal guidelines<br>• Provide incentives/ disincentives | – F D,<br>– AD,<br>– AH,<br>– TDD,<br>– SCSTE,<br>– Local communities,<br>– NGO's |
| 20 | Hunting is still prevalent in the area Inspite of putting a ban by the Govt. | • Stringent applications of existing Laws to curb, poaching and hunting. | • Increased vigilance to discourage illegal hunting and poaching.<br>• Association of stakeholders/ local communities against illegal forest activities.<br>• Effective measures to prevent damage to the biological environment. | – FD,<br>– Panchayats,<br>– NGO's |
| 21. | Forest fire is a problem in the area. | • Training local people for vigil/ protection of forest from fire.<br>• Creation of awareness about loss of biodiversity due to forest fire amongst local people. | • Creation of awareness in school/local people.<br>• Train local people for combating forest fire.<br>• Constitute forest fire fighting/management committees at local level. | – FD,<br>– NGO's,<br>– PRI's,<br>– TDD,<br>– SCSTE |
| 22. | Local livestock rearing declining in the area. | • To frame policy for encouraging rearing of local livestock in the area.<br>• To give incentives for rearing of local livestock.<br>• Increase the rates of wool from the livestock reared at local level. | • Package of incentives through policy framing.<br>• Frame policy for encouraging rearing of local livestock products.<br>• Livestock based small industries promotion. | – AH,<br>– Panchayats,<br>– NGO's,<br>– MM,<br>– TDD. |
| 23. | Woolen rates are very low and there is lack infrastructure developed/ arrangement for processing wool and hosiery/handloom based industries. | • Strengthen the local handlooms with improved equipments/tools.<br>• Create infrastructure for value addition of the local wool and sheep/goat based products. | • Providing remunerative prices to the sheep/goat rearers.<br>• Local Handlooms to be upgraded.<br>• Value addition of wool/ sheep/ goat based products. | – WFI,<br>– HHC,<br>– TDD,<br>– PRI's |
| 24. | High costs of timber imported for construction and trees, shrubs, bushes and perennial herbs are used as fuel wood during prolonged winter season. | • Reduction of cost of imported timber.<br>• Apply complete ban on cutting of local trees, shrubs, and perennial herbs for use as fuel wood during the winters. | • Plantation of local timber trees on large scale in the area.<br>• Fuel wood from the other parts of the State mainly fallen trees in the forest due to damage caused by | – FD,<br>– TDD,<br>– PRI's,<br>– SCSTE,<br>– MoEF. |

| S. No. | Issues | Strategies | Actions | Responsibility |
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| | | | unprecedented snow, wind and other calamities arranged for making use as timber and fuel wood.<br>• Reduce timber cost to the TD right holders getting TD from other Districts. | |
| 25. | Impact of National and State Forest Policies negligible. | • Create awareness about the National and State Forest Policies amongst the local people in the area. | • Organization of workshops at Panchayat levels for implementation of the Forest Policieis of State/Center. | – F D,<br>– MoEF,<br>– SCSTE,<br>– TDD,<br>– PRI's,<br>– NGO's,<br>– MM |
| 26. | Lack of stakeholder's participation in Forest Management for livelihood. | • Stakeholders participation in joint forest management programme of the State Govt. to be made compulsory. | • Plan Action to encourage stakeholders to volunteer their association in joint forest management.<br>• Exploring possibilities of mandatory responsibility of the stakeholders. | – MoEF,<br>– TDD,<br>– SCSTE,<br>– PRI's,<br>– FD |
| 27. | Prevalence of feeling amongst the stakeholders that maintenance, preservation and regeneration of forests and other development activities carried out in the common land around the villages is only the State Govt. duty. | • Sensitize local communities about the need to protect, conserve and regenerate forest for their own benefit.<br>• Discouraging over dependence on govt. efforts and actions for protection of forests.<br>• Inculcating a sense of responsibility for voluntary participation in joint forest management. | • Generate mass awareness on need for larger forest cover.<br>• Sensitize and educate people on the possible disadvantages of forest felling, hunting and poaching. | – TDD,<br>– SCSTE,<br>– PRI's,<br>– NGO's,<br>– M M |
| 28. | Lack of policy for proper management of the wastelands, common property. Resources, encroachment and extraction of forest produce which leads to the problem of soil erosion. | • Inventorisation of Wastelands and Community properties.<br>• Status of use of these wastelands and community properties documentation.<br>• Management of the produce of these wastelands and Community lands.<br>• Management of the local forest produce. | • A long Term Action Plan for the optimum utilization of wastelands and community properties.<br>• Commercial Management of forest produce and bio resources | – FD,<br>– WDB,<br>– GOI,<br>– TDD,<br>– SCSTE<br>– PEI's,<br>– M M |
| 29. | Lack of methodology for recording and ascertaining the actual production of fruit crops in the area. | • Accurate production estimation of agro horticulture crops.<br>• Strengthen meterological data. | • Effective applications of Remote Sensing and GIS technology for accurate estimation of land produce (Agriculture and Horticulture).<br>• Complete mapping and inventorising land under horticulture and agriculture covers. | – GS,<br>– SCSTE,<br>– IMD |

| S. No. | Issues | Strategies | Actions | Responsibility |
|---|---|---|---|---|
| | | | • Up grading the meterological stations. | |
| 30. | Water in plenty is available in the area through river flowing and glaciers round the year especially during summer/crop growing season but irrigation is the major problem in Lahaul, Spiti and Pooh Sub-Divisions because of the shallow soil strata of the cultivable land. | • Popularize water harvesting for storage of running water.<br>• Encourage Hydram technology for lifting water from the river beds/running streams for irrigation purpose. | • Water harvesting technologies to be demonstrated and propagated by constructing water tanks and lifting water through Hydrams in the area for the irrigation purpose.<br>• Popularize use of Bamboo for irrigation purpose in the area. | – IPH,<br>– TDD,<br>– SCSTE,<br>– Himurja,<br>– F D |
| 31. | Grazing Lands/Pastures/ Grasslands shrinking scarcity of fodder and most of the area remain snow covered for more than half a year. | • Develop pastures/grazing lands through introduction of local varieties of grasses.<br>• Improve local grasses through R&D. | • Introduction of improved varieties of grasses in Pastures/grazing lands and in the fields of the farmers to be carried out.<br>• R&D for improvement of local grasses | – FD<br>– UHF<br>– HPKV<br>– AH<br>– HD<br>– A D<br>– SCSTE<br>– TDD |
| 32. | The local plants namely *Juniperus, Betula, Pinus geradiana*, Deodar, Kail etc. are not being propagated in the area and only two types of plants namely Willow and Poplar are presently being propagated. | • To promote specific species of planting material which could serve the local needs.<br>• Propagation of Juniperus, Betula, Deodar, Pinus geradiana alongwith other local plants in the area. | • Area specific nurseries involving local stakeholders will be developed for propagation of plants according to soil texture and climatic conditions.<br>• Proper plant makes to be worked out to cater to fuel and fodder needs of local inhatitants. | – UHF<br>– FD<br>– HICR<br>– TDD<br>– SCSTE |
| 33. | Govt. land in the area is put under agriculture by the local people (like Jhum cultivation) | • Frame policy for putting Govt. land under cultivation by the local people. | • Areas for putting Govt. land under agriculture to be demarcated at local level. | – TDD<br>– FD<br>– PRI's<br>– AD<br>– HD |
| 34. | No output is seen under the watershed programme in the area as lot of money is there under watershed and result is not satisfactory . | • Watershed programme to be executed with the involvement of local people.<br>• To ascertain goals and achieve in watershed development in the area. | • To involve local people in watershed development programme in the area.<br>• Impart training to local people for watershed management. | – FD<br>– AD<br>– AH<br>– HD<br>– PRI's<br>– MM<br>– NGO's<br>– TDD<br>– SCSTE |
| 35. | Traditional animal husbandry (Livestock decreasing in the area. | Provide incentives for rearing local animals (Livestock) i.e. Yak, Churu, Churi, Sheep, Goat. | • To workout a package for providing incentives. | – AH<br>– TDD<br>– MM<br>– NGO's<br>– PRI's |
| 36. | In Lahaul and Spiti area the potential of introduction of Apple and stone fruits not fully exploited. | • Encourage local farmers for introduction of Apple and stone fruits for cultivation through laying | • Demonstration trials in the farmers fields.<br>• Providing package of practice to local farmers for | – UHF<br>– HD<br>– TDD<br>– PRI's |

| S. No. | Issues | Strategies | Actions | Responsibility |
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| | | demonstration in their fields<br>• Distributing quality planting material alongwith package of practice for cultivation of the plants for Horticulture purpose. | growing horticultural plants in their fields.<br>• Monitoring regularly in the fields. | |
| 37. | Traditional crops cultivation decreasing and only selected commercial crops being grown in the area. | • Discouraging excessive use of chemicals in farm activities.<br>• Preparing proper crop rotation.<br>• Introduction of multi-cropping system and natural IPM techniques. | • Shot terms and long terms plans to educate and sensitize farmers on the adverse effects of chemical applications.<br>• Workout strata wise crop rotation schedules and mixing up crops for better commercial gains and soil conservation. | – AD<br>– HPKV<br>– MM<br>– PRI's<br>– NGO's<br>– TDD |
| 38. | No steps are being taken presently for protection of important wild animal species of Pangi and Lahaul (H.P.) and Kishtwar and Ladakh (J&K) | • Imposition of complete ban on hunting of wild animals.<br>• Identification and propagation of endangered species. | • A long term Action Plan for protection of wild life.<br>• Constitution of Special Task Force for safeguarding wild life.<br>• Building up a conducive environment for reproduction of wild life especially the endangered species. | – FD<br>– TDD<br>– SCSTE<br>– J&K Govt. |
| 39. | Nomadic graziers namely Gaddis, Gujjars, Pangwals grazing needs and problems at the boundary areas of J&K is continuing and threat of militancy is there from across the boundaries covering H.P. | • Over grazing by nomadic cattle and herds leading to land degradation.<br>• Appropriate fodder and grazing areas for the nomadic herds.<br>• Grazing pastures for specified numbers of cattle. | • Development of land for use by nomadic cattle and herds.<br>• Working out carrying capacity of the pasturelands.<br>• Action Plan for identifying and recording nomadic groups for use of the pasture lands. | – FD<br>– TDD<br>– SCSTE<br>– J&K Govt.<br>– Nomadic glaziers |
| 40. | Impact of Armed/Paramilitary forces on the local ecology has not been studied and forces not used effectively for joint operation for conservation sharing of information and promotion of specific/unique species besides prevention of smuggling of medicinal herbs/plants. | • Assessment of impact on eco-system by the movements of Armed and Paramilitary forces.<br>• Synchronizing Army movements for minimum loss to the Biodiversity. | • Selection of parameters for assessment of impact of Army movements on Eco-system.<br>• Sensitization of Army to avoid any damage to Biodiversity and Eco-system as a whole. | – Army HQ<br>– ITBP<br>– R&D Inst.<br>– TDD<br>– SCSTE |

# Nahin Kalan Sub-State Site (Uttaranchal) Biodiversity Strategy and Action Plan

Coordinating Agency: Vividhara, Nahin Kalan

The Nahikalan area lies nestling in and atop a water rich valley called Sinsyarukhala on the Outer Himalayan range, overlooking the Dehradun valley, bordering the district of Tehri Garhwal, in Uttaranchal state. The site stretches across a wide altitudinal range from 2000 to 5500 ft. a.s.l (approx.), across typically high gradient slopes, with great variation in rock, soil types and a fragile geological profile. The area recieves high annual rainfall, especially heavy in the monsoon. There are numerous natural springs that amongst other values are the sole sources of drinking water to more than a dozen villages.

The confluence of the above stated locational, altitudinal, edaphic and climatic factors have bestowed this area with a wide range of wild and cultivated diversity. More than 3/4th of the site is covered with forests. Many tops of hills and slopes near villages host meadows and grasslands. The agroecosystem makes wavy circles around the villages and hamlets of the area.

Ban Oak forests cover the upper reaches of most hills, with some pure strands. It occurs on the middle slopes too depending on aspect and moisture availability, with the Oak line running strategically along or near most villages/hamlets.

The lower half of hills is entirely dense mixed forests. Some of the staggering tree diversity of lower/mid hill forests is *bauhinia semla, baherha, amarha, dhaura, amla, raini* (Mallotus phillipinensis), *harshringar, jhingan, madara* , in the gullies its tun, *tilphara, sinsyaru, paiyan* etc.

Main shrubs like kingora, hinsar, saikna/sakina, khaksa. And numerous grasses and herbs.

Some of the fifty plus medicinal plants we identified are *kutki*, Gloriosa superba, *malkangni*, *gilloe, brahmi, amla, parhkesar* etc. Many wild relatives and varied orchids, ferns, mosses and lichens.

In the wide wild faunal diversity the main species are tiger, leopard, leopard cat, himalayan bear, seerau(serrow), goral, sambar, barking deer, wild boar, *totriyala*, porcupine, hare etc. A wide range of unidentified avifauna, butterflies, and insects.

The mainstay occupations of local human communities(LC, from now) are pastoralism and agriculture, interlinked and dependant on local biodiversity and ecosystem. They carry a vast knowledge of wild flora esp. fodder, food, fuelwood, timber, medicine, basketry and fibre species.

Cultivated diversity Location, climatic features and striking wild diversity have enabled the evolution and cultivation of a vast array of indigenous himalayan crops and varieties. Agriculture in the area is entirely rain fed, organically grown and part of a traditional agroforestry system.

Some important crops are *mandua* (finger millet), *jhingora* (barnyard millet), *ramdana\marsa* (amaranthus), *phaphra* (buckwheat), wheat, *jaun, makki* (corn), kulath/gehath, *tor* (pigeon pea variety), *rajma/chhemi* (kidney beans), turmeric and ginger. Typically himalayan spices and oilseeds like jakhiya, bhangjeer, mustard varieties (*torhiya, rada, sarson*) and several vegetables. Most crops/varieties are strikingly hardy and adapted to growing rainfed under local climatic and edaphic conditions and many possess exceptional medicinal and nutritive properties.

Agriculture is totally dependent on livestock for fertilization and tilling. And they turn are primarily dependant on forests and wild plants for fodder. Thus, forests, livestock and agriculture form an interconnected triad. Agriculture is a traditional agroforestry system with a hundred wild tree species and numerous species of shrubs, grasses, herbs and many wild relatives of crops

## Key Issues Facing Biodiversity and Major Gaps

To appreciate the intensity of issues/threats facing biodiversity, the local contextual features of steep slopes, extreme geological fragility and heavy monsoon rainfall, may be borne in mind.

This section has primary, consequent/secondary threats, underlying causes and key local factors and issues with a bearing on biodiversity conservation.

**Wild Diversity:** Foremost of the primary threats is **forest fires**, raging with an increased frequency, intensity and spread over the last 10 to 12 years. Various factors like more and longer dry spells (autumn to summer even), changing local attitudes and lack of initiatives have made this threat very serious.

The second biggest threat is concentrated **goat grazing**, devastatingly serious due to local contextual features. Large herds of migratory goats have been camping here over 4-5 winter months and locally kept goats that concentrate on and degrade sites proximate to villages. Both inevitably cause consequent threats as these fragile hills are unable to bear goat grazing.

Areas proximate to human communities often suffer from **unsustainable local utilization** of biodiversity, including callous methods, ignoring traditional principles and vast local knowledge.

**Contractor driven medicinal plant extraction** has proved to be excessive, callous and non-regenerative in all instances in this area. Pushing all targeted plants like *gilloe, semla, kingorha, and dalchini* to locally rare or endangered status.

**Hunting**, a traditional small-scale activity has got a fillip due to increased crop losses to wild animal raiding - leading to anger and resentment. And there are hunters from outside the site.

Then there are the **consequent**/secondary) **threats**, arising from impacts of the above threats, now need attention. Severe soil and **rock erosion, landslips and landslides**, and rapid moisture depletion, and the arrival and proliferation of **exotic bio-invaders**, like *kala bansa* (eupitorium), Lantana camara and jangli pudina are some inevitable outcomes of above pressures.

There is an interplay of various threats on most sites. Ground level flora, especially species preferred by browsing animals is severely depleted. There have been some initiatives and hence improvement in this scenario, listed in Ongoing Initiatives.

*Whenever and wherever, there has been drastic loss of biodiversity through severe pressures, it has triggered a chain reaction of degradation (rock/soil erosion, landslides, choking springs...), leading to further biodiversity loss and degradation. This necessitates a dense, diverse floral mantle for stability and very survival of the hills and water sources, making* ***biodiversity conservation a local contextual imperative****, on this site.*

Underlying Causes and Concerns: Despite deep dependence and initiatives at conservation there is a fair degree of **alienation from responsibility** in the LCs relationship with local resources. This makes the task of conservation that much harder to achieve. There is an ambiguity about **who is responsible for protection, conservation and restoration**. Who will meet the big threats to diversity. Who plans, monitors, decides and undertakes initiatives for conservation ?

When the FD hasn't addressed key threats of fires, goats and mining earlier ... the LC did each time with significant success, but only when the threats get big and devastating. Till then it waits (for the FD, govt. godot?) and time is lost. And yet the FD behaves arrogantly like sole protectors, rulers of the forest. Though, the only time the FD, forest guards, visit the area is when someone is building a house, to collect fines or bribes for timber use. All this together breeds resentment and alienation amongst the LC and defeats the primary purpose of conservation.

Despite the significant local knowledge and utilisation of wild diversity the **awareness** of diverse values of local biodiversity is partial and unevenly spread amongst the local population.

**Social cultural values** and attitudes of the LC have been changing too, there is significant devaluation of traditional occupations, outmigration lessening social cohesion, community feeling and cooperativeness, growing and changing needs and aspirations.

**Hard work and drudgery** is characteristic of the lives of human communities, most so of the women and those with less land and no jobs. Womens lives are ceaseless work, ranging from 12 to 16 hours a day. Fodder, fuelwood and water collection needs are significant part. Adequate and gainful **livelihood and employment** is a regular challenge, priority and concern. Any plans for biodiversity conservation in this area will need to address these issues, to be effective and equitable. The increasingly erratic **rainfall and climatic patterns** need to be accounted for too.

## Gaps

Lack of clear and known **roles, rights, and responsibilities of the FD and the LC** regarding conservation and sustainable utilisation of biodiversity and the ecosystem implies that nobody takes adequate and full responsibility. A big obstacle to full and timely action.

Inspite of the significant role the LC has played in conservation in this area, its role has never been officially acknowledged nor real participation and involvement ever sought.

Lack of monitoring and initiative from the FD/Government to counter threats to this biodiversity rich area, especially focusing on **primary conservation tasks**: countering the biggest threats to biodiversity like fires, goats etc. and creative/effective strategies and actions for restoration, regeneration and enhancement of biodiversity, water sources and ecosystem. This is most effectively in **partnership and complementariness with local communities**. Relative roles and responsibilities for conservation need to be shared based on relative strengths, abilities and local contextual factors and these need to be known widely. Specifically, the **biggest threats of forest fires and goats** can be effectively met only through a joint, complimentary effort. Ditto for most important strategies. There are some priority issues of **subsistence/livelihood needs** of the LCs which the FD needs to address. Foremost is the critical issue of increased crop losses to wild animals, particularly by wild boars and monkeys – ironically, **wild animals are today the biggest threat** to livelihood – food security and agro-biodiversity on this site. See cultivated diversity issues and gaps. Another important issue is over rights/easier access to dry tree timber for repairing and building houses. Harassment fear often forces families to cut green timber trees nearer by, defeating any conservation purpose.

**Support for ongoing local initiatives and endeavors**, specifically those that have been undertaken/experimented with through voluntary self-activity and/or minimal support by local communities and proved eminently successful. Many of these were pilot small scale in nature and need to be undertaken on a larger/fuller scale and intensity. See Ongoing Initiatives.

Specifically, important gaps threat wise: *A high priority/viable/comprehensive strategy to prevent and control forest fires*. FD needs to play its significant role in this and the second biggest threat of goat grazing. There is unevenness in spread of awareness of biodiversity values and issues. Local awareness and involvement is the key to conservation, typically neglected by most agencies.

Urgent, practical measures for **conserving critical water sources** (ensuring water security) and their catchments. Currently totally neglected. Agencies like FD, Jal Nigam need to take initiative. There is need for effective soil and water conservation measures, across the entire site.

Strategies and *actions to meet the threats of wanton medicinal plant extraction, spread of exotic bio-invading species* like lantana, kala bansa and others.

Creative strategies at **enhancing local livelihoods** while sustainably utilizing local biodiversity.

Creative actions to *lessen drudgery and excessive never ending work for women* of the area.

Support to and development of Eco-tourism.

**Issues and Major Gaps facing Agrobiodiversity**

**Increased crop losses** to raiding by a diversity of wild animals is the primary threat/disincentive to farming. This increases hardship, abandoned terraces, anger, frustration, demand for arms etc. Major crop raiders threat wise are monkeys, wild boar, sambar, rats, barking deer, porcupine, bear etc. This reality forecloses the support of LCs for wild faunal conservation. Ironically, large forest tracts that LCs have protected, the area`s best, are a big factor behind wild animal and increased raiding. As a local person puts it, when these dense diverse forests are an island in a sea of.... Isn't that an imbalance and unsustainable?

Rainfed agriculture on steep slopes(including sloping terraces), rocky soils and heavy downpours. Add increasingly dramatic climate swings/change over the last 10 to 15 years - heavy concentrated downpours and long dry spells, unseasonal rains, lack of snow/hail, winter rain, late arrival early/abrupt withdrawal of monsoon. Rainfed farming communities find the sky difficult to read. What and how to farm in times of changing climate? This big challenge faces these and other rainfed farming communities. Making focused and effective action on soil and water conservation all the more important and urgent. Anyway, large tracts of agri-terraces and agroecosytsem are characterized by **heavy soil erosion and rapid moisture loss**.

The last decades have seen an **enormous devaluation** of traditional crops/varieties and associated knowledge. Govt. poli-

cies/programs and commercial interests are critical factors behind this. And now dwindling cultural appreciation and knowledge about indigenous crops/varieties, esp. among the young is a new challenge. Other factors are *low market value of most traditional crops/varieties*, lack of market access and value addition and a huge research and policy bias. Does anyone believe that all this knowledge, practice has no place, relevance in sustainable agriculture, food, nutritional security and livelihoods for mountain people?

A large part of the LCs, especially womens unceasing work is linked to biodiverse agriculture. Weeding and hoeing, carrying wet dung over long distances, increased crop raiding etc. It is imperative to find ways to lessen work drudgery, so that work adds up to something.

There has been a sharp increase in **pest and disease problems** facing agriculture, over the last ten years. Locally new pests and diseases, and increased scale of damage. The cultivation of many traditional crops like kulath, tor, ramdana is seriously threatened.

Dramatic **decline in productivity** for many individual and crops groups like pulses and winter crops. Overall too, it's a declining trend, according to detailed crop wise assessments. *In Barkot, a remote hamlet nestling under an oak forest, the decline has been marginal*.

Most traditional crops have a limited/low value in the markets the LC can access. Transportation is an issue, with the nearest raodhead 8 to 13 km away, on a steeply sloping path.

The above factors together, unadressed, are a significant disincentive, contributing to devaluation of agriculture amongst the young and reducing the attention/effort/experimentation in agriculture – with serious consequences, for agriculture, biodiversity and people.

## Ongoing Initiatives

Almost all the initiatives listed below are voluntary and few have been undertaken with minimal short-term support. Most were undertaken over last five years. Through this process many strategies and actions have been tried out, with significant positive impacts and an identification of most promising approaches and relevant local factors. Including during BSAP formulation. Awareness, sensitisation and social mobilisation has been a key approach especially to counter the three biggest threats to local wild biodiversity – *forest fires, goat grazing by migratory and local goats and sustainable local utilisation of natural resources*. This was undertaken as a campaign from 1998 to 2000, and continues as a low key voluntary effort by Vividhara.

Significant outcomes are visible in all three key issues. Forest fires are being prevented for the first time in 40 years, though more efforts are needed. Migratory goats have been kept away from a large reserve forest area by the women of the main village. Local goats numbers are down dramatically to 20 from more than 125. There is movement towards sustainable local utilisation of biodiversity, especially down is callous lopping. Impact of these and other positive developments is strikingly visible in regenerating floral diversity across most sites, including the most degraded.

- Awareness – Work Camps for college and university students from Delhi. And mutually beneficial visits by chosen young environment enthusiasts. Our chosen version of eco-tourism.
  Half a dozen springs were dechoked/revived and as many joharhs joharhs(ponds) made on hill tops. Repairs and maintenance were carried out in subsequent years.
- Monitoring biodiversity status, trends along with local communities. Implementation of strategies formulated under the BCPP (see box below) and evaluating their impact.
- Protection of the catchment of main village spring.
- Environmental education workshops and activities with children in the library-activity centre and local schools.
- Enabling the successful installation and functioning of a pan-chakki (water mill).
- Sustainable Livelihood Options and Biodiversity - An annual exhibition on Himalayan biodiversity, especially cultivated and sale of organic biodiverse produce and products, at Dilli Haat, New Delhi - for the last 8 years. This has outreached to lakhs of people over these years. Enhancing returns for biodiverse farmers, healthful food options for consumers, awareness and sensitisation. Small scale direct selling and retailing is on through the year.
- Dentification and integration of suitable fruit trees and medicinal plants in the agroecosystem.
- Encouraging/facilitating homesteads and vegetables, for nutritional security and conservation.
- Facilitating improvement in organic manures, including from neglected/wasted biomass.

### Evaluating and Learning from a Recent Plan

As a part of this BSAP, an Action Plan for Wild Biodiversity Conservation for this site, made four years back under the Biodiversity Conservation Prioritization Project of WWF-I (BCPP) was evaluated for its effectiveness. Key threats, changes, and especially, chosen strategies were assessed.

This evaluation and experience of a recent plan played an important role in formulating strategies for this BSAP, enabling us to focus, detail and prioritise strategies and action points beyond what may otherwise have been possible. Building, changing formulating new and importantly to detail the most successful and highest priority strategies/action points. The latter may particularly be examined for wider relevance and adoption.

In the four years since the formulation of this Plan there have been only 4 months of financial support, for two programs, viz. environment education, awareness and social mobilization and lessening crop raiding and the people wildlife conflict. All other initiatives have been voluntary. The primary players in whatever has been happening and attempted so far have been the local communities themselves and Vividhara members.

## Srategies and Action Points

This summary, due to space constraints, essentially lists out strategies and actions. For details and elaboration of Strategies and Action Points (which have been worked out for all priority strategies and actions), -- please see full Action Plan.

To indicate the structure of the Strategies and Actions in the full Plan, the first few strategies in both sections (wild and cultivated) are more detailed. Also for these are the highest priority strategies, countering the biggest threats.

### Wild Diversity Conservation Strategies

**Forest Fires – Prevention and Control** Priority: V. High

- Considered, concerted action by both the forest department and the local communities, with help from peoples organisations and NGOs is the only real way to meet the fire threat.
  *For all of Uttaranchal, an effective, viable action plan needs to be formulated and implemented on a priority basis. At its core needs to be an effective and participatory awareness strategy.*
- Awareness, Sensitisation and Training – All key aspects of fire prevention and control need to addressed in an awareness/training program. Like causes and consequences, training in best prevention/control methods, key actors in prevention/control and coordination amongst the same.
- A Big Awareness and Sensitisation Campaign across the site - with promising tried methods like: wall writings/sign boards; publicity to law regarding forest fires; pamphlet/handbill; posters ; street play; slide shows; meetings ; spots on Doordarshan and Akashvani. Clarity of issues, approach and communicative, evocative qualities are critical.
- Making fire lines and transporting fertility - By turning forest paths and mule roads into effective fire lines by clearing them of all inflammable materials. Carrying fallen leaves to agricultural terraces for fertilization. Successfully experimented with. Support needed to cover entire forest.
- Preventing fires from agri-terraces/grasslands from spreading are squarely the responsibility of lighters. Overall, the fire lighting way of doing things needs to be discouraged.
  *Controlling fires*: Complimentary partnership action by the FD and LCs is the key here as well. Details need working out based on respective strengths. Some chosen specific actions are:
- Who and how to inform in case of fire. Ideally, a *forest fire help line or publicized phone no's*.
- Training in effective methods to control fires in a hill context, remoteness and gradient as features.
- FDs fire guards need to be from local areas for effectiveness – currently, no FD personnel ever manage to reach in the event of forest fires.
- Publicity and enforcement of law regarding fire lighters and responsibilities of controlling fires.
- Encouragement, incentives and support for communities that prevent and control forest fires.

**Ban the Goat Rush** *Priority: V. High*

- Grazing and camping by migratory goat herds, needs to be strictly banned and enforced. The forests in question are Reserve Forests and camping and grazing is on for the last 30 odd years. The forest department must ensure goats do not enter this ecologically vulnerable area.

- The villages of Nahikalan and Nahin Khurd have already restricted migratory goat grazing in a large proximate forest zone for the last four years. This initiative needs support. The biodiversity rich Reserve forests of kutiyan and bacharvarh (home to seerau and goral) and sinsyarukhala are still degrading. Initiative/intervention of the FD and neighbouring villages is necessary.
- Proximate villages need to be sensitized not to allow grazing in lieu of money.
- Migratory goat herders need to be offered sustainable alternative sites/options.
- Local goat keeping: The Government needs either to impose a total ban on goat keeping and grazing on steep, vulnerable hills or atleast impose a goat tax/per goat/per year. Ecologically and practically the first option is more suitable.
- Local awareness has grown, motivation is now needed and hopefully decisions here too.
- Vulnerable and special areas such as above springs, to be out of bounds for goats.

### Awareness, Sensitization and Mobilisation

***Priority: V. High*** A pivotal strategy that can make or break the full plan

- *Highest Priority Issues and Themes for Awareness Action:*
- Meeting the biggest threats - forest fires, goat grazing, sustainable utilization of biodiversity etc. and other strategies where awareness is important.
- Enhancing awareness of the exceptional biodiversity richness of area and its and various values.
- Local contextual imperatives for conserving biodiversity
- knowledge gaps about biodiversity

### Mitti Pani Sanrakshan Samvardhan/Water Matters

***Priority : V. High***

- *To dechoke, revive, enhance flow and perennial nature of all springs and streams.*
- Watershed works need to be undertaken *in all gullies, with priority to : gullies rich with water* springs, streams and loose rocks, catchment conservation for *springs dechoked by LCs* over the last years, focus on two main village springs and their home gullies.
- *Conservation of catchments of all springs and streams by* eliminating big threats, especially in areas above springs, protection and propagation of water-holding species of trees etc.
- Eco-restoration of all unstable/destablilised areas (ECO SOS ASAP).
- *Pan chakki* (water mill) catchment conservation - See strategy by same name.
- *Joharhs* and *jal chaals* (small and big ponds and lakes) -- reviving, improving and making new. Locally tested proven form of watershed treatment. Improvements and new sites identified.
- Ensuring water security by *entrusting responsibility for conservation of water springs and their catchments to proximate human communities*.
- An exceptionally water source rich forest zone within the site, which amongst other values provides drinking water to numerous villages should be declared a '**water reserve**'.
- Ensure wild animals and ecosystem needs when tapping forest water sources for human needs.

### Sustainable Fodder/Fuelwood and other local Utilisations of Biodiversity and The Environment

- Awareness, Sensitisation and Training - Popularizing adoption of Basic Sustainable Use Principles, distilled from local traditional knowledge and practice:
  *Chhote-bachhe perh na kata* (don't cut young trees and saplings, protect them).
  *Choti na kata, Mota phanga na kata* (don't cut the tree tops and big branches of trees).
  – Adopt principles of sustainable utilization for forest and common lands as on private lands.
  – Assessment of sustainable use levels/carrying capacity for important sub-sites.
- Rotational use/closing of sub-sites for regenerative rest.
- Extremely fragile and high value areas need to be closed to fodder fuelwood pressures.
- Reducing hardship, especially for women, by easier availability of fodder and fuelwood etc.
- Bio-Gas : Large scale adoption of biogas is a high priority multi- benefit, tested, creative action.
- Popularizing bamboo as a multi-purpose wood substitute and a soil and slope conserver.

**Harmonising People-Wildlife Relations** see in cultivated diversity conservation strategies.

### Medicinal Plant Conservation and Cultivation

- There should be no extraction of medicinal plants through the solely profit driven and hence degrading contractor system. The targeted plants need regenerative rest. Through local efforts over the last four years, perceptible improvements are evident.
- When possible sustainably, medicinal plant collection should be undertaken only by a local village cooperative or samiti, with

sustainability and regenerative use as guiding principles.

- Cultivation of medicinal plants and simple processing is a contextually highly promising option. A medicinal/biodiversity garden focusing on threatened, rare, high value plants and experiments with cultivation techniques can be a part of this. Identification of suitable plants is underway.
- Gilloe Latkao Abhiyan: Growing gilloe by placing fresh cut twigs on trees in the monsoons.

### From Alienation to Responsible Initiative, Ownership and Partnership

- Acknowledgement and statement of rights, roles and responsibilities of local communities in conservation and sustainable use of biodiversity and the ecosystem.
- The relative roles and responsibilities of FD and LC in conservation of biodiversity and ecosystem, determined and widely known.
- Rights/easy access to dry timber trees to LC for construction and repair of houses.
- A system of incentives for communities undertaking exceptional initiatives for conservation of biodiversity and environment, including as rewards/awards and financial support. Community initiatives at fire prevention/control can be considered by itself too.
- Mandatory approval of most relevant local body for all projects and schemes for the area, esp. any proposal for non-forest uses.

### The Regeneration Way to Reforestation

Protect And Regenerate! Why Plant? In the Garhwal Himalayas it has been demonstrated in valley after valley that the best way to reforestation, regenerate/restore biodiversity is to close patches of forest completely/significantly or check the biggest threats for a substantial number of years. No plantations are needed. From a biodiversity conservation viewpoint this is inherently unmatchable by plantations, ecological and cost wise too.

The protection-regeneration route to conservation/restoration needs to be followed by all agencies. So far, its been primarily undertaken by local communities. And it works best with their involvement.

### Halting and Utilising the Bio-invaders

- Lantana - Urgent control is needed, as it will be very difficult to impossible to control later.
- Kala Bansa (KB) - The highest priority (holistic) action is prevention and control of fires, goat grazing and then other excessive/significant pressures on native floral diversity and ecosystem. Wherever native diversity can be protected and allowed to regenerate, kala bansa and kurre can be manually uprooted and/or cut. It can thus be turned from a threatening colonizer to a 'bio-eco restorative agent'. A medicine for cuts/sounds with shelf life may be explored.
- Kurre and jangli pudina - Cutting, uprooting before flowering season is likely to control.

**Adding Value to Indigenous Biodiversity** see in strategies for cultivated diversity.

### Ecologically and Culturally sensitive Eco-Tourism

Upscaling the ongoing initiatives of awareness and work camps and hosting individualos small groups interested in nature and culture in the hills. Vividhara`s version of eco-tourism.

Pan-chakki Catchment Conservation

For the new pan-chakki(water mill) to work more than 2-3 months annually, elaborate catchment conservation and watershed works/actions are needed (and have been detailed).

## Section 2 Cultivated Biodiversity Conservation Strategies

Spectrum/Overall Strategies

### Reducing Crop Losses to Wild Animals and Harmonising People – Wildlife Relations

**Sub-Strategy1/Forest Habitat Level: Enhancing Water and Food Availability In The Forest Habitat**

Action Points:

- Actions for water needs of wild animals in strategy, Water Matters, in wild diversity conservation section. Priority: V. High
- Identification and propagation of wild animal preferred food sources in the forest areas, away from the village. Priority : High/Medium Identification of preferred food sources, protection and planting where needed. Implementation of wild diversity conservation strategies, especially for water and soil, fire prevention/control, goat grazing etc. will make a huge difference.

**Sub-Strategy2 Agri-Terrace Level: Making Crop Raiding Difficult for Wild Animals Priority:V. High**

Action points:

- Encouraging community level engagement, action and choosing and implementing effective, innovate methods. A list of the

current selection all examined mostly tried/tested over last years, including during BSAP process.

- Revival of Tands/Machans (small watchtowers on agri-terraces) Most important, effective traditional method has declined. For reviving its effectiveness/popularity we propose:
  - *Consolidation of scattered and fragmented land holdings*. Elaboration in the next Action Point.
  - *Integrating creative and innovative ideas with tands* to enhance protection, area coverage and reducing effort. Elaborated in later actions. Some were tried successfully over last few years.
  - *Encouraging farming families to set up tands or little huts/homes* wherever land is enough.
    A perceptible revival of tands has been visible in the last years, indicating proactive hope.

Consolidation of Land Holdings – Priority: High

- A fundamental handicap is that already scattered landholdings have got further fragmented over generations, making protection nearly impossible. Land consolidation, here implying bigger clusters of khets can form the best basis for effective, sustainable protection from raiding, primarily driven by the self-initiative of farmers. Financially supporting villagers for the making huts/homes (dispersal of village), where most lands are, is a high potential action as it will bring long term, sustainable multiple benefits to agriculture as a whole.

Basic guidelines for consolidation of holdings have been worked out (see detailed plan).

- Ringing, Rattling Drums, Tins, Bells on a long Wire. Priority: High. Waves of different sounds over a large area. Initial experiments very successful for deer, wild boar and birds.
- Damru, Dholak, Dhols, Nagarha's, Whistles, *Daphli* and *Bhompu* (hooter) – *folk music concerts under the mountain night sky*.
- Upale/kande (dry cowdung smoky fuel cakes) and fire crackers

The traditional method of lighting kande has been tried combined with the newer method of fire crackers to roughly set the timing of bursting crackers. Attempted very effectively.

Some Other Methods are being tried too by the local farmers like *bharooka* and *gophia* (flying, whistling stones), *wire barriers* or *traps* is another.

- Chosen Medicinal Plants and Fruit trees for Far-off mostly Abandoned Terraces, due to animal raiding. Known economic and/or local value and non-preferrence by wild animals and market accessibility are the criteria. Complementarily or alternatively these farthest from village areas can be developed further as fodder and fuelwood lands.
- Bio Fence between Agriculture and Forest lands

A Barrier around the agricultural zone, adjoining the forest, especially on the sides that animals primarily come from, is an action long suggested by villagers and will protect the lands of three villages. The current optimization of idea is : A closely planted bamboo barrier, of appropriate species with thorny cacti like rambans(agave), nagphani etc. Also possible is a wall where stones are available, and a pit where that's appropriate.

- Actions For Bandars (*currently the biggest and by far the most obstinate crop raiders*)

Listing the most promising/interesting ideas:

- *Bandarwals* (village agriculture guards), dedicated crop protectors, paid a proportion of produce.
- Bandars are best, easily chased at *brahm mahurat* time, morning light before sunrise, old Garhwali belief.
- Bandars shouldn't get used to easy successful raiding, a habit. Or they wont go away. But don't hassle them too much or be ready for the favour.
- Joint community effort and the larger the group the better, is the key and chase them far.
- Groups of trained dogs, preferably kanjar dogs.
- Plant all over terraces and far too, so they are controlled there only. Rest of agriculture becomes much safer and overall crop losses are significantly less.
- Wild Boar Control – The Forest and Wildlife Department needs to urgently address this issue (of boars and monkeys) and find a satisfactory solution. Anger and frustration with one or two species of crop raiding animals tends to spread to others and provides a fillip to wild animal hunting. Addressing peoples genuine problems can help broaden the support base for protection of wild animals. Responsibility: Forest Department
- An Agri-Landscape Design for Crop Protection - An overall design option for agriculture holistically integrating most promising crop protection ideas into a agri-landscape design.

The design has three zones. Zone1 (Farthest terraces, many abandoned, and surrounding grasslands), Zone2 (The farthest currently farmed terraces, difficult to protect) and Zone3 (crops preferred by both humans and animals).

- There is scope and need for more realistic, imaginative and effective *scarecrows*.
- Some simple techniques *to control rats with local materials* like leaves of chhirna, horse dung and wild apricot seed oil cake. Any of these in or near rat holes is known to chase rats away.

**Enhancing and Widespreading Awareness of the diverse values and characteristics of Biodiversity**
**Priority: V. High**
**Local Level:** Documentation of special values and characteristics of traditional crops and varieties including comparisons to hybrids/exotics. Enhancing and spreading awareness of local agrobiodiversity from all the critical and relevant Themes/Aspects (listed) through creative methods: Like hardiness, resistance, adaptation for growing in specific local climatic, edaphic and other conditions etc etc.

**Methods for local level, mostly tested: Folk music, lyrics and poetry, riddles Folk/Street and Forum Theatre. Informative, communicative literature at the local library in Nahikala.**

*Slide shows* – for which some material already exists.
- A *Kheti-Sanskriti Mela* for the broad local area. An exhibition on agro-biodiversity, interactive sessions, fruit tree saplings, medicinal plants, folk music, crafts, theatre and activities for children.

**At The Consumer Level:**
- *The Nature Bazaar at Dilli Haat* - Over the last 8 years, an annual exhibition of himalayan diversity and sale of organic produce and products has outreached to, in mutually enriching exchanges, lakhs of urban people of very diverse backgrounds and ages.
- *Action*: Financial support for producing awareness materials, displays, labeling and info sheets, street theatre and folk music can significantly enhance awareness outreach at this best regarded annual crafts fair in Delhi. A full exhibition on Himalayan biodiversity is another exciting possibility.

**Soil and Moisture Conservation and Enhancement and Farming Rainfed in times of Changing/Swinging Local Climate**

Above and Around Terraces
- Restoration/Regeneration of Oak and other chosen species, known for their water/moisture holding and soil binding properties. **Priority: V. High**

Enabling conditions for regeneration of oak etc. and/or direct seeding/planting.
Ensuring sustainable use through awareness and sensitisation.

The Terrace And Kalna Level Actions
**Priority : V. High**
- Spreading awareness of enormous soil erosion/moisture loss-causes and consequences.
- Implementing prioritised measures for structural stability and erosion control on kalnas and agri-terraces.
- Planting chosen soil and moisture retaining plants on kalna's.
- Various identified actions to conserve soil and moisture on terraces, like to reduce slopes on terraces.
- Enhancing Flow and Perennial Nature of Springs and Streams in the Agricultural Zone
- Support irrigation for agriculture through rainwater harvesting and spring/stream water collection.
- Roof top rainwater harvesting. For homesteads/sagvarhas/kitchen gardens.
- Spring/stream water collection tanks for support irrigation for some agri-terraces

Jujharu Jugarhu Jumbish – JUJUJU – **An experimenters/innovators/seekers/sharers collective**
- Action Point - formation a group of motivated, knowledgeable local individuals to encourage, undertake, support innovation in agriculture. And share/spread promising tried out ideas. With Agrobiodiversity and organicity at the base, the larger effort being to evolve a sustainable productive agriculture for the area, meeting key local needs and aspirations. They can also be key players in implementing many action in this BSAP.

***Reducing Excessive Work And Drudgery***
**Priority : High**
- Lessening drudgery in weeding and hoeing, of monsoon crops, esp. mandua and jhingora.
- Making fire lines in forest by clearing and carrying leaves to agri-terraces.
- Enhancing productivity of agroecosystem for easing access to fodder/fuelwood.
- Bio gas is a multi-benefit locally tested appropriate choice. More in sustainable use strategy.

**Conserving Vegetable, Herb, Spice Diversity and Meeting Nutritional Needs** Reviving and Developing *Sagvarha*'s (Traditional Homesteads) will meet both the objectives.
Water requirements can be met through rain harvesting tanks (rooftop or ground run-off) or spring/stream collection water collection. Many revival initiatives are already underway, including growing winter vegetables with dew.

**Improved and Less Effortful Fertilisation**

- *Enhancing the traditional method* through proper site selection and size of heaps and adding non/under utilized plentiful organic materials. *Vermiculture* is very promising, what with abundant animal dung. Collaborations identified. *Forest leaves for far-off terraces* – experiments successful. *Bio-fertilisers. Biogas slurry* as fast fertilizer. Restoring And Discovering Crop And Varietal Rotations and Combinations
- Carefully planned rotations and combinations, traditional and new can be critical to meeting the current problems as well as potential of biodiverse agriculture. Process, actors identified. Documentation, assessment, ideas from elsewhere, experimentation, sharing, rotating varieties every 3 to 5 years, crops where new varieties are needed etc. Orienting Govt. Policy/Programs and Extension-to Conserve and further Agrobiodiversity
- All policy interventions, programs in Himalayas need to adopt the mountain perspective.
- Review and harmonizing of agricultural policy and programs from the perspective/imperative of agrobiodiversity conservation, environmental impacts and sustainability.
- The research bias towards traditional agriculture and knowledge needs to be corrected.
- Policies/program suggestions are in respective strategies and action points.

## Enhancing and Sustaining Livelihoods and the Agroecosystem

Like most of the Himalayan and other mountains the world over, traditional agriculture in this site is high on biodiversity but currently low on economic sustainability for the LCs. There are livelihood and employment paucities, hard and never ending work drudgery, especially for the women, and not enough or very uncertain returns for labour put into farming. From the fairness and sustainability viewpoints this needs engagement and improvements. The presence of spectacular cultivated and wild diversity (though challenged), on this hill site, implies that there is no abject poverty here, but these strengths need to be built on.

Most solutions, theoretical and implemented, have been economic development at the cost of local biodiversity and the environment, hence long-term unsustainable. We believe from our own experience as well as some other experiments that carefully planned and implemented additions need not, necessarily, be at the cost of indigenous diversity.

There is a great need and possibility to address these economic/livelihood issues from within a biodiversity, ecology and sustainability perspective, seeing them as complementary and not as exclusives. This has been an underlying endeavor throughout the formulation of this BSAP, and especially of this section.

**Integrating Chosen Fruit/Medicinal and other Plants into the Agro-Ecosystem** Priority: V. High
Action Point: Some important factors – During selection preference to be given to native wild plants. Other critical criteria are, agro-climatic suitability, hardiness, local utility, economic value and non-preference by wild animals. * Fruit species are shortlisted, with sources for planting materials. Medicinal plant selection is on. LC is keen.

**Strenghtening Traditional Agroforestry With Compatible Local Species**
Towards fertility, productivity, lesser drudgery and enhanced livelihoods.
Action Points - tree selection criteria for growing amongst terraces:
Partial sunlight blockers or winter deciduous. Moisture retainers/holding species. Soil fertility improving species like leguminous plants and others.
Other desirable attributes: Green or dry leaf mulch source species. Insect disease repelling/hosts species for beneficial insects.
Some examples: Leguminous trees/shrubs/vines on the kalnas are appropriate and multi-value.
Honey Bee, Indian Himalayan
**Priority : V. High**
A multi-benefit inspirational strategy, from conservation to livelihoods and how.
Action Points - Three most promising methods, with worked out know-how and collaborations.
*Ahinsak (non-violent) Madhu* – gathering honey without harming the bees or pupae, developed by Mr. Ghatge, Wardha, Maharashtra, after a lifetime`s work inspired by Mahatma Gandhi. Collaboration has been finalized with CSV (Center of Science for Villages, Wardha.
*Traditional Method* – to revive the dwindling local knowledge/skills and successful practice of bee-keeping.
*Traditional Method Upgraded* for higher productivity by Devbhumi Madhu, an agency working in the Garhwal Himalayas.

**Enhancing Value of Indigenous Diversity Through Creative Markets and Other Means**

- Small Scale Unit for Natural Products from local cultivated/wild diversity. Some crops for which we already have products: Haldi, Ginger, Ragi/mandua, Amla, Wheat, Barley and Jhingora.
- Marketing of Biodiverse and Organic Foods and Natural Products - numerous crops and products are already known and experimented with. The marketing component of biodiverse organic foods needs to be strengthened/streamlined/organised, building on the experience and learning of all these years. We identify key areas for action.
- Identifying and developing markets for diverse indigenous crops and varieties - Many markets are already identified.
- Registration, Transportation, Packaging and labeling.

## Crop Specific Strategies

Specific strategies/actions formulated for **protection/conservation and spread of crops facing serious challenges/threats**. Some notable crops for whom such actions points have been made and detailed are -- ramdana/chollai (amaranthus), mandua (finger millet), jhingora (barnyard millet), tor (hill variety of pigeon pea), kulath/gehath, rajma/chhemi (himalayan varieties of kidney beans), bhatt(himalayan soyabean), march (chillies), adrak (ginger), gehun (wheat), jaun (barley)and masoor. Most of these are important crops that have become very difficult, challenging to grow. Experimentation and adoption of some of the actions has already started.

Notably for ramdana, kidney beans, tor, gehun, sarson/rada/torhiya, kulath.

Important, **exceptionally locally suitable crops that are currently neglected and/or undergrown** have also been identified. Reasons behind selection have been stated. Some of these are - local himalayan haldi (turmeric), naurangi/jhilanga, philanga, torhiya/sarson/rada/rai (all of the mustard family), kuttu/phaphra (buckwheat), bhatt and jakhiya. The cultivation and production of most has begun to show some increase.

# Nagpur Sub-State Site (Maharashtra) Biodiversity Strategy and Action Plan

Coordinating Agency: Vidarbha Nature and Human Science Centre, Nagpur

## Brief Introduction about biodiversity of the site:

Overall, the present study shows that the composition of biodiversity in Nagpur is quite rich, however its protection cannot be taken for granted for variety of reasons.

### Flora of Nagpur City

The vegetation of the fast developing city of Nagpur is fairly rich and varied. Almost all major groups of the plant world are represented in the flora, the dominant component being the Angiosperms or the flowering plants. There are around 850 plant species of the flowering plants distributed among the two major classes-the Dicots and the Monocots.

The tree cover of Nagpur is quite rich. There are over 160 species of trees, some of them bearing beautiful flowers. The trees are broad leaved and dcciduous. Most trees flower during summer months. Besides the moderated sized trees, the woody component consists of several shrubs and a few woody climbers. The grasses cover of the city-appearing after the onset of the monsoon in July and continuing till December-January-comprises as many as 150 grass species. Algal flora that forms an important component of aquatic ecosystem is well represented by over 200 members belonging to four major groups. There are around 110 species of fungi belonging to six groups, whereas the Pteridophytes are represented by a few species of Selaginella Equisetum and Isoetes.

### Fauna of Nagpur City

The Chordates, animals with backbone, consists of five different classes - pisces, amphibia, reptilia, aves and mammalia.

The fresh water fish fauna of this area is described up to species level. In all about 50 species are identified. Amphibians are probably the best indicators of environmental health of all vertebrates, being extremely sensitive to temperature and humidity. Present survey describes 10 amphibian species belonging to 4 genera. Of these one is extinct and two of genera Rana have become rare.

In all 17 species of reptiles belonging to 3 orders are described. Except lizards, the population of snakes and turtles has gone down as per studies carried out by Zoology Department. Species of mammals are second largest in number, next to birds. In all 36 mammalian species belonging to 8 orders have been listed. Despite urbanization, population of fruit bat is increasing, and that of black buck, cheetal, fox etc. is declining. Tiger is extinct from this urban area and panther is rare. The checklist of Birds of Nagpur compiles by the VNHS Centre contains up-to-date information regarding 235 bird species belonging to 50 families.

Animals that lack backbone (spine) cover almost 95% of the animal kingdom. So, for every vertebrate specimen we have 20 sp. of invertebrates. Invertebrates are divided in to 11 major and 20 minor phyla depending upon number of species and its participation in animal community. Till date under the present programme VNHS working group has been able to identify and record about 450 species of Invertebrates so far. This list is being updated.

## Brief description of major biodiversity related issues

Nagpur City lies at a critical location, considering a major biodiversity corridor in the country. It is important to understand the links of this corridor passing through the or near the city (in the form of natural habitats like river tributaries, extension of hill ranges) and allow these links to survive during the evolution of the city.

As per biogeographic zoning done by Wildlife Institute of India (WII), Metropolitan Region of Nagpur City appears to lie at the confluence of three sub-biogeographic provinces, named 6-E, 6-C and 6-B in the report on biodiversity conservation prepared by WII. Zone 6-E represents the dry-deciduous forest type of 'Central Highlands', 6-C represents the 'Eastern Plateau', part of which is evergreen forest, while 6-B is the 'Central Plateau' an extensive tract of semi-arid and arid regions of Deccan Peninsula in Maharashtra and is covered with tropical thorn forest.

Nagpur City was referred to by the British as the 'Gateway to the Central Indian Forests. Till only about 300 years back the city and its surroundings remained a tribal area in 'Gondwna Land', outside the influence of major empire building in the Indian Sub-Continent.

Remnants of the eastern edge of the rolling Mahadagarh Hills, which are themselves extension of the more prominent Satpura Ranges, can be seen in the city in the form of Seminary Hill, Starky Point Hill, Ramnagar Hill and the Sitabuldi Hill. At the western edge of the city, on a rim of high elevation of these hills are located the major tanks from which two rivers appear to rise and flow eastward, the true origin of the rivers lying very close to the fringe of the city.

The Bonsale Kings planned and developed the City as a City of Gradens and Lakes. Traditional Planning of Nagpur, which had provided a means of sustainable development within the city, is now disregarded in the headlong rush for a different, more modern development model, where sustainability is at the lowest priority. Even so, the ecological profile of the city shows that Nagpur City has a better potential than other cities in the similar phase to become an Ecocity – a city, where both Economic and Ecological development can be ensured in a balance way, on a sustainable basis. Nagpur also has the potential to become the 'Garden City of Maharashtra'.

However, in the absence of special attention to the biodiversity and nature conservation issues, the most likely scenario would be that the essential elements of the biodiversity hotspots and the biodiversity corridor zone connecting them would get severed. The adverse effect of this on the biodiversity rich zones within the city was well as on the surrounding rural areas with agricultural base would be quite adverse. Indeed, the city has already begun to 'develop' in this direction.

## Brief Description of Ongoing Initiatives and Key Gaps

### Gaps and Key Strategies

There are gaps in information (data base and flow of information). gaps in vision (skewed objectives, thoughtless implementation of ill-conceived projects and break with the indigenous practises), gaps in policy and legal structure (inadequate accountability of officials, inadequate laws inappropriate implementation, lack of concern / contradictory views of judiciary and gaps in institutional and human capacity (lack of dentification with the issue, lack of training, lack of commitment and lack of inter-department coordination.

It is essential to understand that these gaps are symptomatic of basic flaws (that are identified and extensively described in the report). The basic malady is these flaws, while the gaps are only symptoms of the malady. Moreover, the fallout of the basic flaws as well as the gaps is the resulting degradation of environment, which is our primary concern. Therefore it would be more fruitful, even for bridging these gaps, to find solutions that address the basic maladies.

It should be our endeavour to first address the basic disorders so that suitable environment is created for effectively bridging the gaps. Therefore our basic approach is to identify and analyse the problem to a degree where most people would be able to understand and appreciate the exact nature of the problem and then, equally importantly, to simultaneously suggest viable solutions that might be readily acceptable.

The basic premise behind this approach is that majority of people - citizens, officials, planners an leaders - are also worried about these glaring defects and are looking or would soon be looking for viable solutions, and we intend to be ready with such solutions.

### Important Initiatives in the Recent Past

- In-depth study leading to development of Ecocity Concept as applicable to Nagpur City
- Holitic Concept that takes into account ecological, economic, social, technological and planning and management aspects concurrently
- Consistent working of a competent team of experts and concerned citizens drawn from diverse backgrounds
- Creation of basic data base and formulation of specific as well as long-term approach for bringing the concept into practise
- Inclusion of Natural Precincts in the official 'Heritage List' of Nagpur City (First example in India)
- River revival and pollution abatement project formulated under Ecocity Concept
- Active groups of citizens fighting for saving of natural features of the city
- Increasing support of administrators and scientific community to the NGO initiative

### Proposed Strategies and Action Plans

A holistic approach is adopted in making key recommendations/strategies under BSAP project. For the sake of greater clarity strategies and action plans are identified under different sub-heads.

For conservation of identified important species and for benefit of stakeholders directly dependent on biodiversity, following, following actions are suggested:

- Conservation of rare threatened species (included in the red book) with their microhabitat
- Rediscovery of critically endangered species earlier reported in the area
- Conservation of habitats for ensuring livelihood of stakeholders

Specific actions to conserve and put natural ecosystem to sustainable use are also identified in the BSAP in form of following projects:

- River revival and pollution abatement project (Pilot project for decentralised sewage treatment reactor as the first step)
- Restoration of existing surface reservoirs
- Creation of new surface reservoirs
- Conservation/protection of hills and important open spaces
- Conservation of Civil Lines area by applying special regulations
- Evolution of guidelines under Heritage Regulations and their strict enforcement

At regional level following strategies and actions are mooted as follow up projects:

- Conservation of Agricultural Lands within and around the city. Field survey of Nagpur Metropolitan region is suggested for landuse planning with conservation angle.
- For ensuring efficient planning and monitoring system as also for achieving more equity between the urban and surrounding rural areas in the metropolitan region, the provisions of 74th Constitution Amendment should be put into operation in the right spirit
- Economic/educational/medical and cultural development of existing satellite centres (smaller towns) around the city

From Town Planning angle following actions are suggested for direct implementation :

- Policies (such as FSI, built up areas) have to be devised to ensure that optimum utilization of land (and service infrastructure) takes place within the already urbanized areas.
- Stricter enforcement of 'Green Belt' regulations are required. Usually the authorities deliberately overlook the fringe areas of the city, where unscrupulous politicians 'establish' slums as also unauthorised layouts until nothing much except regularising of the same remains to be done. In Nagpur there are close to 5000 such layouts out of which 572 layouts were recently regularised and 1900 more are to be regularised soon.
- Perhaps the only solution to control of 'green belt' is to convert it into a 'red belt'. A sufficiently wide tract of land could be given over to authorities which require large campuses, e.g., Army, Police Department, Airport Authority, Forest Department etc. This tract on the periphery of the city would have better chance of remaining green and unencroached.
- Due to use of the Gorewada tank as the Balancing Tank for the water brought from various rivers, the tank now remains full all the time irrespective of the seasons. This has adversely affected that wildlife and biodiversity which depends on seasonal fluctuations in the water level. VNHS Centre has made these observations mainly by studying the bird life over the years. Could the excess water be distributed over a larger number of reservoirs in the city?
- One important and step in conserving the Natural Precincts is to recognize their importance as 'Ecosensitive Zones' and impart more and more legal protection to them. In addition to the Heritage Regulations, declaration and regulations for 'Environmentally Sensitive Areas ESA (or zones, EZA)' under the section 3(2)(v) of the Environment Protection Act and Rule 5(v) thereof, as also declaration and regulations / guidelines for 'Biodiversity Corridor Regulations Zones' (BCRZ on the lines of CRZ) can prove to be a very effective legal tools for this.
- Maintain the status of existing agricultural lands within the city, especially the PKV land.

From Regional Planning angle following immediate measures are suggested

Understanding the regional setting from biodiversity corridor zoning point of view (recognise 'Biodiversity Corridor Zone' (on lines of CRZ) and adopt suitable regulations for guiding all development within the zone)

Adjust the current administrative boundaries according to the natural setting (E.g., in case of Nagpur, the Nag River and Pili River originate just outside the city (in Lava Village boundaries) and also meet in at a confluence just outside the city (near Village Pawangaon). Another example is that the boundary of the city passes through middle of Gorewada Lake. Also there are areas just outside the city which are developing as appendages of the city (namely : Hingna Industrial Estate, Villages Wadi, Dabha, and Pardi etc. All these areas should be included in the city plan for effective planning and implementation.)

Adopt policies for conserving major and minor biodiversity corridors during planning

Identify and conserve biodiversity hotspots during planning and development

Adopt policies to reduce conversion of agricultural land to permanent non-productive use

### Immediate Actions Suggested at the City Level

Assess the development of the city in the distant and the immediate past, and suggest suitable and sufficiently strong measures for inclusion in the Development Plan. Specific steps to be taken in this direction include :

Prepare Integrated Conservation plan for Nagpur

- Preparation of a base map for Nagpur with the help of satellite imagery/survey plans
- Preparation of natural precincts and heritage zone plans
- Preparation of special regulations for natural features
- Integration of the conservation plan in the Development Plan of the city

Increase People's Participation

- Increased interaction with the stakeholders
- Create public awareness, increase participation, improve understanding/knowledge

Development of local expertise

- Creation of an information database
- Develop in-house expertise within the Local Authorities and among NGOs

Action for conservation

Special fund for conservation/also find private sponsors for funding conservation

Protection of natural features from degradation, encroachments and pollution

This will involve a study of various other civic activities that are directly connected to conservation, such as garbage disposal, wate-water disposal, rainwater harvesting

**To oversee implementation of the action plan, as a follow up of the BSAP, following actions and coordination mechanisms are suggested:**

- Initiate Information/Education/Communication (IEC) training programmes for awareness raising and orientation of citizens, people's representatives, officials, judicial officers
- Creation of displays/exhibitions/museum for information and inspiration
- Creation of data base covering conservation and development related themes for easy accessibility information. Translation of relevant material into local (Marathi) language
- Implementation of pilot projects and dissemination of results
- Periodic evaluation and review of SAP
- Citizens' Annual Environmental Report prepared through participatory process (Prepared by citizen's committees or group of NGOs in coordination with authorities)
- Student - Teacher based research and action projects to be integrated into their curriculum
- Participation of citizens (especially students) in bird count, tree census and conservation of important natural precincts and habi-tats
- Participation of citizens in decision making processes

# Rathong Chu Sub-State Site (Sikkim) Biodiversity Strategy and Action Plan

Coordinating Agency: Sikkim Forest, Environment and Wildlife Department, Namchi

The Rathong Chu Valley (sub state site), Biodiversity Strategy and Action Plan a project of the Ministry of Environment and Forests, Government of India was executed by the State Forest Department to prepare a detailed strategy and action plan for the biodiversity in Rathong Chu Valley of West Sikkim. Accordingly in January 2001, a steering committee was formed and the members including forest officers, NGO's and scientists visited the remote villages of West Sikkim, namely, Labdang, Karjee, Gangyap, Tashiding, Yuksam and Khecheopalri. Public hearings, environmental education campaigns through models and green games were organized in all of these villages.

Many interesting environmental issues were explored and noted using 4D methods of Appreciative Participatory Planning and Appraisal (APPA). It was indeed noteworthy to see the people showing immense concern for conservation of sacred features such as caves, hotsprings, lakes, monasteries followed by the surrounding forests, wildlife living therein, water sources and catchment areas. Apart from this, a majority of the villages gave high preference to ecotourism as a potential livelihood option for sustenance. Greater emphasis was laid on strict implementation of the forest and wildlife laws, eviction of foreign nationals and infrastructure development for tourism, education, health and sanitation. Also the major threats to biodiversity were perceived from the greed of a few influential people and settlers from outside. It was also found that while these influential people gobbled up the benefits from biodiversity unsustainably, the local community had to bear the costs of the ensuing environmental degradation.

After the successful completion of this venture, a biodiversity *mela* was organized at Yuksam to demonstrate environmental issues, useful plants, and the rich traditional and cultural heritage of the area to the communities and tourists alike. A wide variety of non-timber forest produce (NTFP) including medicinal plants, wild edible fruits and vegetables, local handicrafts, handlooms, traditional dresses and instruments were also displayed. Moreover, various programmes pertaining to the local culture, and a play depicting the sacred values Rathong Valley area was also enacted. The *mela* made the various communities as well as the tourists, aware of the richness of their area in natural and cultural resources.

Thus community strategy and action plan was prepared in this participatory manner. This was then placed before various government departments, policy makers, scientists etc in the state level workshop organized at Gangtok. Their feedback was incorporated and the strategy and action plan finalized.

# Simlipal Sub-State Site (Orissa) Biodiversity Strategy and Action Plan

Coordinating Agency: Mayurbhanj Swechhasevi Samukhya, Baripada

## Background

Similipal and Mayurbhanj are very rich in its biological resources; varying of natural Eco-system, species and lifestyles exist in this part of the world. These biological resources are the main components to provide livelihood support to the local people.

MOEF included Similipal in this process after getting response through the leaflet "Call for Participation" from MASS. As a part of the process Govt. of India decided to select Similipal as a Sub-State Site. The technical and Policy Core Group provided regularly clear guideline. These guidelines were basically followed with local modifications to prepare the strategy action plan at local level.

## Objectives of the Sap

- To sensitize people on Biodiversity, its degradation and importance of conservation.
- To identify thrust issues and find strategies, chalk out action plans for effective measures towards Biodiversity management and conservation.
- To substantiate factors of culture, ethics, ecology and economy prevalent in the area for good governance and local acceptability of programmes in relation to Biodiversity management in the sub-state site.
- To find local level solutions to thrust problems by acknowledging, recognising, promoting individual and institutional initiatives in the local level.
- To identify major gaps in coverage and to delineate strategies needed to plug gaps and enhance efficacy of on going initiatives.
- To suggest strategies and prepare action plan for ecosystem management and Biodiversity conservation.
- To create a platform for advocacy and lobbying for development of Biodiversity in Mayurbhanj district.

## Content of the Sap

The BSAP contents profile of the Mayurbhanj district. It describes the present status of Biodiversity different state of natural Ecosystem. It describes these causes of Biodiversity loss. It contains role of different stakeholders and ongoing initiatives by different institutions for Biodiversity conservation. Finally it contains a member of strategies and proposal for plan of action for Biodiversity conservation.

## Methodology

The methodology involved in the SAP is broadly participatory, interactive and investigative that involved adequate fieldwork, PRA and participatory observation. The following methods and instruments were used in collection of data to substantiate the SAP. The informants were grouped under three categories; local community, government functionaries and intellectuals from various walks of life including those from NGOs.

- Workshop on Biodiversity
- Training on SAP
- Biodiversity campaign: Life 2001
- Questionnaires
- Village Meetings
- Group Discussion
- Focus group Discussions
- Interview
- Interaction and Interface
- Secondary sources
- Data Analysis
- Draft Report preparation
- Sharing of Draft Report

## Location, General Boundary, Total Area and Population of Mayurbhanj District

The district lies between 21'17" north latitude and between 85'40" and 87'10" east longitude. Mayurbhanj district is bounded on the north by Singbhum district of Jharkhand State and Midnapur district of West Bengal. On the south by the districts of Balasore and Keonjhar, on the east by Midnapur dist of West Bengal and Balasore. On the West Keonjhar dist. And Singbhum of Jharkhand.

| | | |
|---|---|---|
| Total area | : | 10,416.6 square kilometer. (Largest district in Orissa as per geographical area) |
| Population | : | 22,21,782 (Twenty two lakh twenty one thousand and seven hundred eighty two) |
| Tribal Population | : | 57% |
| Schedule cast population | : | 07% |
| Total Forest Area | : | 44.86% |

## Status of Biodiversity

### Floral Diversity of Similipal

Similipal is a virgin sub-tropical forest and is a repository of large flora, which is a mixture of South Indian, North Indian, and Andamans species. Very few plants are endemic. The range of flora existing and evolving are the elements evergreen forest of deep valleys, moist and dry deciduous forests of medium to high table lands, chiefly represented by Sal, as well as alpine and savannah elements. The data of enumerations by taxonomists gives a total of 3000 species of plants, ferns, orchids, and mosses. The topographic variation, as described earlier, harbaours many diverse species and ecotypes of species of plants. Saxena and Brahmam (1989) have reported 1076 species of plants representing 168 families. The density of species per family is one of highest, as compared to the distribution of the Himalayan species. The larger genera are Acacia (with 11 species), Aneilema (with 6 species), Anthraxon (with 6 species), Bauhinia (with 6 species), Blumea (with 14 species), Butea (with 5 species), Carex (with 4 species), Cassia (with 5 species), Cheilanthes (with 4 species), Dendrobium (with 13 species), Cyperus (with 24 species), Desmodium (wit 23 species), Ficus (with 11 species), Indigofera (with 12 species), Leea (with 10 species), Lindernia (with 9 species), Terminalia (with 5 species) etc. (with 6 species), Bauhinia (with 6 species), Blumea (with 14 species), Butea (with 5 species), Carex (with 4 species), Cassia (with 5 species), Cheilanthes (with 4 species), Dendrobium (with 13 species), Cyperus (with 24 species), Desmodium (wit 23 species), Ficus (with 11 species), Indigofera (with 12 species), Leea (with 10 species), Lindernia (with 9 species), Terminalia (with 5 species) etc.

Mishra (1986) has reported 93 species of orchid flora of Similipal, out of which 4 species are new reports for India. In a biomass study of plants in selected areas of Similipal it was tested how the number of species on each plot affected the growth of plants as well as their use of nutrients. It was found that in two years the more the species a plot had, the greater the biomass of plants and the more nutrients were utilized in their growth. Thus the increased productivity of an ecosystem and use of nutrients indicates rich trends of plant Biodiversity (Anonymous, 1994).

Further, Similipal rears many rare species of plants. Besides the more economic species of trees such as Sal, Silk cotton, Arjun, Asan, Champa, Eugenia, Dispyros, Madhucam, Bija etc. it also contains about 200 species of medicinal plants, many species of economic plants and plants yielding alkaloids, resins, lac, myrobalan, arrowroot, and species as feed for tassar. Some common medicinal plants are the species of Achyranthes, Andrographis, Cassia, Cissampelos, Cyperus, Eclipta, Emblica, Holarrhena, Hygrophila, Phyllanthus, Rauwolfia, Saraca, Solanum, Strychnos, Swertia, Terminalia, and Vitex. Besides, Saxena and Brahman (1989) reported 52 timber yielding species, 12 fuel wood species, 8 species used for plywood manufacture, 13 species used for paper pulp, 10 species used for match industries, 17 species for fibres, 7 species for dyes, 5 species for oil seeds, and 8 species for gums and resins. Thus combining the gene pool of the natural resources as described the Similipal is one of the greatest centres of Biodiversity of plants, which requires to be conserved.

### Fauna of Similipal

One can easily imagine that, such diverse topography and soil conditions coupled with climatic variation and rich diversity of autotrophs is sure to support a fascinating faunal composition. The primary heterotrophs among the mammals (herbivores) are represented by sambar, elephant, gaur or Indian bison, cheetal, barking deer, mouse deer, chousinga or fourhorned antelope, common langur, rhesus monkey, porcupine, Malabar giant squirrel, flying squirrel, Indian pangolin and rufus tailed hare, etc.

Among the secondary heterotophs are tiger, leopard, jackal, wild dog, Indian wolf, rattle, jungle cat, civet cat and common mongoose.

These scavenging animals are hyena, jackal, jungle cat and rattle.

While different animals are adopted to different vegetation covers like dense forest, open forest, scrub and grassland, there is considerable overlapping in their distribution.

Due to its topographical and climatic variation, besides the avifauna common to peninsular India some Himalayan birds have been found by Salim Ali. Some common birds are peafowl, painted spur fowl, black partridge, gray partridge, doves, crested serpent eagle, shahin falcon, fly catcher, hawk, malabar pied hornbill and gray hornbill, owl, hill myna, golden oriole, parakeets, piogeons, sun birds, common snipe, crow pheasant and red jungle fowl etc. Besides them, water birds like white ibis, spoon bill, herons, egrets, red wattled lapwing, teal, plover, terns, sand piper and king fishers are seen in artificial and natural water bodies in and around Similipal.

Mugger, python, cobra, king cobra, land tortoise and monitor lizard are among the common reptiles found in the forest. Besides them, large varieties of fishes, aquatic fauna and insects are found in this forest. Mahasheer fish though much depleted in number is notable among the rare fishes of Similipal. Honey bee is a very important insect of economic importance to the tribals particularly, the 'Khadia' tribes (S.K. Pattnaik, CCF, Wildlife 1997 Conservation and Management Wildlife in Similipal).

**Census of Wild Animals**

| | | |
|---|---|---|
| Royal Bengal Tiger | : | 99 |
| Tiger (Leopard) | : | 119 |
| Elephants | : | 402 |
| Bison | : | 850-950 |
| Wild boar | : | 10000 |
| Sambar | : | 7000-9000 |
| Deer | : | 2500-3500 |
| Kutra | : | 4000-5000 |
| Gurandi | : | 1500-1800 |

(Director, Similipal Biosphere Reserve)

**Mayurbhanj District Livestock Population (2001)**

| | | |
|---|---|---|
| Cattle | : | 8,79,210 |
| Buffalo | : | 26,390 |
| Sheep | : | 1,63,550 |
| Goat | : | 6,01,587 |
| Pig | : | 8,492 |
| Poultry | : | 22,94,378 |

(Chief District Veterinary Officer)

**Statement of the Problem Relating to Biodiversity**

- Smuggling of Timber and Other Products
- Forest Fire
- Grazing
- Habitat destruction and land diversion
- Hunting
- Unsustainable Harvesting
- Over use of Chemical pesticides and fertilizers
- Poisoning and pollution
- Population, unemployment and poverty
- Soil condition and introduction of exotic species
- Breaking of Food Chain
- Erosion of traditional knowledge system

**Gap Analysis**

- Gaps in Information
- Gaps in Vision
- Gaps in Policy and Legal Structure
- Gaps in Institutional and Human Capacity

**Strategy**

- Involvement of local communities
- Securing livelihood
- Proper care has to be taken to involve marginalised group
- Making concern everybody for Biodiversity conservation
- Capacity Building of Govt. Functionaries
- Reviewing existing policies and operational modalities on Biodiversity Conservation
- Linking Panchayat Raj Institution
- Popularising, documenting indigenous knowledge and linking with modern technology
- Inter Departmental Coordination
- Research and study
- Fire wood and Timber Management
- Local Committee for Biosphere Management
- Alternative Income Support System
- Restoration of degraded habitats out side National Park

## Plan of Action

**Action 1**
Promoting and strengthening community institutions in forest and wildlife conservation

**Action 2**
Restoration of degraded forest area out side national park

**Action 3**
Control of timber smuggling and ilicit felling

**Action 4**
Controling of hunting and illegal trade in wild animal and their part.

**Action 5**
Participatory resource mapping, village level participatory planning for livelihood support

**Action 6**
Sustainable harvesting of non timber forest produces (ntfps), processing and marketing

**Action 7**
Promotion of organic farming and conservation of local seeds

**Action 8**
Establishing medicinal plant garden

**Action 9**
Opening centre for biodiversity studies at north orissa university, baripada

**Action 10**
Documentation of indigenous knowledge and transfer of technology

**Action 11**
Biodiversity conservation campaign

**Action 12**
Preparation of long term fire wood and timber management plan

**Action 13**
Review of tourism pattern and exploring tourism potentials

**Action 14**
Increasing participation in existing local committee for management of similipal biospher reserve

**Action 15**
Hygenic disposal of carcass and ophals

**Action 16**
Conservation of local and wild varieties of species

**Action 17**
Review of existing government policies, laws and operational modalities

**Action 18**
Organising communities in peripheral villages of similipal biosphere reserve for natural resource management to secure livelihood and biodiversity conservation.

**Action 19**
Documentation of cultural ethics on biodiversity conservation and establishing memory gardens.

**Action 20**
Dialogue with the villagers of core area regarding rehabilitation and resettlement

**Action 21**
Integration of biodiversity conservation in district planning

**Action 22**
Inter state effort on biodiversity conservation

**Action 23**
Control of forest fire

**Action 24**
Renewable energy development

**Action 25**
Conservation of modal eco-race and strengthening livelihood support system based on sericulture

**Action 26**
Socio economic study of similipal peripheral villages

**Action 27**
Health education and malaria control programme

# Uttara Kannada Sub-State Site (Karnataka) Biodiversity Strategy and Action Plan

Coordinating Agency: M.D. Subhash Chandran, Department of Botany, Dr. A.V. Baliga College, Kumta

## 1. Introduction

Uttara Kannada district of Karnataka, is one of the 17 Sub-State Sites chosen under the NBSAP for preparing a local level Strategy and Action Plan (SAP). It is rich in biodiversity due to its central location in the Western Ghats, along the shores of the Arabian Sea, and due to the traditions of conservation among the people.

### Biodiversity of Uttara Kannada

Notable of the diverse kinds of ecosystems/habitats here are: the tropical evergreen, semi-evergreen, moist deciduous and dry deciduous forests, savanna and scrub. The forests are interspersed with grassy blanks, rivers and streams, waterfalls, wild nutmeg swamps etc. Valleys cultivated with spices, areca, rice and banana form mosaic with forests. The marine and estuarine habitats are rich in diversity too.

**Table: A glance of Uttara Kannada's biodiversity (partial data)**

| Type of organisms | Region covered | Known species | Remarks |
|---|---|---|---|
| Flowering plants | Uttara Kannada | 1741 | |
| Gymnosperms | -do- | 2 | Gnetum and Cycas |
| Pteridophytes | -do- | 70 | |
| Bryophytes | -do- | Data deficient | |
| Known algae | Sharavati river estuary | 199 | |
| Phytoplankton | Kali river estuary | 55 | |
| Birds | Uttara Kannada | 419 | 75% of Western Ghat spp. |
| Bats | -do- | 25 | 62% of Karnataka spp |
| Mammals- terrestrial | -do- | 38 | |
| Mammals: Dolphins and Porpoises | Karnataka coast | 7 | |
| **Reptiles** | | | |
| 1. Tortoises | -do- | 1 | |
| 2. Turtles | Karnataka coast | 5 | |
| 3. Snakes | Karnataka W. Ghats | 20 | Only in Kali river |
| 4. Sea snake | Karnataka coast | 2 | |
| 5. Crocodiles | Uttara Kannada | 1 | |
| Amphibians | Uttara Kannada | 11 | |
| Endemic fresh water fishes (rivers) | Uttara Kannada | 44 | Endemic to W Ghats/South India |
| Commercial fishes (coastal/marine) | -do- | 89 | |
| Marine/estuarine invertebrates | -do- | 100 | |
| **Agricultural biodiversity (partial)** | | | |
| 1. Rice | -do- | 44 varieties | Survey incomplete |
| 2. Black pepper | -do- | 6 -do- | 4 appears to be lost |
| 3. Banana | -do- | 4 -do- | |
| 4. Betel vine | -do- | 4 -do- | |

## 2. Major Biodiversity Related Issues/Problems

It is to be admitted that considering the diversity of ecosystems/habitats that Uttara Kannada harbours, and with substantial segments of its biodiversity of lower organisms yet to be documented, preparing a Strategy and Action Plan (SAP) through a consultative process is not an easy task. Almost every kind of resource management system operating in the district has its weaknesses. The SAP has to be an ongoing exercise, and during its evolution the fragile ecosystems are not to be subjected to further stresses and strains.

### 2.1 Lack of Co-ordinated Biodiversity Inventorying and Management

Biodiversity is vital to the ecology of the district and forms the main support base for the livelihoods of most people. Yet harmonised efforts to inventorise and manage biodiversity are lacking. The present management systems are primarily driven by exploitative forces.

### 2.2 Need to Develop Watershed and NTFP-Centred Forest Management System

The pre-colonial community-based management of forests revolved around water and non-timber forest produce (NTFP). A watershed forest was conserved in every village as sacred kan. The kans, as their relics reveal, were centres of endemic biodiversity and cultural centres of the community. They were at the sources of streams and springs, and yielded valuable NTFP like black pepper and cinnamon. Biomass harvesting from other forests was community regulated. The state-centred forest management system from the British times deprived the communities of their forest rights, with also adverse effects on biodiversity, agriculture and water regimes. With commercial timbers like teak meriting priority in the state agenda, the forests were depleted of such species. The policy was also ruinous to NTFP. That stress on NTFP can play a much greater role (in conservation of ecology, promotion of organic farming, enhancing nutritional levels, creation of more employment opportunities for rural people, artisans and women) was not given much thought. The shrinkage of the watershed is also due to mining as in Yellapur, Joida and Karwar taluks and due to forest fragmentation caused by various developmental projects, expansion of agriculture and horticulture into forest swamps and stream-sides.

### 2.3 Forest Encroachments not Seen in Historical Context

The British period saw ban on shifting cultivation (kumri system) and palming off the NTFP to the ruinous methods of extraction by forest contractors. The depletion of prime timbers saw large area of multi-canopied, climatically harmonised natural forests giving way to monoculture plantations depriving also the people of NTFP. Moreover about 73% of the district's area is under forest and legally under State ownership. The old Forest Settlement Reports mention about communities like *Kunbis, Kumri Marattas, Karivokkaligas* and several others as affected by ban on their traditional forest cultivation. When the *kan* forests were taken over by the State the *Kandivars* who were guardians of the *kans* and whose subsistence depended on *kan* products were put to great hardships. Moreover, most of the watershed monopoly and permanent cultivation are with the privileged classes. These factors culminated in the saga of forest encroachment. Further, people displaced by and brought in by developmental projects aggravated the problem that has snowballed into a major crisis today.

### 2.4 Inadequate Involvement of Local Communities in Forest Management

When bulk of the lands came under the control of the Forest Department it was necessary to have associated the village communities, who had good traditions of conservation and sustainable use, with forest management. Under the Joint Forest Management (JFM) villagers are involved in forest management; but the system is today ailing from: 1. Lack of funds to continue the JFM; 2. About 75% of the villages are yet to be covered under JFM; 3. Only degraded forests/scrubs and marginal lands are brought under JFM. 4. The JFM plantations are dominated by industrial woods than local and NTFP species.

### 2.5 Habitat Shrinkage and Wildlife Decline

Qualitative changes in forests, increase in plantations, forest fragmentation, sport-hunting in the past and poaching today as well as depletion of bamboo and drying up of streams caused major decline of wildlife and increased the human wildlife conflicts.

### 2.6 No Inventory on Domesticated Diversity

The farmers through ages had evolved a large number of cultivated varieties of various crop plants and fruit trees. Unfortunately, except for fragmentary efforts, no comprehensive inventory exists on cultivated biodiversity. Many stakeholders are not aware of the threats to the biodiversity of crops and food plants of the wild. In Uttara Kannada the agricultural systems are closely linked to the natural (forest) ecosystems. Agriculture and forests formed an interacting system integrated also into the culture of the local communities. Further, promotion of high yielding varieties caused genetic erosion of many crops and paved the way for greater dependency of farmers on agro-chemicals instead of on organic materials.

### 2.7 Habitat Changes and Decline of Wild Relatives of Cultivate Plants

Wild mango trees, jack and pepper and various other food plants of the wild and wild relatives of cultivated crops declined due to logging, habitat changes, monoculture plantations, diversions of forest lands for non-forestry purposes etc. Major habitat changes in

the forests went hand in hand with decline of watershed, decline of honey bees and increase in weeds.

### 2.8 Over-exploitation of Marine Biodiversity

Recent times saw large-scale entry of outside capital in marine and estuarine fishing creating serious ecological dislocations and livelihood crisis among traditional fisher-folks. Under, mostly state-sponsored schemes, banks made large advances to private individuals, hailing from non-fishing and commercial sectors to exploit fisheries, who subsequently dominated the fields of marine fishing, fish processing and transportation. As mechanised crafts and modern gadgets steadily increased fish catches declined. Unemployment and under-employment grew among the traditional fisher-folks, including women. Artisan fisheries have been totally marginalised. Fishing by foreign trawlers in our territorial waters intensified the travails traditional fishing sector.

### 2.9 Ecological Devastation of Estuarine Ecosystems

Tropical estuaries are ranked among the world's highest productive ecosystems- the Aghanashini estuary of Kumta is one such. Full of mangroves and mudflats and receiving high amount of detritus from the forests of the Western Ghats, the estuary produced great quantity of fishes, prawns, crabs and bivalves (14 species of bivalves are reported). The estuarine areas sustained livelihoods of thousands of families. The collection and sale of bivalves, and selling of fish employed and gave financial independence to large number of women and food security to scores of families. There are 40 species of birds exclusive to the estuaries and the sea-shore, several of them are winter migrants from northern countries.

Shallow portions of backwaters were in the past reclaimed by building earthen embankments (bunds) and mangroves planted alongside. Salt tolerant rice was raised in these *gajni* fields. From the 1960's when the State Government built permanent bunds replacing the earthen ones, the farmers discontinued planting of mangroves. The farmers started storing tidal waters in their *gajni* rice fields to grow fish and prawns and auctioned the fishing rights to the contractors, thereby depriving the traditional fishermen of their rights to fish. Recent years saw complete ecological devastation of the gajni areas, whose biodiversity has been destroyed to bring up prawn farms.

### 2.10 Lack of biodiversity awareness in the administrative machinery and civic bodies

Exploitative approach towards ecosystems and species is considered a necessity for generating employment and raising income. This is primarily due to the lack of awareness on the benefits of ecological enrichment and sustainable resource use.

## 3. Ongoing initiatives/gaps

- Joint Forest Management programme has been introduced – but it covers only 25% of the villages. JFMs are allotted only scrub jungles, and degraded forests, with very little NTFP. JFM plantations are dominated by Australian acacias than by NTFP species. Moreover, JFM programme is passing through funds shortage.
- Overall good protection is afforded to forest in general- yet there is no special recognition for conservation/restoration of endangered habitats such as wild nutmeg (*Myristica*) swamps and other endemic vegetation (such as *Dipterocarp* forests).
- State sponsored sacred groves called *Pavitravanas* have been created in some places by planting a mixture of sacred species. At the same time the community conserved sacred *kans* of the past of high endemic vegetation were subjected to timber extraction and even put to alternative uses.
- Wild Life Conservation Act has strictures on hunting of several birds. Forest birds receive high degree of protection because of forest protection. At the same time estuaries and beaches have witnessed steep decline in birds because the Wild Life Conservation Act has nothing to prevent the destruction of important habitats such as mangroves and beach vegetation.
- The policy makers, the agriculture and concerned departments, overlook the inherent value of biodiversity of cultivated crops. The usefulness of different species and varieties in providing ecological security is least understood. This situation prevails despite the ability of agricultural universities and other related institutions to address effectively the question of conservation of genetic diversity by the farmers.
- There is no legal structure to protect the rights of farmers who have evolved some of the indigenous varieties of crops and trees.
- The Coastal Regulation Zone (CRZ) Notification, 1991 classifies mangroves as CRZ-I, and have strict regulations on violations of the CRZ. But at the same time CRZ has no positive stipulations regarding restoration of mangroves and beach vegetation.
- Different states have closed seasons for fishing, during the early monsoon period. At the same time these closed periods vary from state to state. There is no central agency to implement or synchronise the closed seasons of different states.
- There are stipulations that mechanised crafts should not fish in the foreshore areas, which are meant for artisan fishers; but these stipulations are not implemented in actuality.

## 4. Proposed Strategy and Action Plans

- **A Biodiversity Centre for Uttara Kannada** needed to inventorise biodiversity, to coordinate research and furnish biodiversity information, to create a common forum for biodiversity managing departments, and to advise the district administration.

- **Greater Involvement of village Communities in Biodiversity Management:**
  1. Since endangered *Myristica* swamps and other rare and endemic vegetation are often remotely situated and subjected to encroachment the services of local residents need to be taken for protection of such areas.
  2. JFM to be expanded to cover more number of villages and to cover more types of forest ecosystems than just degraded forests.
  3. JFM to make special provision for subsistence of the poorest segments through appropriate selection of species for planting
  4. Villagers to restore mangroves and seashore vegetation.
  5. Farmers to be give incentives for *in situ* conservation of rare, threatened and endangered elements of domesticated biodiversity.
  6. Creation of botanical gardens/arboreta involving poor peasants.
  7. There are over 10,000 reported forest encroachers. After scrutinising individual case histories, genuine persons may be associated with forest maintenance and restoration, in enriching forest plantations with NTFP species, food plants for wild life and in creating and maintaining animal migration corridors.
  8. Anshi, Ghat, in the process of conversion into a National Park, has many human habitations. To avoid more misery to the forest dwellers and to prevent more forest encroachments, Anshi be made part of the proposed Sahyadri Ecologically Sensitive Area (SESA) and people be associated as partners in conservation.
  9. A programme to be initiated for the ecological upliftment of *soppinbettas* (leaf manure forests) from their present degenerate state through giving more rights to the farmers on the products of these bettas.

- **Development of Community Heritage Centres**

  The *kan* forests were heritage centres of village communities during pre and early colonial periods. They were also centres of biodiversity and endemism and rendered ecological services. They became part of state forests and lost their special identity, and were subjected to timber exploitation, causing biological, ecological and economic impoverishment of villages.
  1. The *kan* forests to be identified, their biological and ecological significance to be evaluated and the village communities to be organised for their management.
  2. Villagers to be encouraged in the preservation of smaller sacred groves

- ***In situ* Conservation of Traditional Crop Varieites**

  Our preliminary surveys show that Uttara Kannada is a large storehouse of traditional crop varieties and fruit trees. As their germplasm value is not understood many are lost and others are on the path to depletion.
  1. A GIS database on domesticated biodiversity to be created by the proposed District Biodiversity Centre/and also by the departments of Agriculture and Horticulture. Incentives to be provided to farmers/individuals by these departments/ NBPGR etc. for the service of *in situ* conservation of rare/threatened/endangered varieties.
  2. Farmers' clams on varieties to be recorded in People's Biodiversity Registers

- **Promotion of Organic Farming**

  The Uttara Kannada farmers have a great heritage of organic farming, perhaps more than any other district in Karnataka State. From the point of human and animal health, for promotion of biodiversity as such – honey bees, butterflies, birds etc. and from the point of soil protection, soil regeneration and water conservation organic farming needs to be promoted.
  1. NGOs to create awareness on organic farming and update the Marketing outlets for Uttara Kannada organic products to be promoted within the district and in outside cities
  2. Medicinal plant cultivation to be carried out organically by local farmers in collaboration with pharmaceuticals
  3. Organic consumer movement to be promoted in towns by NGOs.

- **Greater Facilitation of Women in Conservation of Traditional Crop Biodiversity**
  1. Women to be involved in small scale conservation enterprises, especially of indigenous crops, including tree crops such as mango, jack, kokum, gooseberry, drumstick etc. for household food security.
  2. Promotion of home gardens, 'Malenadu Home Garden and Seed Exchange Network' of Uttara Kannada already initiated. Women are the main participants in this effort being carried out by an NGO.

     Growing of local medicinal plants in home gardens to be encouraged.

- **Adoption of Watershed Based Approach in Forest Management**

  Forest fragmentation, diversion of streams, conversion of substantial areas of forests into monoculture plantations, mining and various developmental programmes have affected water-holding capacity of forests
  1. Forest patches to be graded according to their watershed value, based on ground surveys and satellite imageries.

2. All evergreen forests, relics of primary forests and swamp forests that have high watershed values need to be prioritized for conservation
3. Restoration of multi-strata evergreen forests to be attempted wherever possible.

- **Forestry to be More People and Biodiversity Based than Timber-centred**
  1. Forest policies to be reoriented to strengthen rural livelihoods
  2. Destructive contract system for NTFP collection to be dispensed with
  3. Poor grade plantations to be enriched with NTFP and nectar plants
  4. Develop direct linkages between NTFP collector and end-market

- **Adoption of Decentralized Fire Management Strategy for Forests**
  1. Fire management strategies should have village communities as playing central Role
  2. Semi-evergreen ground vegetation to be promoted in suitable localities
  3. Removal of dry materials from fire-prone forests by locals to be permitted

- **Strategy for Wildlife Protection**
  1. Eco-clubs/wildlife protection committees to be formed in forest villages
  2. Ponds to be de-silted in forest villages and fish farming promoted to minimize hunting by locals
  3. Raising of food plants for wildlife in poor-grade plantations essential
  4. Creation of wildlife corridors, including micro-corridors to be considered
  5. Butterfly parks to be created in each vegetational zone

- **Regulation of Marine Fishing and Restoration of Fishing Sector to the Traditional Fishing Communities**
  1. A Central Ministry on Marine and Coastal Resources necessary
  2. Inshore waters be reserved for exclusive use of artisan fishing
  3. State financial advances for fishing vessels and gadgets and fish processing units to be granted to traditional fishing communities only
  4. Creation of fisher-women's cooperatives and seaweed-based enterprises
  5. Women to be trained in breeding of ornamental fishes for aquarium making.

- **Strategy for Protection of Estuarine Ecology**

  The rivers of Uttara Kannada are variously affected by industrialisation, mining and dams (Kali river) or by dams alone (Sharavati). The only notable river with vast estuarine area is Aghanshini. It supports considerable fisheries, estuarine agriculture and high levels of women's employment (through collection and sale of bivalves) and has great potential to be a haven for birds.

  1. Aghanashini estuary deserves to be declared as Ecologically Sensitive Area, in view of its biodiversity, productivity and livelihood security. It has great potential for sustaining academic and eco-tourism
  2. The fishing communities and others for whom the Aghanashini estuary, forms the main livelihood support system (Rs. 39 crores annually, excluding aquaculture, as per one estimate) fear, with strong reason, that the execution of the proposed international port at Tadri will jeopardise their livelihoods.

- **Need for Protection of Sea Beach Ecology**

  Sea beaches of the district are affected variously due to human impacts with serious implications on coastal ecology
  1. Construction of sea walls to protect beaches from erosion to be carried out only after due EIA process
  2. Sea beaches to be brought under natural vegetation
  3. CRZ regulations on sea beach protection to be more positive in approach

- **Preparation of Master-plan for People-centred Eco-tourism**
  1. Tourism policy to create employment opportunities for locals while enriching ecology of tourist areas
  2. Tourism infra-structural facilities to be more eco-friendly
  3. Sensitive eco-systems to be closed to tourism
  4. Tourist spots to be identified and classified as of scientific, educational, cultural and religious importance and managed accordingly

- **Creation of Sustainable Livelihood Options for Youth**
  1. The enrichment of plantations with NTFP species can create jobs in forest based handicrafts and cottage industries sector

2. Large-scale planting of nectar producing species can create more employment opportunities in apiaries while also increasing agricultural production
3. Start of small scale and cottage industries processing medicinal plants, plant dyes, gums and resins, seed banks, small nurseries, food preservation/processing, extraction of plant chemicals, natural fibres.
4. Training to be given to youth as guides for eco, cultural and academic tourism (trail guides, identification of butterflies, birds, plants etc., in cultural matters), employment in museums, arboretum, botanical gardens, in small-scale catering and promotion of ethnic foods.
5. Training and employment in the upkeep of tourist areas (in minimising waste, waste management, beautification).
6. Village fodder farms to be created in suitable villages using combination of grass and woody plants
7. Training to be given in rain water harvesting methods

- **Infusion of Biodiversity Concerns in Administration**
  Considering the fact that biodiversity is at the root of livelihood of bulk of Uttara Kannada's population care has to be taken to see that biodiversity concerns are infused into concerned departments and civic bodies.
  1. NGOs to be entrusted with the primary responsibility of infusing biodiversity concerns. NGOs to seek/ be provided with necessary financial assistance for the task
  2. The programmes to cover awareness on CRZ, forest and wildlife conservation, waste disposal/treatment, sanitation and health etc.

- **Promotion of Biodiversity Education**
  Creation of biodiversity awareness can have significant results in Uttara Kannada district, full of fragile ecosystems. Due to the initiative taken by the Centre for Ecological Sciences of the Indian Institute of Science considerable work is being in this field. The undergraduate Botany and Zoology syllabus of Karnatak University has been made more biodiversity centred. The CES also had successful tie up with local educational institutions in pilot projects on biodiversity inventorying.
  1. There is need to introduce biodiversity and its conservation in the school and college syllabi
  2. Routine biodiversity education for government machinery, civic bodies, industrial sector and the public in general will be very useful.

# Vidarbha Sub-State Site (Maharashtra) Biodiversity Strategy and Action Plan

Coordinating Agency: Amhi Amachya Arogyasathi, Gadchiroli

## Location of Site

Chandrapur and Gadchiroli sub-state site is located in the eastern Maharashtra the location map is as attached.

## Objectives

1. Creating awareness about biodiversity conservation and promotion as well as natural resource management and sustainable development among all sections of society.
2. Organization education and training of eco-clubs, self help groups and village planning groups for scientific management of natural resources and sustainable development.
3. Undertaking participatory studies and researches about status of biodiversity, threats to biodiversity, natural resource assessment, bio mass needs of the community etc. at the micro (village) level and creating databases.
4. Ensuring participation of disadvantaged sections of society like women, tribal in decision making process related to biodiversity conservation and sustainable development.
5. To provide livelihood opportunities to poorest section of the society by ensuring their access to resources (Natural and financial) and promoting equity in resource use.
6. To promote self-governance at the grass root level among the groups and communities who have primary stake in biodiversity.

## Project Duration

The duration of the project was: From to

## Process Highlights

A food biodiversity mela for women was organized in Korchi and Dhanora blocks of Gadchiroli districts
Children's science congress with focus on biodiversity was organized at Korchi
Public hearing and consultative meetings were arranged with farmers, fishermen, women and tribal etc. to know about the various problems related to biodiversity conservation.
Discussions were held with government functionaries at the different level
Working plans, other relevant literature, reports used by govt. departments and universities and researchers were referred
Questionnaires and training modules were developed for training villagers on natural resource management and they were tested on small scale

## Major Achievements

Development of awareness about the need for actions related to biodiversity within a cross section of the society initiated in a sustainable manner
Process for creating biodiversity registers at village levels initiated and sustained.
Better understanding of the issues confronting conservation, sustainment and development of biodiversity achieved amongst all major players
___ Areas for action identified and actions formulated in _____ areas.

## Important Outcomes

Long term perspective and SAP for conservation, sustainment and development of biodiversity developed
Local action is taking place wherever it can be taken up without the help of external resources.
Closer co-operation is seen between various active groups and Govt. departments and joint activity (e.g. Development of medicinal plant nurseries and training in preparation of herbal medicines) is taking place.

# West Garo Hills Sub-State Site (Meghalaya) Biodiversity Strategy and Action Plan

Coordinating Agency: P.G. Momin, Society for Environmental Protection and Rural Development, Department of Geography, North-Eastern Hill University, Shillong

The Garo Hills district is one of the major districts (out of the three original districts) since inception of the State of Meghalaya in 1970. The Garo Hills district by now, again has been divided into three districts, West, East and South Garo Hills districts in 1975 for better developmental activities and closer relationship between citizens and the State Government agencies.

The Garo Hills district lies in the western part of the State of Meghalaya, bounded by Assam in the North and Western part, and Mymensing district of Bangladesh in the South. The Garo Hills district is a part of Meghalaya Plateau with beautiful undulating hill ranges with rich flora and fauna such as wild animals, birds, reptiles, different medicinal plants, valuables trees, orchids etc. in the past. The Garo tribes have inhabited/settled in the area since time immerorial. The main occupations of the Garo tribe are the traditionally practicesed jhum cultivation, i.e. by way of cutting down the jungle and growing different types of rice, maize, vegetable etc. for their livelihood. The plot of jhum cultivation is shifted after every two years for another plot of land. The continuous cutting of forest/jungles for the cultivation purpose created all the ill effects in the area such as top cover soil erosion, drying of reiver beds, destruction of valuable timber trees, extinction of traditionally used medicinal plants, barks and roots, flower and orchids, wild animals like tigers, elephants, leopards, deers, pythons and different kinds of birds and fishes in the stream, rivers and lakes. Not only that, it effect the uncertainty of climatic condition and health harzards of the people like malaria, cholera, black fever and leprocy till 1950.

Man live with his surroundings for their livelihood and survival. Man depend on nature for every development, to change in his lifestyle and co-existence. But the present condition of the gifted nature on earth is in extinction due to the misused of man, greediness for wealth and wasteful exploitation of its natural resources. The vegetation cover, including kinds of plants, the animal life on earth's surface and water bodies are of our great concern to preserve and maintain for future human existence and future purposes. From this view point, the present exercise of the activities of the NBSAP project on the West Garo Hills, aims at maintaining and preservation of the natural flora and fauna by way of educating the rural people how to make the best use of the natural resources.

The project took an advantage of partnership for biodiversity advocacy among the state borders w.e.f 20th July 2000. The National Biodiversity Strategy Action Plan Workshop held at New Delhi on 22nd-23rd June 2000.

**The following were the activities carried out:**

1. Consultation with State and district authorities such as:
   a. Civil Sub-Divisional Officer, Resulbelpara, Dadenggriri and Amapati of Garo Hills- dt. 25th-26th July 2000.
   b. Deputy Commissioner, Tura, West Garo Hills, 27th July 2000.
   c. Dist. Officers of Agriculture, Horticulture, Malaria Officer, D.F.O. Wildlife, Conservator of Forest Western Range, Conservator of Forest, Territorial, Soil Conservation Divisional Officer and Eco-Development Board at Tura dt. 27th-28th July 200.
   d. North Eastern Hill University, Tura Campus, College Teachers, Head Masters of Govt. High School dt. 28th July 2000.
   e. Concern Nokmas (owner of land) village, gaonburas, prominent personalities and social workers available within Garo Hills district dt. 2nd-3rd Aug. 2000.
   f. Block Development Officers of Resu, Tikrikilla, Selsella, Rongram and Jikjak Dev. Blocks dt. 4th-5th Aug. 2000.

2. Out of the above mentioned state, district, educational institution, officials, Nokmas (village headman) and other important social workers and village women folk were formerly selected to be the members in the Local Advisory Committee (LACM) constituting twenty two (22) members with their consent. A copy of the LAC members had already sent to the Member Secretary/ TPCG, New Delhi.

3. The 1st Local Advisory Committee Member (LACM) meeting was held at Circuit House Meeting Hall at Tura, West Garo Hills, on 2nd October 2000, where DC, Tura, Prof. P.C. Bhattacharjee, Guwahati University, TPCG Member and other dignitaries along with

the district officials attended for meaningful discussion and suggestion. The minutes of the (LACM) meeting was sent to the Member Secretary of the Project for necessary action.

4. As per NBSAP Brochue "A Call for Public Participation" guidelines were conducted "Public Hearing Cum Awareness Camps" on 8 selected Jhum village of Garo Hills on different dates and places as follows:
   a. Dobokjakolgiri village on 10.09.2000 covering 15 (fifteen) jhum villages.
   b. Rembegiri village on 11.09.2000 covering 10 (ten) jhum villages.
   c. 1st Local Advisory Committee Members Meeting (LACM) held at Tura, Circuit House on 02.10.2000.
   d. Bolsaldamgiri village on 07.10.2000 covering 7 (seven) jhum village.
   e. Post Graduate students, NEHU, Tura Campus, West Garo Hills on 10.10.2000.
   f. Mronggiri Bikonggiri village on 15.02.2001, covering 8 (eight) villages.
   g. Gimbegiri village on 15.02.2001 covering 10 (ten) jhum villages.
   h. Chisikgiri jhum village on 18.02.2001 covering 12 (twelve) villages.

The proceedings of those Awareness Camps have been submitted to the Member Secretary of the Project for necessary action with a copy to Dr. Ashish Kothari and Prof. P.C. Bhattacharjee both TPCG Member, NBSAP. The number of photographs of each camps were also attached along with the minutes.

5. On the basis of the LAC members meeting held at Tura, West Garo Hills, and the suggestions based on discussion with participants, jhumas, Nokmas, gaonburas, school teachers etc. the following action plans is suggested for the said district
   a. The jhum cultivation is West Garo Hills to be reduced substantially and slowly by way of diverting the activities of the people and mode of livelihood to
      – Horticulture- cashewnut, bettel nut, rubber plantation, pineapple, coffee and orange plants etc.
      – Encouragement for Pisciculture development-assistance for fishery pond construction
      – Piggery and Poultry farming development

b. Development of Handloom Weaving activities among the young women in the rural areas along with training and marketing support.
c. Village Reserve Forest Development and Afforestation Programmes including protective to the Sacred Grove forest in the selected village and locations.
d. Development and assistance to the Traditional Tribal Medicinal Plants and herbs to the selected village forest.
e. Preservation/storage facilities to the locally available horticultural produce to be set up with proper transport and marketing facilities (to stop exploitation of the other people across the State).
f. Fruit Canning/Processing industry to be setup at Chibenang and Tura (for orange, giner, guava, pine apple, lemon, cashewnut, tapioca, jackfruit, etc.)
g. To continue the Public Awareness programmes in the interior jhum village (minimum at 25 villages).

On the basis of the LAC members meeting held at Tura West Garo Hills on the 20th November, 2001 and Public Hearings cum Awareness Camps, the suggestions based on the discussions with the participants, jhum cultivators, Nokmas, Gaonburas, school students and teachers and people from other walks of life, etc., the key and specific Strategy and Action Plan is hereby suggested for the West Garo Hills District, are as follows:

### Strategy I: Reducing Jhum Cultivation

- Review and modify forestry policies to ensure sustainable use of forests
- Frame and promote agricultural policies that enhance preservation of crop diversity and crop varieties and encourage the use of biofertilizers and biopesticides.
- Protect and ensure community rights over genetic resources and regulation of their collection.
- Establish incentives for effective and equitable private-sector plant breeding and research.
- Audit the consumption of biological resources to raise awareness of the balance between local consumption and production.
- Provide universal access to family planning services and increase funding to support their adoption.
- Increase incentives for local stewardship of forests, public lands and waters.
- Recognize the ancestral domains of tribal and indigenous people and support their efforts to maintain traditional practices and adapt them to changing trends.

### Strategy II: Creating Conditions and Incentives for Local Biodiversity Conservation

- Compensate individuals and local communities who own or depend on land or resources taken for public purposes as per current market values.

- Manage bio-resources on public lands through new forms of community-state partnerships and cooperation on the lines of JFM.
- Recognize and quantify the economic value of natural products in development and land-use planning.
- Encourage local communities to explore opportunities for developing a large market share for natural products harvested sustainably.
- Increase the awareness and local benefits of eco-tourism in natural areas and ensure that tourism development does not affect biodiversity or cultural conflict.
- Strengthen local capacity for maintaining and benefiting from floral and faunal diversity.
- Promote recognition of the value of indigenous/traditional knowledge system (IKS), practices and products.
- Recognise the role of traditional medicines and ensure their appropriate and sustainable use by the *ojhas* and *kavirajs*.

### Strategy III: Education, Training and Awareness

- Establish a biodiversity information network to enhance the flow of data for local, district and state assessments.
- Provide all citizens with legal and institutional guarantees of access to information on development projects and other activities with potential impacts on biodiversity.
- Systematically assess national and state biodiversity research priorities by promoting basic and applied natural sciences.
- Strengthen social science research on the connection between biodiversity and social processes.
- Strengthen research on ethical, cultural, and religious concerns relating to biodiversity conservation and revive relevant traditional customs and practices relating to sacred groves.
- Increase support for training of biodiversity professionals, particularly in biodiversity rich areas.
- Revise career incentives to increase the attractiveness to work in the field.
- Strengthen the influence and capacity of NGOs and CBOs to promote biodiversity conservation in jhum areas.

### Immediate Implementable Actions

- Encourage the establishment of Community Biodiversity Conservation Centres (CBCC) at District level which will function to document the biodiversity, provide deeper understanding on the benefits from conservation, organize programmes and initiate alternative methods to enhance proples' capabilities to meet their integral needs, and to provide a link with concerned departments.
- To initiate the exercise of creating and setting up of a database for the State Biodiversity Register starting with Village Biodiversity Registers. Appropriate aids and workshops/trainings may be given to the village elders/schools to make them conduct these exercises. The data in turn may be pooled and a database be created.
- Creation and constitution of Environmental Courts in the District headquarter.
- Necessary legislative, legal and administrative changes are to be made to ban the collection of wild plant species that are rare, threatened, endangered and vulnerable species. Trade related activities on medicinal plants should be properly looked into in view of Biopiracy. However, efforts be made to encourage various communities to cultivate and multiply them on large scale to avoid/minimize collection from the wild.
- Awareness campaigns on Biodiversity conservation and environmental related activities should be taken up in real earnest on the lines of Total Literacy, Education of the Girl Child, Community and Audit Education etc.
- To immediately initiate the documentation of all aspects of indigenous knowledge system (IKS), revitalize and revived old traditions and beliefs related to conservation practice and to set up Information Cells pertaining to Patents and Intellectual Property Rights (IPR).
- To introduce alternative conservation technology packages suited to the area or region where the conservation programs would be taken up. Plant based (phytochemical) and Eco-tourism industries should be encouraged. Economic incentive and tax benefits be provided to these sectors. Motivation in sharing of benefits accrued from such resources, raw or value-added finished products.
- Traditional herbal practitioners should be given due recognition and their efforts and activities supported by helping them tie up with research institutions.
- There should be stringent regulation on the introduction of exotic plant and animal species in the wild.
- Tissue culture and seed banks to maintain germplasm must be actively taken up by the concerned line departments. Biotechnology of wild economic plants be pursued for future need base commercial access.
- State and Central departments, Armed Forces, Construction Companies, Mining and Quarrying, Industries as well as individuals should undertake Biodiversity Conservation programs as part of social duties. A part of their budget should be earmarked for this activity.
- Smaller but more gene sanctuaries especially of threatened plant species be established to avoid managerial problems. In this process involvement of the local communities is a must.
- To identify more ecologically sensitive areas and to protect them for long term scientific baseline studies.
- A chain of Botanical gardens be established at different altitudes to conserve and multiply the germplasm of rare and endangered plant species.

- Sacred groves which serve as germplasm/gene banks of several threatened species should be properly protected and revived. Necessary support, financial or physical be provided to the local communities so as to encourage these traditional conservation practices.
- Network of protected areas covering different bio-geographical and eco-climatic zones may further be established and the existing areas be given proper protection, by providing adequate funds to agencies undertaking such activities.
- Encouragement in modern agricultural technology be given to the people to grow cash crops like tea, coffee, black pepper, rubber, pine apples, orange, cashew nuts, betel nuts medicinal plants, nitrogen fixing plants, dye yielding plants, mushrooms, bamboos, canes and aromatic and oil yielding plants and efforts to boost piggery, poultry, sericulture and aquaculture wherever feasible and necessary support for storage, processing and marketing to combat the pressure of *jhum* cultivation.
- Before any project is to be launched an Environmental Impact Assessment (EIA) should be prepared with remarks from various related disciplines followed by Environmental Auditing (EA). EIA should not only be a prerequisite for industries and dams to start, but also must be reported periodically.
- Proper survey and documentation of the Biodiversity of the district is a must, and the status of individual wild species be carried out.
- Threatened Plants: Special attention may be paid toward protection of ornamental plants like orchids and other groups of plants which are of economic importance and are threatened, some of which may be multiplied vegetatively or by tissue culture.
- Use of Bio-fertilizers, bone meal, organic fertilizers and vermicompost should be encouraged.
- Charcoal processing and sale should be controlled and regulated.
- State Government should integrate Biodiversity Conservation as one of its priority.
- The various conservation and development programs conducted by different government agencies should be with the agreement of the local communities so that maximum participation can be ensured.
- Mining and quarrying activities in catchment areas should be banned to protect the water resources for the community.
- Non conventional sources of energy to be encouraged in order to reduce pressure on forests for fuelwood and charcoal.
- Use of fuelwood for road metalling blacktopping and lime processing should be regulated.
- Launching of any indigenous product (s) in the market in any form should be certified that it is not from the wild but domesticated. The Certificate of Origin should be invoque.
- Fruit canning and processing units be set up in Tura and Chibenang for orange, guava, pineapple, lemon, jackfruit, etc.
- Establishment of handloom, handicraft, weaving centers for young women.
- Public hearings and awareness programs in *jhum* villages to continue.