

Capacity Building of Community Organisations For Biodiversity Monitoring and Management in Himachal Pradesh, Western Himalayas, India

Dr Virinder Sharma¹

1. Introduction

The Western Himalayan State of Himachal Pradesh has undertaken a series of initiatives to promote conservation or halt degradation of natural resources. Most of these have not been focussed on conservation of biodiversity, as this subject has only recently become an issue of public perception and policy. The State's conservation and biodiversity initiatives over the last few decades include:

- National Parks/Wildlife Sanctuaries
- Social forestry
- Plantations
- Ban on hunting and green felling
- Regulation of medicinal herbs trade
- Forest development corporation
- Joint Forest Management, FC societies
- Involvement of local people in biodiversity assessment and monitoring (e.g., the project described in this case study).

Historically, communities depend on local biodiversity for sustaining their lives and livelihoods. This has shaped a diverse gamut of cultures, resource uses, management traditions and spiritual beliefs. In India, there are an estimated 100 million forest dwellers that live within and near forest areas. Another 275 million people continue to depend on forest biodiversity as an important source of their livelihoods. At least several tens of million people more depend on freshwater and marine biodiversity for their sustenance. Even today, in the country's predominantly agricultural areas, there are examples of communities that have preserved and maintained cultural traditions. These traditions are centred on conserving biodiversity through sustainable use. In this way they provide an acceptable livelihood. Agricultural biodiversity itself is a critical base for meeting the economic and cultural requirements of today and, perhaps even more so, those of the future.

Current models of development have devalued the critical links between biodiversity and livelihoods. There is a trend towards urban and industrial development, which has alienated communities from their natural surroundings and forced them to produce for urban markets or work in industry. In forestry, pastoralism, fisheries, agriculture, and other 'primary' sectors of the economy, external market-driven extraction and production have resulted in reduction of biodiversity and in destruction of biodiversity-based livelihoods. Urban and elite lifestyles, in particular rampant consumerism, are also drivers of biodiversity loss through over-exploitation of raw materials and destruction of natural habitats for short-term gain.

Simultaneously, wildlife protection programmes usually perceive and treat traditional communities as a threat. They are excluded, rather than included, from official conservation programmes and the wealth of indigenous knowledge and conservation traditions is thus ignored. The sudden delegitimisation of entire livelihood systems, resource rights and rights to access alienates the very people with primary knowledge and stakes in biodiversity conservation and sustainable use. This leads to damaging conflicts and to loss of indigenous knowledge and goodwill. In recent times, however, a reverse trend is occurring. Hundreds of communities, on their own or aided by NGOs or

¹ DFID-India, British High Commission, India, V-Sharma@dfid.gov.uk

government officials, are reviving their natural resource base and the livelihoods that depend on it. Self-initiated forest protection measures, Joint Forest Management, biodiverse farming, community-based conservation, and widespread resistance to destructive commercial and industrial processes, are rapidly increasing.

2. Project context

The Western Himalayan ecosystem, of which Himachal Pradesh (HP) is a part, has been recognised as a repository of local conservation traditions that promote the prudent use of resources in order to maintain a long-term subsistence, agrarian economy. However, these mountainous areas undergo rapid socio-economic and environmental changes due to accelerated development. In particular, there is a rapid decline in biodiversity that directly affects village people throughout HP. This is due to depletion of the natural resources and to an increase in the number and rate of adverse effects from changes in effluence, agriculture, livestock, soil erosion and water pollution.

There is a need to conserve this biodiversity for the benefits and the values it provides to the communities and to safeguard it for the benefit of future generations. In this context, environmental action and biodiversity monitoring by community organisations becomes an imperative. Implementation is required through a combination of traditional and modern methods that are, for example, carried out by para-taxonomists and scientific staff who have been trained in ethno-scientific methods. Community organisations need to be trained to monitor trends in ecological processes and to take up various environmental actions that help conserve biodiversity.

The State Council for Science, Technology & Environment (SCST&E) formulated the current project as a proposal for involving local people in biodiversity assessment and monitoring. The basis of the work was to establish a pilot project in biodiversity capacity building with a village community so that flora and fauna trends and consequent environmental impacts could be monitored.

3. Current institutions

The people in the village generally belong to a number of formal and informal groups or institutions (community organisations) that have the objective to improve the physical and social environment of the village. These institutions are important to village life because they are always from and of the village. In general, these committees and institutions work to solve problems at the village-level. Such problems may be related to work, water management, agriculture, or grassland maintenance. Usually village-level institutions comprise of two types:

- Formal institution (Panchayat, Mahila Mandal, Yuvak Mandal).
- Non-formal institution (Devta Committee).

Most of the Himachal Pradesh villages have these bodies. The main formal, local group of the village is the Panchayat, which looks after the village management activities, dispute settlement, revenue issues and agricultural works. The body is mainly associated with 'government' actions. In the village of Mehli (our study area) the Panchayat is known as Pujrali Panchayat, under which ten villages resort, including Mehli. The Panchayat is headed by a Pradhan who is elected by the people of the Panchayat. Other institutions like Mahila Mandal, Yuvak Mandal and Devta Committee are also involved in development work in Mehli.

4. Project area initiatives and monitoring objectives

Project initiatives

A high level of dependence on nature is usually complimented by a local system of prudent use of scarce resources. The landscape of Himachal Pradesh has a number of examples of such systems.

Local people have devised informal arrangements for sustainable use practices and community forestry², with recent examples of opposition to commercial pressures. While sustainability may not be achieved by such initiatives, we must look critically at these efforts from the point of view of equity and perceptions of communities towards nature and conservation.

Based on the above, the following activities were considered to be important for the project site at Mehli, namely:

1. Assess the current situation of biodiversity-based livelihoods, what threats they face, and how they have changed or are changing.
2. Assess how changing lifestyles in rural and urban areas are impacting on biodiversity.
3. Study gender differentiated community perspectives on appropriate conservation strategies that would link local livelihood security with biodiversity conservation by making community members the primary stakeholders and beneficiaries.
4. Identify the property rights regimes (including IPRs) and institutional arrangements (state agencies and local institutions) that would be required for biodiversity conservation and sustainable use.

Monitoring objectives

Biodiversity and human needs are always in a state of continuous adjustment. There is much discussion today on the environmental degradation in the Himalayas, with assertions indicating that the Himalayas are facing destruction. There is a lack of understanding of which environmental impacts are natural and which are accelerated through anthropogenic activities. Biological monitoring programmes can detect and evaluate trends in the status of areas, species, communities and ecological systems over time. The conservation of biodiversity can be enhanced by monitoring programmes, especially the programmes that have a feedback loop to identify beneficial and adverse changes. This allows managers (especially villagers) and policy makers to make appropriate changes.

Monitoring programmes should be devised to operate at a scale that is relevant to the ecological process that is monitored and be suited to monitor the particular conservation or management in question. Monitoring programmes must not be static and they need to be evaluated over time in order to refine techniques and to test new methodologies. Carefully chosen indicator species are required in order to provide an efficient means to assess the status and to monitor the trends in the populations for specific species and, potentially, for certain ecosystems.

The survey and monitoring strategy should be aimed at:

- Identification of areas with high diversity.
- Trends in species loss.
- Trends in habitat loss.
- Threats, risks and causes related to loss in biodiversity (e.g. due to factors like population growth, availability of resources, consumption and trading systems).

Conservation measures should include species monitoring in order to audit changes in, e.g., diversity, custodial management, buffer zone, ecodevelopment and corridor sites.

5. Methodology

Mountain societies and their cultures have a long history of interaction and co-evolution with the environment. Formal investigation methods and their results are rarely translated into action as they are not interfaced with the people and the environment in question. Consequently, there is an urgent

² Community forestry refers to the numerous self-initiated forest protection groups. Protection groups present in the villages are usually protecting patches of forest, mainly in response to scarcity.

need to develop and test methods that are communicable and acceptable to rural people, whose traditional knowledge and wisdom can be a source of accurate information with which to assess and manage the environment.

5.1. Baseline data collection through consultative process

Baseline village information and bioresources used

After the selection of Mehli as the site for the pilot project, the village was visited on many occasions by the project team in order to understand the environmental features and the community of the site. Workshops were organised with the village people at the governmental middle school premises, which is a central place in the village. Information was collected through social interactions with individuals and families. Information about land use patterns, flora, fauna, and the overall environment was gathered. The process of information gathering from the people involved the following components:

- informal introduction of the team with explanation about the objective of the visit;
- request for village community participation in the pilot project;
- requesting the consent of each person to be interviewed;
- asking general questions about the land and resource use pattern of the village and the main occupation of different community groups.

General information on the description of the community was entered in a Community Register Format that includes topography, population, and different types of land use. Participatory mapping was done with the village community to locate the agriculture fields, grasslands, forests, streamlets, and old and new houses.

Questions were asked on the bioresources used by the community and their local names, the local perceptions towards abundance and changes of these resources, the habitat requirements of the resources, the consequences of changes in their abundance and the possible remedies. For the list of questions in the Community Register Format and the Bioresources Use see Annex 1. People were also interviewed about the changes in grasslands and agriculture fields. They were asked to collect samples of flora and fauna of the village and to identify those samples.

After this, a ranking assessment on the available quantity and the quality was done on a scale of 0 to 100 % for quantity and on a scale of 0 to 10 for quality.

Identification of species by Community (Women) and scientists

During the workshop a group of women was asked to identify the different species in the village grasslands. The group identified several grass, weed, insect and fodder species. All information was recorded, specimen were collected and photographed. Scientists from ZSI and the University helped to identify the species and define their perceived scientific or agricultural value. In another workshop, the photographs were shown to a group of women in order to record their perception of the value of the same species, as well as information on habitat requirements, trends in abundance etc. This dual system of identification allows to establish a good baseline of reliable information.

Information was also obtained on many other features, including:

- a) Grasslands status, e.g., decreasing or increasing.
- b) The most effective existing way to use the grasslands.
- c) Agriculture patterns, past and present and their changes.
- d) Use of existing natural water bodies for irrigation or other purposes.
- e) Problems of the present water supply system and possible solutions.
- f) Effects of urbanisation on biodiversity.

- g) Status of micro fauna (macro-invertebrates) in grasslands and land under cultivation and if these are increasing or decreasing.
- h) Particular species of insects that have abruptly increased or decreased.
- i) Status of wildlife in the catchment forests.
- j) Problems with wildlife.

During the workshop, students of the school were consulted and asked to prepare named posters and charts on the flora and fauna of the village.

A sample of the questionnaire is provided in Annex 2.

5.2. Identification of potential indicators

Communicable indicators of biodiversity are required, which should have the following features:

- Local name (from ethnic language)
- Local occurrence
- Local measure of abundance and/or diversity (e.g. extent /numbers /volume /weight)
- Indicators can be recognised repeatedly.

Communicable indicators may be identified through a participatory process of environmental investigation, usually between traditional people and scientists.

It must be noted that the biodiversity monitoring and conservation proposed for the project is not specifically aimed at threatened, 'flagship' species. Rather it proposes to develop an understanding of the status of the 'common' element of Himalayan biodiversity. It will achieve this through involvement of community members, education, and development of methodologies and resource materials. A number of species identified by the villagers during the workshop turned out to be good biodiversity indicators. Fieldwork in Mehli also identified a range of indicators potentially suitable for local use in assessing biodiversity, namely:

- aquatic indicators are unlikely to be of value since all watercourses are intermittent and highly polluted. However, these may be of use in the future if water quality improves;
- terrestrial indicators could include items such as:
 - extent of Ban oak, Chil pine and grassland;
 - changes in the composition of indigenous species in grasslands;
 - incidence of introduced and native weed species in grasslands and Ban oak forests;
 - changes in the composition of ferns and fern allies in Ban oak forests;
 - distribution, knowledge and use of medicinal plants;
 - a range of invertebrate species, especially grasshoppers, mantids and ants;
 - vertebrates, especially the indigenous voles, and pest species, such as rats. Some bird species, such as pheasants, may also be useful;
 - changes in non-rural housing (frequency and distribution).
- development of oral, written and photographic indices using local people and language would be used to develop the Mehli Village Index of Biodiversity. This Index is likely to be of national and international interest and value.

Much time was spent on identification and discussion of all aspects of the proposal with members of the village. This concentrated on understanding their perceptions, roles and knowledge through

consultation. It must be remembered that this is their knowledge and project. The project team serves as a facilitating and focussing agent only. The culmination of this activity was the development and delivery of several workshops involving the primary school students and villagers (through the Pradhan).

5.3. Preparation of village map and transfer to GIS

An accurate base map of the Mehli village pilot study area was developed using GIS-based techniques. The topographic features indicated on the map include contour data at 20 to 40 m contour intervals, streams, roads, and location of water sources, including water pumps and springs. Infrastructure data, such as the location of houses and other buildings (schools, shops etc.), were derived from merged multi spectral and panchromatic imagery, supplied by the SCST&E Remote Sensing Unit. Field data was also indicated on the map. These include, e.g., photographs, landuse boundaries, cadastral boundaries (supplied by the Remote Sensing Unit) and vegetation boundaries for grasslands, terraces, woodland and forest.

Ultimately, the locations of the specimen collection are to be entered into the GIS. These were initially recorded on paper and will be transferred to a base map in future. In addition, the date of collection and identification of species must be recorded as well. The ultimate goal is to transfer these data to a GIS ArcView Version 3.0 based map. This software is available from the Remote Sensing Unit. The data were successfully transferred to a GIS in Australia. This was laborious owing to the lack of digital information and the poor quality of base maps. Information on this map includes the following items:

- Title of Map. Transferred data. Accuracy of data.
- Date prepared. Who produced the data?
- North arrow (for orientation).
- Legend.
- Scale bar.

All data will require further elaboration and refinement over time.

5.4. Preparation of monitoring booklet for villagers

During the consultative process of meetings and workshops, substantial information about how local biodiversity affects the village or about how biodiversity is affected by village activities (through the use of fodder, livestock, forest and animals) and associated problems was provided by the people of Mehli. Again, analysis of the information was carried out by a group of scientists and the villagers jointly. We have selected a few of the plants and animals that could be helpful in understanding the village-level problems relating to agriculture, pastures, water and forests, in both long term and short term. These are species for which local people have indicated a perceived change in both quality and quantity. On the basis of this information, a Monitoring Manual was prepared. This Manual contains a photograph of each species with an adjacent questionnaire. It is anticipated that this will help the project team to collect “standardised” information from the village in future on a regular basis.

The aim of the Manual is to make people aware of the cultural and environmental richness of the area and to devise methods that help understand and monitor the changes in Mehli’s environment. Life depends on the basic elements of air, water and land and these elements share a balance. Human needs of food, shelter and clothing are provided by nature. Any imbalance in these elements is bound to affect the people and the plants and animals that live around them.

By collecting information on the changes in the environment on a systematic basis we shall be able to conserve and better manage the environmental resources of this village, that is, the streams, air and

land which provide water, food and shelter. The support of villagers in this is essential. Any person in the village, including school children, could provide this information. This information enables people to better understand and monitor the changes in these plant and animal indicators and, ultimately, to better manage these resources.

The Monitoring Manual will also provide a means for the transfer of village-level resource and management knowledge from the elders to the younger generations. This will allow for the protection of the environment and the culture of Mehli, and help the development and progress of the village.

The people of Mehli are concerned about the development of the village and the maintenance of its culture. Managing water sources, local forests, grasslands and croplands in a manner that enhances productivity and profitability will also help maintain the people's intimate cultural and spiritual connection to the environment.

The draft Monitoring Manual was provided to the villagers to assess its value in detecting the general trend of the species and their values. After 3 months a workshop was held to assess feedback of the community on this manual. Initial, favourable reactions were recorded from the village on the value of the manual. Following this sharing process, the Manual was revised according to the community's requirements and the project objectives. Further village level biodiversity monitoring will be undertaken with the Manual. In this way the Manual will no doubt continue to develop through various iterations.

5.5. Repeat photography at fixed points

A simple technique for monitoring change in habitats or landscapes over a period of time is repeated photography at fixed points, or 'fixed point photographing'. This technique is best used to depict changes in habitats such as vulnerable areas, scattered tree and scrub vegetation on open slopes, and forests. Repeat photography at fixed points thus helps to monitor overall changes in small areas, such as the impact of grazing, cattle, camps, erosion, colonisation of vegetation on land-slides and expansion of agricultural lands. An alternative is remote sensing, but this is an expensive monitoring tool for small areas.

The technique involves establishing a fixed point and photographing the area from this vantage point at regular intervals. This helps to detect changes. Photographs should be obtained for an area on at least two consecutive days in a month, season, or more usually a year, and repeated on the same dates over the intervals. The camera equipment used for all repeat photographs and the vantage point should be the same. In some cases, a scale can be developed for the subject area. This involves measurement of two distinct landmarks or subjects in the photograph. Scales on photographs can help in measuring the extent of impact, i.e. quantitative changes, objectively. Repeated fixed-point photography adjacent to Mehli proved to be very useful for documenting changes in biodiversity components.

6. Results

6.1. Species value

A study conducted in the BCPP Project in 1998 demonstrated that people tend to perceive biological diversity as those biological resources that are of economic and livelihood importance. Biological resources that are not beneficial are perceived as nuisance species.

Nuisance species listed by local people are as follows:

1. *Lantana* in forest, pasture and grasslands
2. *Ageratum* in farms, forest, grassland and pastures
3. Bichhubuti in forest and farms
4. Chir in grasslands
5. *Parthenium* in grassland, forest and farms

6. Black bear in forest
7. Wild boar in farms
8. Common birds in farms and orchards
9. Jackal in farms
10. Porcupine in farms
11. *Rhesus* monkey in farms and orchards
12. Leopard in habituated areas.

6.2. Relevance of village folklore to biodiversity

In the villages of HP it is very common for the local flora and fauna to be mentioned in local folklore. Most of the local names of these species refer to information on the habitat, structure and value of the plants and animals.

In the case of Mehli the following preliminary information was collected:

1. Praying mantis: The local name of the species is 'Bhagman Ki Ghas', it is mostly found in grasslands. The villager's perception about this species is that it is a good sign of productive grasslands.
2. Grasshoppers: These insects are very common in village grasslands. People do not generally consider them as beneficial and some species destroy the native grasslands. Note: There are many grasshopper species. These must be further analysed and this is being co-ordinated by SCST&E.
3. Ladybird beetle: Children generally consider this beetle as a good omen for success.

6.3. Trends in species

The project found that the Mehli community assesses biodiversity on the basis of the value to them and their livelihoods, i.e. is a species useful or harmful? Preliminary trends in species are discussed in this section.

Increasing trends occur in the following fauna: Jackal, Rabbit, Magpie, Tree pie, Rat, Parrot, Leopard, Mosquitoes, Malaya (LN) potato eater insect, Spider. Decreasing trends occur in the following fauna: Kakkar, Goral, Water insects, Flies.

Flora changes are as follows:

- Woody weeds (bushes) have increased in the area;
- *Ageratum* is a weed that has increased its abundance. It degrades the grasslands by out-competing the native grasses.

After entering all information on a Community Register format it was found that further modification of the questionnaire was required, primarily by inclusion of other parameters to specifically suit this project. Additional information on fauna was then collected, for example:

- *Leopard*: The number of leopards is increasing. The rate of increase is moderate and this increase has been observed over the past 10–15 years. Animals are seen more in the rainy season and winters around the village with dens located in ravines. The reason for the increase is believed to be deforestation and a ban on hunting. Leopards kill the village cattle. To control this menace villagers report sightings to the Forest Department that traps the leopards and take them to the zoo.
- *Rats*: Rats in the area are grey and include both a large and a small species. They are found throughout the year. The population is more or less constant. They live and eat crops in the fields and stored grain. Cats and chemical poison have been used as control measures.

- *Parrots (Shooya)*: Their numbers are consistent, but as the corn (maize) crops mature earlier in Mehli than some other areas, parrots migrate to the village. Parrots destroy the maize crops and fruits. In order to frighten them away, loud noise is made (e.g. through drum beating).
- *Mosquitoes*: Mosquitoes are increasing in abundance during the rainy season (generally) and in humid places. Increase has been reported over the past 2–4 years due to increases in solid waste on the slopes. They cause fever. Villagers use smoke to repel them.

Information of this kind was further quantified and then crosschecked. It was decided that a workshop using Participatory Rural Appraisal Methodology should be organised. With the collaboration of Pradhan, Gram Panchayat, Mehli, and the Headmaster of the Governmental Middle school Mehli, a workshop was organised in October 1999, in the premises of the school. Around thirty villagers and forty school children actively participated in this workshop. Further workshops were undertaken during 2000 to review other potential items (e.g. aquatic species and grassland insects).

6.4. Trends analysis for grass species in Mehli

As a follow-up on the acquisition and cross checking of information on grasslands and their component species, a trend analysis was undertaken (Table 1).

Table 1. Trend analysis for grass species in Mehli

	Grass Name	Properties	Quality assessment	Quantity (availability)	Changing pattern
1	Baareek Ghas (Grass)	Good for milk cattle, good for storage, not found in rocky areas.	10	60%	Constant
2	Dagaryosh (Grass)	Good for cattle only when it is green. Cattle does not like it. Cannot be destroyed easily. Rate of growth is high.	5	10%	1 % annual increase
3	Mota ghas [Chamb]	Cattle eat it when it is green. Found on the boundaries of fields. Available in larger amounts. Formerly used for making mats.	5	8%	Constant
4	Joob	Used for grazing by cattle and religious purposes. Harmful for crops, good for cattle.	8	1%	Constant
5	Khodhaey ka shana	Good for cattle found in lesser amount and mostly near the water sources.	4	0.5%	Constant
6	Firgane	Found in fields. Hard, not good for cattle.	2	0.5%	Constant
7	Fulnu	Found on boundaries of fields in rainy season, good storage capacity. (For winter).	3	1%	3% annual increase
8	Kawaine	Found in maize fields in rainy season & good for increasing the yield of milk from cattle.	8	1.5%	Constant
9	Piplu	Good for high yield of milk cattle & found after rains in fields.	8	2%	Constant

Grass Name	Properties	Quality assessment	Quantity (availability)	Changing pattern
10 Shelu	Harmful for cattle, used only when it is not ripe and before flowering.	-10	3%	Constant
11 Khatta Maloru	Harmful for crops. Not eaten by Cattle.	-10	1.5%	Constant
12 Shada/Shayra	Good for cattle in rainy season, good yield of milk and cream.	8	1.5%	Constant
13 Drab	Used for fodder and religious purposes. Found on the boundaries of fields.	7	0.5	Constant
14 Dhara Dhaira	Found in rainy season. Used for cattle when no other grass is available.	3	1%	Constant
15 Others				Constant

6.5. Information collected from school children

School children collected various plants and insects from the surroundings and recorded their local names. They made a chart and pasted the plants with their names and made notes on their uses (Table 2).

Table 2. School children's knowledge

Name	Place	Uses
1. Fegu	Open place/hill side	Used in injuries
2. Leaf of a flower	Flower Pot	Fragrant
3. Heere leaf	Forest	Edible
4. Kashmal Leaf	Open place/ hill side	Edible
5. Palam leaf	Garden	Edible
6. Sweet leaf	Open place	Edible
7. Kainth	Open place	Edible
8. Dudalae leaf	Forest	Used (burns)
9. Sadabahar leaf	School ground	Evergreen
10. Geedu leaf	Forest	Used in vegetables
11 Palak leaf	Surroundings	Edible
12 Paaje leaf	Forest	Edible
13 Yellow rose - Peela Gulab	Surrounding	Ornamental
14. Thorn leaf [Katewala patta]	Open place	Edible after extracting the thorns
15. Dhania	Open place	Edible
16. Gainda	Garden	Medicinal uses
17. Palak	Open place	Cattle
18. Siyar leaf	Open place	Edible
19. Dhaine	Open place	Edible
20 Gaindae flower	Open place	Decorative
21. Samjora	Forest	Edible
22. Jeevan	Open place	Evergreen
23. Baajaes flower	Open place	Decorative
24. Shana	Open place	Cattle eat it
25. Lal Gulab [Red rose]	Garden	Medicinal uses
26. Jubal leaf	Bushes	?

The insects were also collected by the children, named in their local language and then photographed. A collection of insects was preserved and a name-referenced collection was provided to the village.

6.6. Identification of action required for conservation

By sharing information on biodiversity between the community and project members, some actions are to be identified that help conserve and enhance biodiversity in the areas around Mehli. These actions can be divided into long-term and short-term actions. A workshop with various stakeholders (i.e. community and government departments which are operating in the area) will be held to discuss the identified actions and their implementation. The community can take up short-term actions with the assistance of various government agencies. Long-term actions can then be recommended to the government for implementation at policy and planning levels. While the project members have discussed potential actions, this work lies outside the scope of the initial project.

7. Conclusions

Through the interaction with various individuals and groups in Mehli, it surfaced that the livelihood of a large section of the community is still dependent on the immediate catchment and its biodiversity (i.e. forest, grasslands, fauna and water bodies) for the production of fodder, fuel and food. The community has observed many changes in the distribution and abundance of plants and animals. A number of plant and animal species has decreased in number, others have increased, including parrots, magpie, treepie and jackal. These data still require scientific validation.

Additionally, the number of 'good' grass species has declined over the past 10–15 years. People now purchase fodder from outside the village. Noxious grassland weeds have also increased. Some changes in land use patterns were noticed during the survey with new houses being built on the outskirts of the village. Villagers also face a problem of increased water scarcity.

To a large extent, village community management of forest, grassland and water reserves is based on traditional knowledge. The community has codes of conduct that regulate the management of forest, grassland and water bodies. Problems due to urbanisation, modernisation, and global warming, i.e. changes in temperature and seasons, all occur. All these issues require further study, together with the community.

The community needs to be empowered to take up the management of these biological resources based on traditional knowledge and the best available scientific inputs. This IATCBP project aims to learn from the village community about their rich knowledge of resource management, to understand it scientifically and work jointly to manage the biological resources in a sustainable manner. This would allow the resources to remain available to the present and future generations of the project area.

Similar sites in the Himalayan region, either within or outside in the state of Himachal Pradesh, are suitable for replication of the project, using the documentation and experience developed in Mehli. It is essential that Government and NGO support and facilitate this implementation.

Traditional knowledge of local people usually provides an accurate and reliable means of environmental monitoring. Therefore, monitoring the environment or specific components of the environment by local people is practicable. Data generated by this type of monitoring is direct and meaningful, particularly if it can be supported or supplemented by data generated from short-term field studies by biologists. Research data on mountain ecosystems are generally based only on short-term field studies. There is a dire need for time series data on the physical and biological environment and on socio-economic processes. Training people to apply the best methods and use the best indicators to assess trends in biodiversity could meet this requirement. Such training needs to be based on both traditional indigenous and modern scientific knowledge. This could be done by involving both indigenous communities, who are the custodians of knowledge on local diversity, and experts

from institutions. At a later stage of the process, blending all information would be required in order to continue to develop methodologies and technologies that are best suited for the particular environment and to complete the phases of monitoring, analysis and drafting conclusions.

Annex 1: Community Register Format and Bioresources

Community register format

Background information: locality detail

1. Name of the settlement
2. Altitude
3. Distance from road
4. Name of the block
5. Name of the Panchayat
6. Population
7. Names of the communities
8. Percentage of community
9. Total geographic area
10. Cultivated land area as Government, private, community
11. Grassland
12. Forest area
13. Non-cultivated land
14. Waste land
15. Water bodies.

Bio resource

- Appearance and local name
- What is happening?
- Abundance increase: slow, moderate, fast
- When (time frame)?
- Time/Season
- Where is its habitat?
- Reason for this change
- What may happen if change occurs?
- What is the effect?
- Remedy
- Predators (control agents)
- Benefits
- General aspects.

Annex 2: Sample page of draft questionnaire

QUESTIONNAIRE

Date: _____

Name and address: _____

1. What is the local name of it? Meaning of this name? Any other name for it?

2. Where is it found?

Houses Grass lands Forest Agriculture land Water bodies All places

3. In which season is it found?

Summer Rainy Season Winter Whole year

4. What is the value of this?

Useful Harmful

5. Why is this useful/harmful?

6. How much found in the village?

Very few/10 Few/10–20 Some/30–50 Many/50–100 Very many/100 or above

7. What is the impact of it on you?

Little Moderate High None

8. What is its changing trend in the village during the last 10 years?

Increasing Decreasing Same as earlier

9. When did the change occur (year/season)?

1–2 months 2–6 months 6–8 months 8–12 months Longer

Summer Winter Rainy season Dry season

10. What is the reason for this change?

11. What may happen if this change continues, including its effect?

12. If it is useful, how do we conserve it? Give local method.

13.If it is harmful, how we can control it? Give local method.

14. Who could be the most effective to conserve/control?

Village Govt. Dept Individual All Collectively

Among the listed species, which is most useful?

Name of Plant: _____

Name of Animal/Insects: _____

Name of Grass: _____

2. Among the listed species, which is most harmful?

Name of Plant: _____

Name of Animal/Insects: _____

Name of Grass: _____

3. What are the plants/animals which are new occurrence or showing sudden change in your village?

Animals

Plants

4. How were you able to get this knowledge about these plants and animals, and from whom?

5. Any further suggestions on use of this booklet?

Family Head Male: _____

Female: _____

Children: _____