

Ethnobotany for Biodiversity Conservation

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Objectives

- To understand the importance of biodiversity conservation in watershed management planning, monitoring, and development
- To explain the basic principles of the ethnobotanical approach for participatory biodiversity management in a watershed
- To demonstrate community-based biodiversity management activities using case studies in ethnobotany

Definitions

Biodiversity encompasses all species of plants, animals, and micro-organisms and the ecosystems and ecological processes of which they are a part (McNeely et al. 1990).

Although biodiversity manifests itself as a characteristic of the natural system, it is actually a product of the interaction of both social and biophysical systems. In this sense it can be defined as functional natural resources on which humans are dependent for their livelihood and socioeconomic development from ancient to present times and extending into future generations. The utilisation and conservation of biodiversity involves intrinsic interactions between species, genetic populations, communities, landscape, and natural ecosystems, on the one hand, and culture, technology, social, economic, and indigenous knowledge, institutions, and information on social systems on the other. Both natural and social systems are interrelated and interwoven in the evolutionary process of biosystems at different levels in a given area: human activities influence the level of biodiversity, either decreasing or increasing components of biodiversity in different conditions or settings (Pei and Sajise 1995).

Ethnobotany is the study of human interaction with the plant world. It is a multidisciplinary science of botany, ecology and anthropology. The fundamental structure of ethnobotanical research is to examine the

dynamic relationships between human populations, cultural values, and plants recognising that plants permeate materially, symbolically and metaphorically many aspects of culture, and that nature interacts with human actions. Thus, ethnobotany is more than simply a study of plants useful to people, for it is devoted to understanding the limitations and behavioural consequences of human actions on the plant environment. To accomplish these objectives, the principles of classification of the plant world are used, and beliefs about plants as specific expressions of more generalised native ideas of world views are studied. Views are pursued to determine how plants structure human relations with plants, and how the composition of plant communities reflect human beliefs and actions. The genetics, phenology, chemistry, and productivity of specific plants and populations are a few of the factors examined (Ford 1987).

The importance of ethnobotany is that it has an important role to play in conservation of nature and culture, and, in particular, the biological diversity and the diversity of traditional human cultures. In fact, conservation of biodiversity and cultural diversity are linked. For instance, traditional medicine and food culture use of edible plants differs from one region to another and one ethnic group to another. Traditional knowledge systems are hundreds or even thousands of years old and involve not only knowledge of plants for medicine and food but also strategies of protection for sustainable utilisation of plant resources.

How are culture and biodiversity conservation linked?

Cultural diversity is largely dependent on the biological diversity that provides materials for humans to create the lifestyle of the society to which they belong. Cultural beliefs contribute to biological diversity and environmental protection. Along with material culture, for example, food, medicine, and shelter, plants have been closely associated also with many social customs and religious rituals (Jain 1987).

Extensive deforestation and intensive farming on steep slopes, heavy population pressure on soil-land-water, biological resources, and the adverse impacts of large development projects have resulted in overall environmental degradation and loss of biodiversity. In the last few decades, concerns about the state of the environment and the poverty of mountain people in the Himalayas have prompted much discussion and a range of development interventions. Degradation of the Himalayan mountain environment not only affects the livelihood of the mountain people and opportunities for economic development in the future, but also has a significant impact on the adjacent plains (ICIMOD 1993).

Examples of interactions of bio-species and mountain people in the region include the development of both wet and dry rice cultivation, tea planting, domestication of barley, buckwheat, cardamom, agall (*Aquitaria agallocha*), yak, mithun, Tibetan goat, and Mugu silk-worm; and the use of thousands of wild species to meet basic needs. Development of the mountain economy in the region will depend on sustainable use of biological resources, maintaining a high diversity of mountain crops in farming systems, and management of forest resources, pastures, and rangelands in the diverse mountain ecosystems. Particular interest is placed on non-timber forest products (NTFPs), medicinal plants, fruits, bamboo and rattan, livestock, and beekeeping. These are the visible means of increasing food production and income generation. The traditional utilisation of biological resources not only reflects a diverse resource-use pattern but also the way of maintaining biodiversity in mountain ecosystems by local communities. It is estimated that at least 70 per cent of the medicinal plants and animals in the region are wild species, and 70-80 per cent of the population depend on traditional medicine for primary health care (Pei 1987).

What is the role of indigenous knowledge in biodiversity conservation?

There are two global systems of knowledge: one being international knowledge systems generated by universities, research institutions, and private firms and the other being the indigenous knowledge system (or folk knowledge) – knowledge that is unique to a given culture or society and is handed down from generation to generation, perhaps only orally. Indigenous knowledge systems are not only of value for the cultures from which they evolve, but also for scientists and planners striving to improve conditions in rural societies (Warren 1990). They can contribute to rural development, industrial development, health care and environmental conservation (Bellamy 1990). Ethnobiology is built upon the

assumption that new ideas and methods can be generated through identification, documentation, and explanation of indigenous knowledge systems. Natural resource management systems are localised indigenous knowledge systems that form a basis for decision-making by farmers.

What is participatory biodiversity management (PBM)?

Culture-based conservation has a long tradition. The conservation of sacred plants, animals, forests, and mountains is a common phenomenon and can be effectively incorporated into modern conservation. Recognising that local people should be part of a conservation programme and understanding that *in situ* conservation should include conservation of biodiversity in different components of traditional agro-ecosystems, buffer-zone development could be a new approach to participatory biodiversity management (PBM) of protected areas. Since 1992, the International Centre for Integrated Mountain Development (ICIMOD) has been working in collaboration with national institutions and NGOs in buffer-zone development of national protected areas in China, Nepal, and Myanmar.

What are the recent methodologies for participatory biodiversity appraisal (PBA)?

There is growing recognition that sustainable resource management needs participation from local communities. Participatory biodiversity appraisal (PBA) can serve as a new approach to analysing, together with local people, information on preserving biodiversity and promoting sustainable use (Xu and Ruscoe 1993). PBA could be useful for assessing biodiversity that manifests itself in a range of functions for local communities in terms of ecological, cultural, and socioeconomic purposes. These include indigenous perceptions and values of biological resources in their surroundings, indigenous knowledge associated with species in agro-ecosystems, as well as priorities and decision-making in the use and preservation of biodiversity in the study area. Such information could be collected and analysed using various diagnostic tools such as interviews and observations. PBA is applicable also for ecological measurement techniques, such as field sampling and inventory, for identifying sample species and for understanding existing land-use patterns. It combines scientific and indigenous knowledge to present an interdisciplinary picture of human and biodiversity interaction.

Inventory

Ethnobotanical inventories can be viewed as a method of participatory inventory. Ethnobotanists conduct field

inventories of human-use species such as medicinal plants, food, fodder, non-timber forest products, swidden crops, home-garden plants, religious plants and others usually involving a large number of local people. Inventories of this type document information on both natural and human-use aspects of the species surveyed, including scientific names, vernacular names, habitat, utilisation, preparation, properties, and maintenance. Various types of inventory are used as follow.

Complete list of species of regional and national biosystems. Species' composition and the geographic distribution of information are often documented in the publications of regional and national monographic studies on flora, fauna, and micro-organisms. These types of inventory are based on biosystemic approaches and should be considered authoritative documentation in the assessment of species' diversity at regional and national levels for biological resource management.

Species' checklists. Species' checklists record species' diversity in a certain geographical area or in a certain ecosystem. This type of inventory can be based on biotaxonomical groups, ecological units, or life forms, or can be in a comprehensive form covering species' elements of plants and animals in a particular area for a specific purpose in the context of natural resource and environmental management.

Ethnobotanical inventories. Ethnobotanical inventories include inventories of plant species used by indigenous people in a given area/region or by cultural groups; medicinal plants used under a certain traditional medicinal system; and natural products locally marketed. Inventories of this type include information on both natural and human aspects of the documented species, including scientific names, vernacular names, habitat, utilisation, preparation, properties, and maintenance, etc. Inventories based on indigenous knowledge will be extremely useful for rural development and the conservation of natural resources on a regional level.

Inventories of genetic diversity in farming systems. Under this category, farming and horticultural crops, trees for afforestation, domesticated animals, and insects are documented on a genetic level covering species, varieties, land races, eco-types, and other gene types of domesticated organisms.

Inventories of endangered and threatened species. Inventories of species endangered and threatened are used to assess environmental degradation and identify the priorities for natural conservation. This type of inventory is often documented in the Red Data Book on endangered and threatened species, at national level or on

regional level, giving alarming indications of the extent of loss of biodiversity.

Agro-ecosystem analysis

Recently, new methods for quantitative studies of biodiversity in the agro-ecosystem have been developed, for instance participatory mapping, free listing of important species, and keystone species.

Cultural beliefs and biodiversity conservation

Biodiversity and cultural diversity, the linkage and impact on watershed management, religious linkage, and traditional labour and village regulations could be included.

Monitoring of biodiversity change

To monitor biodiversity change in a watershed, species' diversity changes and farming crop diversity changes are used as indicators along with forest-cover change and land-use pattern change. Forest products and NTFPs, water resources and soil erosion, and key species' distribution are also used as indicators. Levels of use of traditional varieties in the farming system are assessed in monitoring plots on selected sites.

Social structure of biodiversity management

Understanding of the social structure is important as it governs use of the natural resources. A number of social elements are involved in the process of biodiversity including local institutions, policy impacts, economic incentives, and the impact of traditional culture on biodiversity. The role of local institutions is a key mechanism for PBM through community biodiversity conservation association.

Utilisation and conservation of biodiversity for poverty reduction

- Identify potential bioresources for economic development
- Integration of local practices and advanced technologies: agroforestry, local species, and NTFPs
- Rural women and biodiversity: biodiversity is gender sensitive (household kitchen and rural healthcare practices)
- Training and education: farmer-to-farmer exchange and native training materials for conservation

What are the main lessons learned?

- Biodiversity management is transformation: it is useful to learn from the traditional subsistence approach in order to refine the market-oriented approach to natural resource management.
- The role of local institutions is the key mechanism for participatory biodiversity management through community biodiversity conservation association.
- Utilisation and conservation of biodiversity can be used for poverty reduction.

What are the future directions ?

- Research: sustainable development models for biodiversity management of different eco-regions should be developed. Joint research and monitoring are essential.
- Policy: communities' and people's resource rights must be ensured and illegal trading on protected species controlled.

Recognition of ownership of resources is a key issue for conservation. Local people should be given the right to self-determination and be allowed to set their own development agenda. local communities should be encouraged to maintain traditional agro-ecosystems in the buffer zones and to preserve *in situ* repositories of crop germplasms. Support should be available to local communities for maintaining traditional 'sacred' forests and holy mountains for biodiversity conservation. There should be increased co-operation regarding enforcement of laws and policies with specific reference to transboundary conservation. Joint patrols, sharing of databases and monitoring methods, and coordinated customs and immigration activities can benefit protected areas and people. Participation of local communities in the development of transboundary conservation programmes and protected area management systems should be ensured. Information on transboundary conservation issues should be shared by governments and institutions. Mechanisms for exchange of information should be identified; for instance, regular joint technical meetings, seminars, and communications. Capacity building should focus on local institutions and the management staff of protected areas. Increased awareness is needed. This should include education and training. Training should concentrate on on-site training and development of native training materials.

Conclusions and recommendations

Biodiversity demands careful protection in order to enhance the process of economic development of mountain areas. In Chapter 12 of Agenda 13 of UNCED 1992 the following is stated: '*Mountains are highly vulnerable to human and natural ecological imbalance and most susceptible of all to climate changes in the atmosphere. Mountains are a source of key resources. As major ecosystems, they represent the complex and interrelated ecology of our planet. Mountain environments are essential for the survival of the global system.*' Biodiversity is a concern common to all mountain ecosystems. To ensure conservation at the local level, community participation in biodiversity management must be treated as an important component of integrated watershed management. Identification of local biodiversity resources to support community development and poverty reduction will help conservation. In addition, traditional culture can be usefully incorporated into modern conservation in all watershed management schemes.

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