

COMMUNITY BASED MONITORING FOR CONSERVATION AND MANAGEMENT OF BIOLOGICAL RESOURCES

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INTRODUCTION

For many years, the governments and major international organizations all over the world have been engaged in implementing a conservation model that emphasizes the establishment of protected areas such as national parks, nature reserves and wildlife sanctuaries. In a country like India, all these protected areas have sizeable human populations that extract a wide array of biological resources to sustain their livelihoods. The impacts of these populations on biological diversity may vary depending upon the size of the populations relative to the size of the protected area and the intensity of use. Although there is little quantitative information about the uses of biological resources or the effects of such uses on biological diversity in any protected area, it is often argued that biological diversity will remain at risk unless people are moved out of the protected areas. Others, however, argue that indigenous people have lived in

protected areas for millennia and such people should be active partners in conservation. It is further argued that traditional knowledge of such people can be integrated into modern scientific knowledge to conserve and manage these areas.

Substantial amounts of biological diversity or resources also exist outside protected areas. Local people clearly have an important role to play in conserving resources in these areas. A case in point is the joint forest management program that has been widely adopted in the reserved forests of West Bengal, and is now serving as a model for conserving and managing forests in other states of the country. The joint forest management (JFM) programs represent partnership between the state forest departments and local communities to protect regenerating natural forests on degraded lands . The village forest protection committees set up under JFM provide protection to regenerating forests in exchange for the harvest of products by the villagers from these forests.

There is a growing realization that even in protected areas, local communities will have to be involved in conservation and management of resources. Conservation goals cannot be met unless the basic needs of people living inside or around natural ecosystems can be met. Moving these people outside or away from the protected areas is not a viable option at the moment, at least in country like India, where available land is scarce and resettlement programs have not been successful. In any case, as long as people remain in protected areas, out of

necessity or otherwise, conservation is likely to be more successful if such people are involved in management, and gradually weaned from unsustainable use of resources, wherever such uses might exist.

Local communities have acted as stewards of local resources for a long time and this long history of community based conservation has continued uninterrupted in many parts of the world. However, in other parts of the world such as south Asia, expropriation of community lands by the state, initially for production to meet the growing demands of an expanding colonial empire and industry, and later for conservation, has led to disenfranchisement of local communities (Gadgil and Guha, XXXX). Moreover, traditional societies or indigenous groups have been increasingly drawn into monetized economies. Goods that were previously harvested from vast areas in small quantities for subsistence are now being extracted from every shrinking resource base, and in large quantities. Increasing trade in ecosystem products has brought outsiders to exert pressure on the resources as well as institutions that previously ensured regulated harvests. Thus traditional practices are being rapidly modified. Moreover the rich body of traditional knowledge is being lost though in some places this knowledge is still being used by fishers, herders and forest dwellers to manage their resources, and probably constitutes an important element of community based conservation programs, as described below.

With an economic stake in local resources, communities should be an integral part of the efforts directed towards the assessment, monitoring and management of biodiversity. Because they must continuously adjust and adapt to their surroundings, communities often have tremendous knowledge about the structure and ecological processes of the local ecosystems. Conservation measures are more likely to succeed if such measures are based, at least in part, on the traditional knowledge and practices of the ecosystem people (Gadgil, 19xx). Thus, people, their knowledge and institutions must be considered as the major elements of successful conservation strategies. There is, therefore, increasing emphasis towards creating or resurrecting mechanisms and institutions that will make local communities partners in conservation.

Community based conservation has been defined as a process of conservation where communities play an important role in decisions concerning protection and use of resources (Kothari et al. 2000). Such a role, according to Kothari et al, may range from simple consultation about conservation and management of natural resources to complete control over the formulation and implementation of all conservation decisions.

COMMUNITY BASED CONSERVATION-- A CONCEPTUAL MODEL

The general objective of community based conservation projects often is to establish or strengthen community organizations or institutions for a) sustainable

use of local resources, b) conservation of local ecosystems and c) equitable flow of benefits to local community from both the use of resources and conservation activities. Although sustainable use of resources is expected to result in conservation, conservation itself is often a distinct goal because the focus on sustainability of extracted resources alone may not be sufficient to conserve resources that are not extracted, or to maintain the integrity of local ecosystems.

The need for monitoring implies that the system is undergoing changes and it could collapse, if not monitored. The first step in monitoring, then, is identification of the threats to the ecosystem or the key drivers of change. The threats or the drivers for example might be harvesting, grazing, fire, poaching, invasion by exotic species or other factors. Based on the identification of threats, interventions can be designed to mitigate threats and to enhance the livelihood of local communities. The effect of these interventions on both the resources and the livelihood then should be monitored to evaluate the effectiveness of interventions and to bring necessary changes in the interventions to obtain desired outcomes. The final step, not mandatory, is the scaling up of the model. Figure 1, graphically illustrates this conceptual model. The key features of the model are that a) local communities are the key participants in each step, and b) interventions are a part of adaptive management, constantly adjusting to the information obtained from monitoring.

Monitoring then must involve a) basic description of the ecological and the interacting social systems, b) identification of factors that drive or degrade the system, c) design and implementation of interventions to curtail the degradation of the ecosystem, d) evaluation of the impact of interventions, and e) modification and possible scaling up of interventions based on evaluation. Furthermore, the institutions that are expected to conduct monitoring themselves need to be constantly followed and evaluated. Thus the monitoring may involve a range of activities, depending upon the goals of the project and available human, financial and technical resources.

DIFFERENT MODELS OF COMMUNITY BASED CONSERVATION

As defined in the beginning, activities under community based management may range from simple consultations between local communities and outside agencies to complete control over management by local communities. The primary determinants of the models adopted at various places are the tenorial control over land, the history of such control, and the state policies for biological resource management. Stevens (1997) outlines several models for community based management (Table 1). Only those that have been used to some extent in south Asia, as described below. Furthermore, these are described in the context of protected areas, recognizing that many other mechanisms and models exist for managing biological resources outside protected areas.

Consultation

Consultations can be symbolic or really seek people's inputs into management decisions. Symbolic consultation is usually in the form of announcements or meetings that are designed to convey state's plans and regulations. The genuine consultation seeks real involvement of people from formulation to execution of plans even though the state's management agencies are under no obligation to accept the inputs of local communities. The latter type of consultation is rare in south Asia. The exception is Nepal, where, as in many other parts of the world, there are formal mechanisms such as park advisory committees that review and modify management plans. Effective consultation can also occur without the formation of committees. Nevertheless the state agencies rarely seek the opinions of those who might be most affected by their decisions. Management plans in most cases do not become public knowledge until these have been formulated and about to be executed.

Co-management

Local people and government agencies jointly manage biodiversity under co or joint management. Again a variety of sub-models and institutional arrangements occur under this general model. Co-management must require formulation and execution of plans, policies and management. Often inventories, assessments, interventions, monitoring, and conflict resolutions are essential components of management plans that might be implemented by joint committees or a coalition

of various stakeholders. Local communities may be involved in some or all aspects to varying degrees. In south Asia, co-management of protected areas is confined to Nepal. However, outside protected areas, co-management or joint forest management is widespread in India and Nepal as well. More and more areas are being brought under joint forest management.

Institutional mechanisms to enhance the effectiveness of joint forest management however need to be enhanced (Lele, XXXX). The primary institutions for joint forest management are the forest department and village protection committees . This institutional framework has several flaws. First the role and mandate of village protection committees are limited. The village protection committees do not participate in the overall planning process, nor do they have a role in formulation of general policy. Second, the committees often lack adequate representation from all constituent groups and are not elected. Third, the relationship between the committees and other agencies involved in management of biological resources is not clear. Fourth, the mechanisms to reduce conflicts between among protection committees are not well developed. Finally, there are no means to build the capacity of village protection committed for integrated natural resource management, including monitoring and evaluation of ecosystem health and the economic well-being. Co-management cannot be sustained without development of social and human capital.

Indigenous management

Indigenous management entails absolute and total control over all management decisions by the local people. Such management is generally possible for areas that are under the control of local people. Considering that much of the area under natural ecosystem is under the control of the government, it is not surprising that the indigenous management is uncommon in south Asia. In southeast Asia, where large forest areas are still under community ownership, several systems are probably prevalent, but not well documented.

There are several examples, however of protection of biodiversity by local communities of sacred groves and ponds throughout India. A number of cases where management is confined to certain resources or ecosystem services have also been described (Kothari et al. 2000; Gadgil). Moreover, there are still several places where range lands and marine ecosystems are traditionally managed by local communities but we do not know the extent to which biodiversity is maintained or optimized in each case.

COMMUNITY-BASED MONITORING – A CASE STUDY

The Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary in Mysore district, India, occupies an area of 540 sq km. The sanctuary has a diverse array of vegetation types ranging from scrub and dry deciduous forests with moist deciduous or evergreen patches along the streams at lower elevations and

'shola' or evergreen forests amidst grasslands at higher elevations (>1300m). The natural vegetation covers more than 80% of the BRT Sanctuary; the remainder is covered by a coffee plantation, miscellaneous tree plantations, and human settlements that include the Karnataka Forest Department units, the campus of Vivekananda Girijan Kalyan Kendra (VGKK), a voluntary organisation devoted to the welfare of the Soligas, the indigenous people of the region, and a temple.

Approximately, 3500 Soligas live inside the sanctuary. They used to practice shifting agriculture, which was progressively banned, particularly after the area was declared a wildlife sanctuary. The Soligas are now settled in hamlets called 'podus'. It is estimated that 30% of the Soliga households have agricultural land around their respective podus. The remainder households rely on harvest of non-timber forest products or employment to sustain their livelihoods.

The most heavily extracted non-timber forest products include fruits of nelli (Phyllanthus emblica), soapnuts (Acacia , Sapindus emarginata), lichens, and honey from the colonies of Apis dorsata and to some extent from other species of Apis (A. florea and A. indica). Many other species are extracted in relatively small quantities. The non-timber forest products are partly used by the Soligas for their own consumption and partly sold to the traders through cooperative societies called LAMPS, (large-scale Adivasi Multipurpose Societies). Although Soligas exclusively constitute the membership of LAMPS,

the functioning of the societies is highly centralized, with state officials exercising most of the control over operations of LAMPS.

In 1994, VGKK in association with Tata Energy Research Institute(TERI) instituted a comprehensive project with the following objectives: a) to provide economic incentives to Soligas to sustainably harvest non-timber forest products and b) to assist Soligas in managing biological resources they harvest. Other objectives included long term monitoring of biodiversity, strengthening institutional and policy framework for conservation of biodiversity, and reform of LAMPS to make these societies more democratic and accountable to Soligas to whom the LAMPS were designed to serve.

Major Components of the Project

In order to provide economic incentives to the Soligas to sustainably use biological resources, enterprises based on the processing of non-timber forest products were established. These enterprises, operated and managed by the Soligas, included a honey processing plant, a food processing unit, and an herbal medicinal plant processing unit. A program to monitor the performance of enterprise units and their impact on the income of the Soliga household was also initiated. Other parameters for monitoring included household determinants of forest resource use, overall changes in biodiversity, production, extraction and regeneration levels of selected non-timber forest product species, and changes

in institutions and policies. Monitoring was also designed to describe the ecological and the interacting social systems, identify key drivers of change, formulate interventions to bring resilience to the system, and to evaluate the impact of interventions. The interventions not only included the enhancement of financial capital through development of enterprises, but also the social and human capital through capacity building and strengthening of institutions.

Participatory Monitoring

The participation of the Soligas in design, implementation and evaluation was considered to be the key element of the project. The system parameters and key drivers of the change in the system were identified in a series of meetings held from 1994 onwards. The participants in these meetings included the Soligas, representatives of the Soliga elected bodies, the representatives of VGKK and TERI, and representatives of the Ashoka Trust for Research in Ecology and the Environment (ATREE) that replaced TERI in 1998 as the implementing organization.

Soligas identified fire, invasive species such as Lantana camara, and harvesting as the potential drivers of the system. They felt that the invasive species have rapidly spread throughout the sanctuary during the last several decades and that fire regimes have changed. Previously, the fire regulated the system but now with the control of fire by the Forest Department, the frequency of fires has

decreased, but the intensity of fires has increased. *Lantana camara* has spread to many parts of the sanctuary, and it burns intensely. Large intervals between fires lead to the accumulation of dry litter and in increase in biomass of Lantana and other invasive species. Thus when fire occurs, the burning is intense. Because Lantana can sometimes grow high enough to reach the lower parts of the canopy. Thus in forest patches containing Lantana, fire can even scorch canopy trees.

Participatory resource monitoring was and remains the key element of the project. The objectives of the participatory resource monitoring are to continuously estimate production, extraction and regeneration levels of non-timber forest product species. The participatory resource monitoring is organized at the podus level and undertaken by harvesters themselves. The records of quantities available and extracted are maintained by the harvesters as well as the staff of the enterprises.

Manuals on participatory resource monitoring have also been prepared. A general manual describes the objectives of participatory monitoring and the parameters to be monitored. Manuals for each specific species describe in detail the natural history of the species, temporal data on production and extraction, harvesting techniques and the key ecological and economic parameters. Initially, these manuals were prepared by the researchers and translated into Kannada. Subsequently, a simpler manual with illustrations was prepared for the use of the

community. More recently, the communities themselves have prepared resource maps showing production and extraction levels. Furthermore, a separate manual has been prepared for the trainers and professionals in voluntary organizations. This manual too, describes the objectives of resource monitoring and the parameters for which data should be recorded.

The community through a managing committee, which meets every month, constantly monitors the performance of enterprises. The enterprise units operated by the Soligas also monitor the prices received by the harvesters from the LAMPS, and the profits distributed to the Soligas by the enterprises as well as the LAMPS.

Evaluation of Monitoring

An assessment of monitoring to determine the extent, to which monitoring is effective in meeting its goal has been made on a limited basis. First, the accuracy of monitoring by the harvesters has been determined by comparing production and extraction levels estimated by the Soligas with production and extraction levels directly estimated by the researchers. Second, there is some evidence that participatory resource monitoring has been effective. For example, in case of nelli, harvesters often cut branches or hack small trees while collecting fruits. It has been found that in areas where there has been participatory resource monitoring, the number of cut stems is much lower than in areas in which such

monitoring has not been practiced. The qualitative observations also indicate that the communities that practice resource monitoring are more aware of the importance of regeneration and repletion of resources than in the communities that do not have a monitoring system in place.

Limitations of Monitoring in Biligiri Rangaswamy Temple Wildlife Sanctuary

Community based monitoring in BRT has several limitations. First of all, it does not include the overall monitoring of biodiversity because the community is only interested in the resources it uses (however, researchers at the site are monitoring biodiversity at various levels). Furthermore, even for resource monitoring, the Soligas showed little interest in monitoring regeneration levels without incentives, as estimating regeneration is a time consuming activity. Second, the forest department, a key stakeholder and a main player in conservation and management of resources, has not yet shown adequate interest in participatory monitoring. Third, participatory monitoring remains to be institutionalized. LAMPS are the logical bodies to play a leading role in participatory monitoring, and should eventually take over monitoring from the enterprise unit. In fact the enterprise units should be integral components of LAMPS. Their existence outside LAMPS is an anomaly. However integration of enterprise units and LAMPS would not be feasible without basic reforms in the governance and the functioning of LAMPS, and accrual of substantial benefits to

Soligas from LAMPS. Such reforms are underway but the outcome at the moment is uncertain.

PROCESSES INVOLVED IN COMMUNITY BASED CONSERVATION AND MONITORING

Community based conservation and associated monitoring may be viewed as a process that seeks to change institutional relationships in natural resources management by drawing various stakeholders together to make decisions. CBC can also be viewed as a mechanism for social and economic change in local communities that are dependent upon local resources for their livelihoods. Empowerment of local communities which can only occur through transfer of power and reallocation of resources among existing institutions and groups, mutual respect and recognition of alternate and diverse knowledge systems, and capacity building of local communities are some of the few, but important ingredients of successful community based conservation efforts.

Although various steps involved in community based monitoring will differ from one situation to another, some common and essential steps may be outlined as follows:

Bringing stakeholders together

The first step is to bring government organizations, community institutions, leaders, or groups and other stakeholders together. This may be accomplished by any of the stakeholders, including the non-government organizations. The meeting of the stakeholders should lead to the formation of a governance structure that will have the mandate of identifying drivers of the system, designing interventions, and ensuring the implementation and monitoring of management plans. A range of institutions can be involved in community-based management, but the essential executive functions should rest with the representatives of the local communities.

Linkages among institutions

Linkages among various institutions at the grass root levels that are involved one way or another with natural resource management, are critical. Although there are village level institutions that regulate grazing, collection of fuel, wood and other non-timber forest products, such institutions do not have the mandate to regulate mining, water resources, except at the village level, and developmental activities. Thus, the existing institutions must be reconfigured to undertake new functions, or linkages among institutions must be explored. Institutions responsible for managing natural resources in turn must be linked with democratically elected political institutions, such as the village level panchayats in India. Alternatively, institutions like panchayats can overtake the functions of natural resource management with or without collaboration with state level agencies (Gadgil, XXXX). Ecological processes occur at a much larger spatial

scale than that over which local ecosystems are distributed. Thus, nested structures are required to manage natural resources. The village level institutions must therefore also have a linkage with institutions that for example, may manage entire watersheds or biodiversity in biogeographical regions in areas as large as hundreds and thousands of square kilometers (Lele, XXXX). The role of community organizations in managing resources at larger spatial scales has not received much attention.

Transfer of power and resources

The transfer of management functions to village level institutions has to be accompanied by transfer of resources and skills. Currently, such resources and skills are largely with state agencies. Without transfer and enhancement of these resources and skills, village level institutions will only have a limited capability to manage resources.

Monitoring and evaluation

Monitoring and evaluation are critical to the success of community based conservation programs. Moreover, monitoring enhances skills and human development, and helps build social capital in the community (). Monitoring can be exclusively by the community or it could involve other stakeholders. The purpose of the monitoring is to assess the effectiveness of the

management plan. Monitoring should involve not only ecological parameters, but also social and economic parameters. For example, in the case communities dependent upon harvest of non-timber forest products, monitoring will be focused not only on populations of harvested species, but also on income realized from non-timber forest products, temporal and household variation in harvested amounts and shifts in sources of household income. Monitoring protocols must be clearly outlined and flexible as in any adaptive management plan. Data and information gained from monitoring should be clearly documented, shared among all stakeholders, and used for future decisions.

Human development

Community based conservation and monitoring in the large context is a mechanism to enhance the power and the ability of local communities to manage their national resources. Development of human and social capital resulting in part from the strengthening of institutions and transfer of power and resources and in part from improvement in health, education, gender and social equity are critical to the upgrading of ability and skills. Thus, community based management has to be viewed as an integrated approach towards meeting contemporary environmental and development challenges through human development.

REQUIREMENTS FOR SUCCESS IN COMMUNITY BASED MONITORING

There are many requirements for community based monitoring to be successful. These include tenure and resource rights, incentives, traditional knowledge, and equity in distribution of benefits, institutions and state policies.

Tenure and resource rights

Secure tenure over resources is critical to the success of conservation programs. However, such tenure is not recognized in protected areas in South Asia. In many cases people live illegally inside the protected areas. In other cases, the settlements occur as exclosures and are not technically part of the protected areas. Often within these exclosures even tenurial control over land is not legally recognized by the state though people may retain control over generations. Although people may have rights to collect resources outside exclosures in protected areas, such rights are not guaranteed and renewed over a short term basis. Uncertain tenure discourages investment in land and promotes resource exploitation of resources in the surrounding areas.

Community based conservation also requires clear definitions of resource rights. Several types of resource rights may exist at various places, as described below, following Stevens (1998).

Traditional resource rights may be defined by the state. Such rights can also be imposed by the communities to prevent the extraction by outsiders. If defined by the state, the rights are less likely to be misused when formulated in consultations with local communities.

Local use with sustainable levels of extractions has been explored in several places in the world, but the problems arise in defining sustainability.

Local use with local decisions involves almost complete control of resources by local communities. The residents make all decisions about use and regulations. Government agencies or others may provide inputs as in the Annapurna Conservation Area, but do not have the final say.

Community empowerment

In many parts of South Asia, local communities used to manage resources in their surrounding ecosystems. As the power of the state increased, it wrested more and more control over resources, disenfranchising local communities. State agencies not only need to encourage local people to participate in management of local resources, but also to equip communities so that they can act as stewards of natural ecosystems. Without political and economic power and without acquisition of skills, local communities cannot play an effective role in developing and implementing management plans. It is not only the local groups

that have to be empowered but also other groups and organizations that are involved in management decisions at spatial scales larger than ecosystems.

Benefit sharing

Costs and benefits of conservation often are not equally distributed among different states of the human societies and also vary considerably across spatial scales. Benefits in general are widely dispersed. For example, people living several hundred kilometers away from natural ecosystems may benefit from such ecosystem services as clean water from the protected watersheds. Even people living thousands of kilometers away benefit in terms of sequestration of carbon dioxide. Costs of conservation on the other hand are highly localized, largely borne by the local communities. For example, the cost of conservation, if an area is declared as a national park and a wildlife sanctuary is much more for people who have lived in these areas than for the people outside the area. Conservation in order to succeed, must reduce the costs for people living inside or around natural ecosystems, and at the same time, spread these costs to others who also benefit from ecosystem goods and service, but do not pay the real costs.

Costs of conservation can be greatly reduced, and in turn benefits of conservation greatly enhanced for local people by a wide variety of economic mechanisms. Care must be taken that increased economic activities does not have an adverse effect of biodiversity, but on the contrary increase the chances

of protecting the environment. In the long run, the objective should be to decrease economic activities in and around protected areas.

The benefits of biological diversity accrue from goods and services that natural ecosystems provide. Ecosystem people have been traditionally using goods such as timber and non-timber forest products (leaves, flowers, seeds, fruits, gums, resins, medicinal plants, fodder, thatch, incense) from terrestrial ecosystems for centuries. With an increase in demands for such products, levels of extraction have increased, while the resource base has declined. The linkage between the livelihoods of the people and the necessity to conserve resource base provides an opportunity to have local communities participate in conservation. For the most part, harvesters do not secure the true value of the goods they gather because these are sold without value addition. Processing and marketing of the products by the harvesters have the potential to reuse their income and to reduce the level of harvests through appropriate institutional mechanisms. Enhanced benefits from local biodiversity in turn can increase the stake of communities in conservation. This alternative is worth exploring as compared to the current practice of unregulated or illegal harvesting without any monitoring, with possible that can have adverse effects on biodiversity.

Benefits from ecosystem goods can also accrue from intellectual property rights, if such rights are recognized for the knowledge ecosystem people have for many the species and their useful properties.

Apart from a multitude of goods, shared benefits can also include ecosystem services. A major ecosystem service associated with protected areas is tourism. Yet, there are very few places in south Asia, where tourism benefits have reached local communities. Ecotourism, if promoted appropriately, can involve ecosystem people and provide substantial economic benefits. The requirements for ecotourism include: development of plans jointly with local communities; decentralized, small scale activities in which local people play a key role; and mechanisms to ensure that primary beneficiaries for ecotourism are the ecosystem people rather than the government departments, tour operators, or large hotel corporations.

Tourism or ecotourism, like other commercial activities, can also have a deteriorious effect on biodiversity or the natural resources of the area. Thus impacts of tourism on biodiversity should be monitored as part of the management plan. Moreover, appropriate institutional mechanisms should be created to encourage the type of tourism that provides benefits to local residents and enhances conservation (see below).

Equity in distributions of benefits

Benefits must percolate through the community for community based conservation to succeed. Communities are not homogenous particularly in South Asia, where economic interests differences due to ethnicity, religion, caste,

gender and economic power can create unusual heterogeneity, and in the absence of strong institutions, inequities as well as conflicts. Inequities must also be removed among neighboring communities with access to the same resources. Often inter-community inequities may overshadow differences among communities.

Traditional knowledge

An important factor that can influence the success of community based management is traditional knowledge. People have managed and conserved ecosystem resources for millennia. Thus local people have considerable knowledge about their surrounding ecosystem. This knowledge accumulated over generations extends from the distribution and uses of plants and animals and their functional role in ecosystems to ecosystem processes. The traditional knowledge has been used by local communities to manage the surrounding ecosystems to ensure continuous flow of goods and services. The traditional knowledge involves continuous enhancement of both the management practices as well as the knowledge itself through a positive feedback loop. Thus management systems involving traditional knowledge are adaptive.

Berkes et al (2000) distinguish three types of management practices based on traditional knowledge. The first type is common to both traditional and modern systems of management and includes monitoring of reserves and ecosystems.

protection of certain species, vulnerable life history stages, and habitats and temporal restriction of harvesting. The second type has been eliminated from conventional management systems but is still a part of the traditional systems. Examples include resource rotation and successional management. The third type is common to traditional systems, but are not a part of the conventional systems. These include managing landscapes, watersheds, and ecological processes; formulating responses to pulses and surprises; and developing mechanisms for renewal of ecosystems.

The existence of traditional knowledge about local biodiversity is well documented in Asia. A notable effort in this direction has been compilation of People's Biodiversity Registers (Box) in many parts of India. These registers record the knowledge of local communities about the ecosystems or landscapes they inhabit. A rich body of knowledge about managing some ecosystem services such as water has also been compiled.

In the Annapurna example discussed below, local communities have traditionally managed rangelands and forests. Following these practices, specific forests have been designated for resource extraction, but restrictions are placed on the amounts to be harvested and the times during which harvests can occur. Complete protection is accorded to sacred forests as well as to wildlife, except the snow leopards that kill livestock.

Although the existence of traditional knowledge about biodiversity has been compiled for many local communities and ecosystems, the use of such knowledge in conserving and managing biodiversity is not well recorded in south Asia

Institutions

Institutions refer to not only the organizational arrangements such as government agencies, non-government organizations or voluntary organizations, and elected or appointed bodies that regulate or govern management and conservation of resources, but also customs, practices, or set of rules that regulate behavior of individuals within a particular group.

There are several types of organizational arrangements to promote community based conservation, ranging from control and regulations by one local organization to combinations of state agencies, non-governmental organizations and local bodies.

Village institutions, if duly elected and if fully representative of all the constituencies, including women, may be the most appropriate for conserving and managing joint resources at the local level. However, village forest protection committees in the forest management programs in India have been unable to protect resources from other neighboring groups as well as outsiders.

Moreover, village level institutions also lack technical and managerial resources for monitoring the state of natural resources. Thus in order to effectively function, village level committees must be a part of hierarchical institutional arrangement that links various committees at different levels and also at the same time provide technical and managerial inputs above the village level.

Inside or at the fringes of the protected areas, the village level institutions must work with state agencies responsible for managing biodiversity. However the roles and responsibilities of community level and state institutions must be clearly delineated. Even after many years of joint forest management such delineation has not been explicitly outlined anywhere. There is often considerable gap between community level organizations and state institutions in goals and the means to advance those goals. Non-governmental organizations can often bridge these gaps. Thus a coalition of village level institutions, state agencies and non-governmental organizations may provide an effective means to ensure the participation of local communities in managing protected areas.

State policies

Policies conducive to participation of local communities are necessary to ensure success in community based conservation. The state policies in India and Nepal have progressively moved towards an ever-increasing role of local communities in managing forest resources. In India, the forest policy act of 1988 clearly

recognizes the rights of communities living in and around forests to the use of forest products to sustain their livelihoods. The joint forest management programs explicitly assign a key role to the communities in protecting and managing regenerating forests. Recent guidelines on forest first management issued by the Government of India (Ministry of Environment and Forests, 2000) seek to further strengthen the role of communities in joint forest management by emphasizing the need a) to accord legal status to village first protection committees, b) to enhance the participation of women in forest protection committees, c) to extend forest first management to non-degraded areas, and d) to increase the benefits of restoration and conservation to local communities.

The policies in order to strengthen community based management must create proper institutional framework for progress in several areas. First is the tenure and representatives of the committees. As mentioned earlier, apart from representation of women and other constituency, the committees should compose of members elected for a fixed term. Second, mechanisms must be created for committees to provide inputs beyond the village level, particularly with respect to issues concerning ecosystem goods and services that extend to spatial scales beyond the areas under the purview of the committees. Third, the committees and the forest department should act as true partners instead of clear domination of the forest department in decision-making processes. Fourth, committees should be entrusted with the greater fiscal control over generation and distribution of revenue with transparency in accounts and book keeping.

Fifth, currently there is no monitoring of the resources that are being managed and of the social and economic benefits that are being generated. Sixth, provisions must be made to enhance the capacity of committees to monitor and adaptively manage resources. Finally, greater incentives and benefits accruing from limited supply of ecosystem goods must be provided to local communities. The benefits from limited supply of goods will be insufficient in the long run to prevent degradation of ecosystems and loss of biodiversity. Ecosystems provide many services that not only benefit local communities but also people in other areas. Thus communities that exchange and protect such services should be provided additional incentives for conserving ecosystems.

LIMITATIONS OF COMMUNITY BASED APPROACHES

Community based approaches have several limitations that must be overcome if the communities want to play an effective role in conserving and managing biodiversity.

The first limitation is that communities are interested mainly in resources that sustain their livelihoods. These communities extract and manage species that are of sustenance and commercial value. Community managed ecosystems like other managed ecosystems are not likely to have all components of biodiversity. Moreover such ecosystems occur as relatively small patches and cannot sustain several ecological and evolutionary progress essential for the long term

maintenance of biodiversity unless the managed ecosystems have a certain degree of connectivity.

Ecosystem services in community managed ecosystems again just like and other managed ecosystem could also be disrupted. Removal of large amounts of biomass could have an impact on animal populations as well as on nutrient dynamics in soil. It is important to note however that in much of South Asia, communities are involved in managing regenerating forests that have been severely degraded in the past. Thus, currently, communities are playing an important part in enhancing rather than degrading ecosystem services.

The scale at which local communities manage ecosystems imposes a second limitation. Ecological and evolutionary processes as well as such ecosystem functions as pollination, seed dispersal are likely to be disrupted at scales at which local committees manage ecosystems in relatively densely populated areas. Relatively small ecosystems are not likely to have disrupted food webs as well. The boundaries of watersheds may not follow the boundaries of areas managed by local groups this leaving the local groups no control over upstream and downstream processes. Such a control can be achieved by a hierarchical management and structures that operate at different scales of which local community institutions constitute the basic element.

Finally, as discussed earlier community level institutions lack means to impose their will on or resist pressures from outsiders. With increasing globalization, such pressures are likely to increase. If communities cannot counter pressures from neighboring groups, they are also likely to be subjugated by more powerful global forces.

CONCLUDING REMARKS

Success in community based monitoring requires stringent conditions, the most important being the complete or nearly complete control over resources. Without substantial control, local communities should not be expected to carry the burden of participatory resource monitoring. Indeed, monitoring should be the responsibility of the state when the resources are under its control. The state agencies in India however have an abysmal record in monitoring the status of biological resources.

Under the joint forest management program in India, neither the state nor the local communities are involved in monitoring the effectiveness of the joint forest management programs. There are a few instances where researchers in collaboration with local communities have examined the composition, regeneration and mortality of plants in forests (Ramakrishna Mission Lokasiksha Parishad, 1999; Roy, 1997; Roy, et al., 2000; Sarkar et al., 2000). The results of such monitoring have revealed significant differences between protected and unprotected forests. Moreover, observations from participatory monitoring have

been used to alter the resource use patterns. Participatory monitoring in such cases however is short-term, externally driven and without any serious plan for continuity. The state has not developed monitoring plan regardless of who might carry it.

Community based monitoring is a growing area of research. Among the important issues are: design of plans, institutional mechanisms of implementation, and evaluation. In the case of India, joint forest management program further presents a range of challenges in institutional arrangements. Investments in research and implementation of participatory monitoring would pay rich dividends in the form of enhanced conservation and judicious management of biological resources.

Box 1. Annapurna Conservation Area

One of the best examples of community based conservation and management of resources from the South Asian region is from Nepal, in the Annapurna Conservation Area (ACA), approximately 7,600km² in size and the home of 118,000 people (Stevens, ?). The Annapurna Conservation Area Project (ACAP) in the Himalayas is an area of immense scenic beauty and cultural diversity, named after the world's tenth highest mountain, Annapurna. The region is also endowed with unique biodiversity in the form of many species of rhododendrons, red panda, snow leopard, blue sheep, and five of Nepal's six pheasants. The

ACAP region is inhabited by 11 different ethnic groups, who all practice subsistence agriculture but differ in their resource use, conservation and management practices.

The ACA was established out of concern from the rapid degradation of the area resulting largely from the high level usage by tourists. The region receives more than 43,000 tourists a year. The tourists, along with the local populations, exert a heavy pressure on natural resources. Initially, the World Wildlife Fund and other conservation organizations proposed the establishment of a national park. A planning team that included Mingma Norba Sherpa, who was to later become the first program director of ACAP, after consultation with local communities, proposed a new brand of protected area that will actively involve local people in conservation and management. The ACAP were to recognize the rights of indigenous people and support traditional resource management institution and practices. Local land use practices were to be supported as long as these practices did not jeopardize overall conservation goals. Local communities were to retain rights or were to be empowered to manage forests. Equally important, benefits from the protected area were to be shared with local communities.

The Annapurna Conservation Area was the first area in Nepal, and perhaps in the rest of Asia, to keep revenues from entrance fees paid by the tourists for its own use. The revenues are to be used to build a trust fund that will finance

conservation and development activities. The expectation is that much of the expenses incurred by ACAP will be borne by the trust fund.

The critical components of ACAP are land use zoning, local resource management, forest and wildlife management and grass roots development. Land use zoning involves designation of areas as wild reserves, protected forest/seasonal grazing, intensive use, anthropological/biotic study area and special management zones. The unusual category is anthropological/biota study area, which is designed to protect traditional way of life and is closed to tourists. There is controversy about such a designation. Critics point out that local communities should decide how a particular area would be used.

Local resource management, as the name implies, emphasizes the essential decision making process from formulation to implementation of management plans by the communities in consultation with park managers.

Decentralized forest and wildlife management is the key component of the Annapurna Conservation Program. The park management works with local communities to reinforce traditional practices with new technology and approaches. Rules and regulations are determined by and enforced by communities. Revenues generated for forest use and from fines are also under local control.

Grass roots development is critical to the success of Annapurna Conservation Program. The basic premise of the program is that economic development and empowerment of people are essential for long term conservation of the area. Consequently, the program emphasizes the development of village level institution and activities that enhance the standard of living, human and social capital, and conservation.

Basically, as the example of ACPA shows, the community based conservation projects seek to enhance the natural as well as the human and social capital of a given region. The typical protected area network approach, based on the establishment of national parks and wildlife sanctuaries, is largely directed towards the betterment of physical and natural capital. In CBC, local institutions and the empowerment of local communities to address issues of natural resource use are seen as the keys to effective conservation.

Box 2. Key Ingredients of a Successful CWM Recipe (From Kothari et al. 2000)
(not in any order of priority)

The community and equity

1. Clearly identify primary stakeholders for decision-making and benefit-sharing purposes.

2. Make conscious attempts to tackle local and larger-level inequities in social status economic class, and political power, eg. through equitable representation in CWM institutions.

3. Support benefit-sharing mechanisms which are equitable, and which create a clear link between conservation and local well-being.

Institutions, management, and processes

Community institutions

4. Build on local community knowledge systems and customary practice relevant to conservation.

5. Incorporate strong local leadership, preferably with a second generation or line developing simultaneously.

6. Build on local community institutional structures, traditional and/or new.

7. Ensure clarity and strength of tenurial arrangements, with clearly demarcated rights to resources.

8. Internally generate core funding requirements, even if initially dependent on external sources.

External institutions

9. Orient government, non-government, donor, and other external institutions to become facilitators and supporters of local community processes, ensuring that the latter are empowered to manage their own affairs rather than become dependent on outsiders

10. Support continuous capacity-building for all stakeholders.

Ecological sustainability

11. Use conscious regulations based on local and larger ecological constraints, and on an understanding of ecological impacts of CWM.

12. Undertake constant monitoring and evaluation, by internal and external persons, of the ecological, social, economic, and political aspects of the CWM initiative; and develop local indicators for this.

13. Balance rights with strong responsibilities and duties towards conservation and equity.

Policies and laws

14. Integrate an ability and willingness to tackle external forces of development, commerce, and politics.

15. Provide clear linkages between local actors with national and international supporters and facilitators (within and outside government), without a debilitating dependence on them.

16. Take appropriate national policy and legal measure to facilitate CWM, including space for customary law, positive macro-economic incentives, facilitating role of government agencies, and others.

17. Provide full access of community to information regarding and programmes affecting the CWM initiative.

Table 1. Indigenous Peoples' Involvement in Inhabited Protected Areas (From Stevens, 1994)

Management Models

and their Characteristics

Top-Down, Outside Management

Settlement permitted

Natural resources use in zones
or regulated use throughout

Managed Units

National parks (enclave
settlements or indigenous use
zones)

Protected landscapes
Biosphere reserves

Managed resource areas

Consultation (informal)

Staff-resident interaction

National parks (enclave settlements or indigenous use zones)

Occasional meetings between local leaders and park staff

Protected landscapes
Biosphere reserves

Occasional village meetings

Managed resource areas

Consultation (formal)

Advisory committees

National parks (enclave settlements or indigenous use zones)

Regular community meetings and workshops

Protected landscapes
Biosphere reserves

Management plan participation

Managed resource areas

Co-Management (natural resources)

Wildlife, forest, grazing management boards

National parks (enclave settlements or indigenous use zones)
Protected landscapes
Biosphere reserve

Protected area management boards

Conservation areas
Management resource area

Co-Management (protected area)

Participation on management boards	National parks (enclave settlements or
Senior staff positions	Indigenous use zones)
	Protected landscapes
	Biosphere reserve
<i>Indigenous Management</i>	
Local management	Conservation areas
	Managed resource areas

Table 2. Institutional structures for conservation in South Asia (From Kothari et al. 2000)

Institutional control	Examples of areas conserved
Exclusively state	Protected areas (most countries) Reserve/Protected/State Forest (India, Bangladesh, Pakistan, Sri Lanka)
Exclusively NGO	(none found)
Exclusively local community	Mendha 9lekha), Bhaonta-Kolyala, Jardhargaon (India)
State/NGO	Makalu-Barun Conservation Area (Nepal)
NGO/local community combined	Annapurna Conservation Area (Nepal); Chakrashila Sanctuary (India); Kharshati 'Wildlife Sanctuary' (India)
State/local community combined	JFM areas (India); CF areas (Nepal)
State/NGO/local community	JFM areas (India); Rekawa Lagoon (Sri Lanka); Hushey Community Conservation Area (Pakistan)
Private (individual)	(none found, perhaps private reserves in Pakistan?) Wildlife management areas Conservation areas

areas

Protected landscapes

Managed resource protected

Protected territories

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