



NATURAL RESOURCE MANAGEMENT (NRM)

The focus of the Natural Resource Management programme is on institutional, technological, and policy innovations for community-based management to increase productivity of mountain resources to reduce poverty, enhance food security, and ensure biological conservation. The programme is divided into three areas: Watershed Management; Rangeland, Pasture, and Livestock Management; and Transboundary Biodiversity Management.

 *River Basin Boundary*
 *HKH Region Boundary*

COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT

INNOVATIONS



Technological



Institutional



Policy

Increased
Productivity
of Mountain
Resources

Food
Security

Poverty
Reduction

Environmental
Sustainability

Myanmar

Salween
River
Basin

Mekong
River Basin

Bay of Bengal

Yellow River

Watershed Management

Watershed management provides an integrative framework for sustainable livelihoods and natural resource management. As the demand for land increases with growing population pressure, and as soil nutrients are depleted through intensified agriculture, there is continuing expansion on to new slopes and unsustainable use of old ones. The majority of mountain people in the HKH are dependent on marginal, sloping agricultural lands and commonly-used forests and pastures for their livelihoods. Combining new technologies with indigenous knowledge, increased clarity and security of land tenure, and forest management by the community gives considerable scope for further development of innovative technological and institutional options for increased productivity and food security.

People and Resources' Dynamics Project (PARDYP)

The People and Resources' Dynamics Project (PARDYP) works with communities at the watershed level to tackle degradation of natural resources and improve livelihoods in the HKH region. Research activities are participatory and farmer-based, and concentrate on developing outputs that have potential for improving food and water security, and the incomes of rural households.

The project was initiated in 1996, and the third phase (PARDYP 3) commenced at the beginning of 2003 with co-financing from the Swiss Agency for Development and Cooperation and International Development Research Centre, Canada. This phase will focus on research for development (applied research and participatory action research by farmers) that makes use of knowledge generated in previous phases, and produces sustainable management options for use at household, community, and policy levels. Research is now being carried out through sub-projects, and this has resulted in a greater regional perspective and stronger regional thinking. During 2003, data generated in the previous phase have been synthesised into a number of cross-watershed papers on rehabilitation of degraded lands, soil fertility dynamics, water-related topics (high and low flows, soil erosion, rainfall), and results from on-farm research activities. A CD-ROM of this analysis has been prepared.



PARDYP team

Farmer meeting
in Kausani,
India

A review of activities carried out in the Yarsha Khola of Nepal between 1996 and 2001 (*Review of PARDYP Work in Yarsha Watershed*) was positive, and revealed that many management options have been taken up locally without the need for further extension. The Department of Soil Conservation and Watershed Management produced a review of soil erosion studies carried out in Nepal, including the results from PARDYP, that indicated that erosion rates are much lower than previously estimated. This has implications for developing management options related to soil conservation and soil fertility.

Within Nepal, water-conserving methods to produce off-season vegetables have been widely adopted. Over 55 farmers in the watershed are using simple drip irrigation systems. Initial results from System for Rice Intensification (SRI) trials show a 40-50 per cent increase in yield. Although labour intensive, SRI is water conserving, suited to small landholdings, and responds positively to farmers' fertiliser management practices.

In India, economic analysis of the use of polyhouses to grow off-season winter seedlings suggests that the technology can be cost-effective for farmers. The polyhouse promoted by the project costs about US\$100 compared to one promoted by government line agencies costing around US\$ 900. Indian farmers, with private water sources and money to construct water-harvesting tanks, are adopting pisciculture on a wider scale as a means of diversifying their incomes and fully utilising their available water resources.

In Pakistan, hybrid maize Super 3032 was successfully introduced. Farmers were satisfied with the favourable cost-benefit ratio and intend to plant it on a wider scale in future. Onion seed production was introduced with technical support and seed certification through PARDYP. Farmers saw substantial returns, and were keen to continue this in the future.

Thousands of fast-growing, multipurpose plants were planted on waste areas and farmers' land, including block plantations of hybrid poplar and *Robinia pseudoacacia* for farm forestry practices and energy plantations. Cocciferous beetles are persistent defoliators in this region, and cause heavy damage to green plants during the larval stage. Beetle traps were laid to control the beetles mechanically without the use of chemicals. A study on local mycorrhizae was initiated in collaboration with a scientist from the Pakistan Forestry Institute who will be assisted by scientists from the National Agricultural Research Centre, Islamabad.

Participatory development of agroforestry innovations and assessment of environmental services

In areas where the IFAD-supported Western Uplands Poverty Alleviation Project (WUPAP) is operating in the districts of Humla, Jumla, Bajura, and Bahjang in Nepal, most households are faced with the dual problem of a small land base and low agricultural productivity. One possibility for improving livelihoods is the harvesting of high-value, low-volume aromatic and medicinal plants. However, poor management practices have led to a depletion of the natural reserves of these resources. Within the region, many communities have access to areas of land that are held as leasehold forest. This land is often degraded and the soil has little fertility. In an attempt to make better use of this land, communities are being encouraged to plant non-timber forest products (NTFPs) such as aromatic and medicinal plants, that can be collected and sold to private companies.

In Humla and Jumla, communities have been linked with Dabur Nepal, a private pharmaceutical company, in a partnership that will provide communities with an assured market for selected products that are used by Dabur Nepal in the production of natural medicines. Lead farmers have been trained in the propagation, cultivation, management, harvesting, processing, and marketing of NTFPs. Seven



C. N. Anil

H.E. the Japanese Ambassador to Nepal visiting the NTFP trial plots of the ICIMOD/Dabur programme in Jumla

medicinal plant species have been selected and are being propagated in two research nurseries in the project area. Emphasis has been placed on farmer-led testing of various propagation techniques and composting regimes. Satellite nurseries are being established across the two districts. This project is at an early stage, and issues such as access to benefits and sustainability of the community-private partnership will need to be addressed. The project is also looking at improving the management of rangelands in the area and the production of winter fodder for livestock.

Farmers' innovations in shifting cultivation

Swidden forms of slash-and-burn agriculture (shifting cultivation) are common throughout the eastern Himalayan eco-region, and are often subject to over-simplified blanket policies by the state as well as insecure tenure structures. These policies usually entail restrictions on traditional practices, such as bans on the harvesting of trees, or attempts to settle the population statically in a defined area. These interventions have not produced the results that authorities intended, and have sometimes resulted in the breakdown of communities whose lifestyles depend on this type of agriculture. In some places, policy-makers, especially those at the local level, have come to realise that the 'official' perspective of shifting cultivation being 'unproductive' or 'destructive' has to change. They recognise that it is possible to develop a collection of good practices for shifting cultivation that can guide policy and stabilise these lifestyles. Indeed, there are many compelling examples of shifting cultivators successfully managing local resources to solve local problems and applying a broad range of agricultural and agroforestry land-use practices. However, there is currently little documentation of these indigenous innovations with which to inform policies or research agendas in the region. The first step in translating these examples into the creation of a new understanding of shifting cultivation is to document the strengths of farmers' innovations within current shifting cultivation systems in the eastern Himalayas.

To start this process, potential advisory group members, focal point representatives, and lead persons from Bangladesh, Bhutan, Myanmar, Nepal, and north east India came together at a workshop at the North Eastern Hills University (NEHU) in Shillong, Meghalaya, to brainstorm and formulate a strategy. Each country team devised a plan of action and designated focal points for follow-up. Parameters for country-specific case stories were agreed upon, and documentation of farmers' innovations found in the shifting cultivation systems begun. Already, policy issues have been flagged, such as those related to increasingly



A farmer in her jhum plot at Sasatgre village in the Garo hills of Meghalaya, India

insecure land-tenure systems, institutional and policy influences on market structures, and lack of access to appropriate technologies and improved management practices. Networking between all stakeholders will lead to the development of a policy framework that takes into consideration shifting cultivators' needs and livelihoods, and that can be advocated across the region.

Technology development, demonstration, transfer, and capacity building for natural resource management

Development, demonstration, and transfer of and capacity building activities in technologies related to natural resource management were carried out at ICIMOD's Test and Demonstration site at Godavari in the Phulchowki watershed of Nepal with the holding of many training courses and workshops. High-value cash crops of horticultural importance, the integration of livestock, such as goats and honeybees, into farming systems, as well as non-conventional energy-related technologies, were demonstrated to many visitors, – including 420 students from schools and colleges, over 330 farmers from across Nepal,

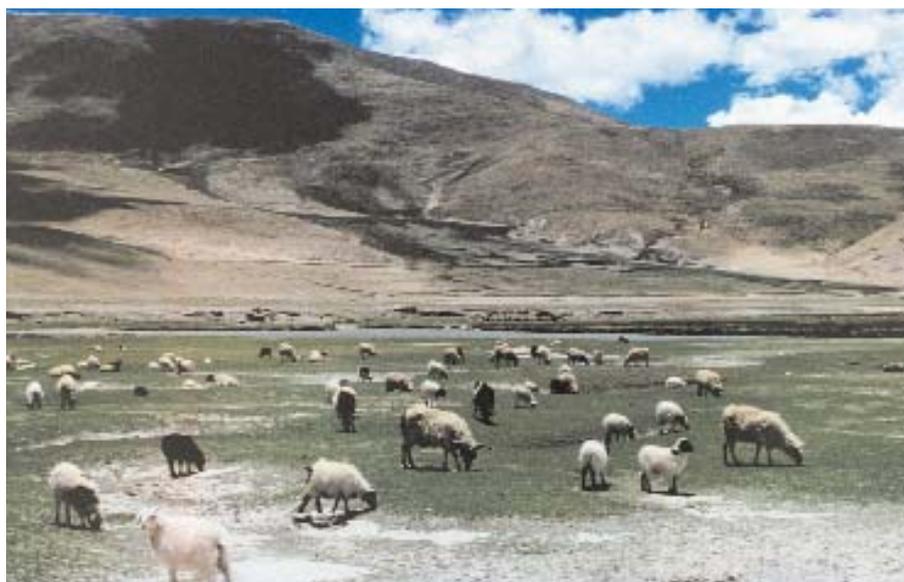


Community members with the resource team after completion of the P3-D Model at Godavari

and about 238 visitors from across the region. A bog garden was created in a swampy area for both conservation and educational purposes. Strategies have been formulated to develop the entire Phulchowki watershed as a demonstration model that works closely with villagers and local institutions such as forest user groups. In 2003, for the first time, ICIMOD, in collaboration with Educate the Children, started working with 93 village households and six forest user groups in the watershed to build their capacities for transferring appropriate technologies. Training has helped four Tamang women's groups prioritise activities on sloping agricultural land technology (SALT), water harvesting, bio-briquetting, vegetable cultivation, vegetable seed multiplication, tree fodder, and forage for their village. A 3D model of the Phulchowki watershed was developed during a training course for the IFAD-funded projects in Bangladesh and India and will be used by local communities to plan and monitor their activities.

Rangelands, Pasture, and Livestock Management

Rangelands, pasture, and livestock directly or indirectly provide indispensable support to the livelihoods of communities in the high mountain areas. Sustainable use of these resources is of paramount interest not only for the sustenance of local populations but also for the conservation of rare flora and fauna species, water capture, and carbon sequestration, and for the preservation of cultural and natural landscapes. Many of the goods and services that high mountain rangelands and pastures provide have uses and consequences beyond national boundaries. Most of the mid-hills are occupied by marginal farmers with limited landholdings often engaged in mixed farming of livestock and agriculture. In many areas, some form of shifting cultivation is practised; this is placing severe strain on the environment while providing nominal economic benefits to farmers. It is, therefore, necessary to demonstrate more sustainable and lucrative farming systems through the integration of livestock and horticultural production. This is to be achieved through the introduction of suitable technologies and the organisation of farmers into cooperatives and associations to improve the efficiency of production and marketing of both livestock and horticultural products.



Daniel Miller

Rangeland
and
livestock in
the HKH
region

Rangeland improvement and management

ICIMOD's rangeland programme started in 1995 with co-financing from the Federal Government of Austria. It is currently in its second phase. The main thrust of the present phase is to demonstrate and introduce sustainable use and management of rangelands through involvement of all stakeholders in the planning and management of rangeland resources. It is aimed at supporting partner institutions to develop and adopt innovative policies, technologies, and institutional reforms to take up co-management of rangelands. Emphasis is placed on community management as the best practice for sustainable use. Models for the various types of regime are being developed, so that those most suitable for an area can be identified and promulgated locally by governments and NGOs. The focus is on regional training in participatory action research in order that stakeholders can identify local problems and develop local action plans and research.

The Regional Rangeland Programme Phase I came to an end in December 2002. Between January and April 2003, the proposal for Phase II (2003-06) was prepared by reviewing the experience gained and identifying emerging priorities among participating countries. This was facilitated by a regional planning workshop held in Kathmandu that brought together representatives from partner institutions, the donor agency, and ICIMOD's rangeland specialists.

Field trips were undertaken to Upper Mustang in April, Bhutan in May, and China (Sichuan and Tibet) in July/August. During the visit to Mustang, a rapid assessment of past activities as well as future needs in rangeland improvement was carried out in collaboration with the Upper Mustang Biodiversity Conservation Project. Field observation trials were established at two sites to assess the potential for introducing winter fodder species. In Bhutan, new partners for rangeland activities were identified and mechanisms for implementation and cost sharing were worked out. In Sichuan, meetings were held with key partners, the Sichuan Grasslands Institute and the Chengdu Institute of Biology, as well as representatives of the provincial and county administration and animal husbandry departments. A field visit to Hongyan County was undertaken to identify field activities for implementation. In Tibet, a meeting was held with partners to discuss and agree to future areas of collaboration.



The Training of Trainers' Workshop in Rangeland Co-management Assessment and Planning held in Bhutan

Improvement of livestock production in mixed farming systems and development of livestock product processing and marketing strategies

This activity is part of an IFAD-ICIMOD collaboration for supporting upland livelihood policies in the region. A demonstration plot for integrated livestock and horticultural production was established in eastern Bhutan in partnership with the Renewable Natural Resources' Research Centre (RNR-RC), Khangma, and the Department of Livestock. Two batches of Bhutanese officials were trained in feed formulation and animal nutrition, and there was a study tour of Bhutanese officials to Nepal to visit small-scale enterprises in livestock and horticulture. A feed-mixing unit for trial and demonstration was procured in Nepal and exported to Bhutan. Two Bhutanese entrepreneurs came to Nepal for training in milk processing and cheese-making. A milk-processing unit will be procured for training and demonstration in Bhutan. It is expected that the introduction of improved methods of processing milk will greatly benefit smallholder cattle farmers through the sale of more marketable products.

As part of the ICIMOD-FAO collaboration on improving livestock policies in mixed farming systems, a manual on Community Empowerment in Livestock Resources' Management was prepared. It will be used as a planning and decision-making tool by local communities for managing and improving their livestock resources.



Sanjay Madhani

Demonstration of stall-feeding for livestock management

Transboundary Biodiversity Management

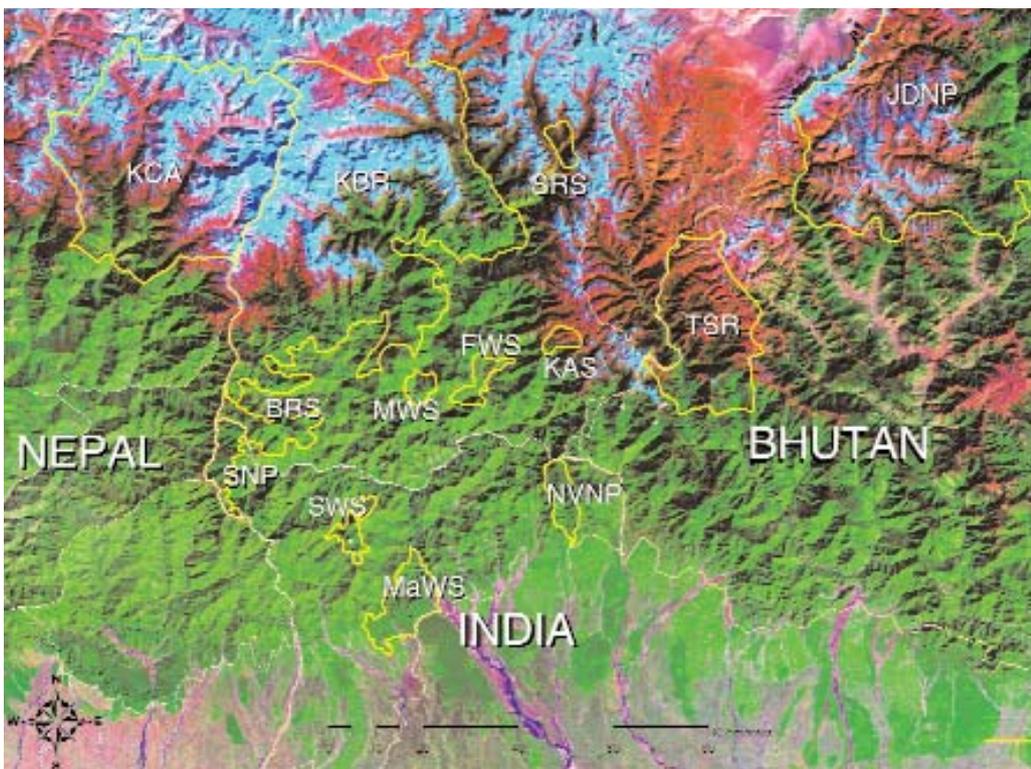
The HKH is one of ten mega biodiversity centres in the world. It is endowed with a rich variety of genetic, species and ecosystem diversities of global importance. Although designated protected areas have increased in number, many of these protected areas have not translated their conservation intentions into ground realities. In addition, protected areas are managed as isolated islands without larger landscape corridors to provide the ongoing movement of animals and genetic traits necessary for long-term survival. Communities in and around candidate complexes are subjected to intense economic, physical, and social vulnerabilities; these are key considerations during planning and implementation of biodiversity-conservation-cum-livelihood schemes. Transboundary biodiversity management will need to find means to ensure that local communities benefit and participate effectively. Regional understanding and cooperation will be necessary for effective transboundary biodiversity management.

Developing a transboundary biodiversity conservation landscape in the Kangchenjunga area

The Kangchenjunga Mountain Ecosystem is an immediate priority. There are several protected areas along the international borders between Bhutan, India, and Nepal that need to be connected by biological corridors. ICIMOD, with co-financing from the John D. and Catherine T. MacArthur Foundation, is playing a role in forming partnerships, developing community-based management plans for natural resources in and around the protected areas and corridors, and providing policy inputs to participating countries. A study based on secondary information of biodiversity components in the Kangchenjunga complex has identified critical habitats, threatened species, and gaps in data.

To help with the identification of biodiversity corridors, a GIS and remote-sensing map of the area that examines land use and land cover is being developed within ICIMOD by MENRIS.

During 2003, a national consultation was organised in India for 54 participants from Darjeeling, Kalimpong, Kurseong, Siliguri, Sikkim, and Kolkata. The participants were representing government departments, academic and research institutions, NGOs, and communities. Three main corridors were identified: (a) Singhalila National Park with Senchel Wildlife Sanctuary, (b) Senchel Wildlife Sanctuary with Mahananda Wildlife Sanctuary, and (c) Mahananda Wildlife Sanctuary with Neora Valley National Park. Attributes; such as special features of the area, landscape elements, and conservation and developmental constraints



Kangchenjunga Conservation Landscape Showing Protected Areas

KCA	- Kangchenjunga Conservation Area	SNP	- Singhalila National Park
KBR	- Kangchenjunga Biosphere Reserve	SWS	- Senchel Wildlife Sanctuary
BRS	- Barsey Rhododendron Sanctuary	MaWS	- Mahananda Wildlife Sanctuary
MWS	- Mainam Wildlife Sanctuary	NVNP	- Neora Valley National Park
FWS	- Fambong Lho Wildlife Sanctuary	TSR	- Toorsa Strict Nature Reserve
SRS	- Singhba Rhododendron Sanctuary	JDNP	- Jigme Dorjee National Park
KAS	- Kyongnosla Alpine Sanctuary		



Nakul Chettri

Kangchenjunga biodiversity and cultural landscape

and opportunities; were outlined for each of the proposed corridors. Strategies and action plans were developed for each corridor to address conservation issues and conservation-linked development activities. Feasibility assessment and research on landscape elements, socioeconomic conditions of local communities, micro-enterprise development, and capacity building for stakeholders are priorities for the future.

Field visits to Nepal, India, and Bhutan were undertaken to prepare reports on issues pertaining to corridor feasibility, land-use practices, consensus with stakeholders, and other biodiversity conservation management concerns. In addition, four studies on landscape elements and tenure; potential options for micro-enterprise development, such as NTFPs, off-season and organic vegetable cultivation, agroforestry practices, and animal husbandry; and potentials for effective conservation in Nepal were completed.



Nakul Chettri

National consultation, Darjeeling, India

Community mobilisation and capacity building in protected areas of the HKH region

In recent years, ICIMOD has been experimenting with the use of three-dimensional spatial models (3D models) of watersheds to help local communities make decisions about the management of their natural resources. At the outset, a local community joins together in a participatory process to construct a 3D model of their village and its surrounding watershed. It then uses the 3D model throughout the annual cycle to make collective decisions about local management issues.

As part of IFAD-ICIMOD collaborative work, the Norkrek Biosphere Reserve in Meghalaya, India, was selected as the location for mobilising communities and building their capacities for natural resource management in protected areas. During 2003, the village of Sasatgre, located close to the reserve, came together to construct its own 3D model for use in planning the management of its natural resources. The village established a Natural Resource Management Group that received training on participatory rural appraisal to help collect information for construction of their 3D model. Once the model was built, the community's first major use of it was in the annual allocation of jhum (shifting cultivation) plots. Households were able to ascertain exactly how much of the village area was available for jhum, as well as the size of each of the 22 jhum plots required. After allocation of the plots was completed, it was found that the area for jhum had drastically decreased from about 140 ha in earlier years to only 41.3 ha in 2003. Moreover, allocations were more contiguous and more consolidated than in previous years. The village was also able to identify areas along the stream that required protection for water catchments and areas available for grazing. The community was extremely happy with the results of the exercise, and was even able to identify and solve potential problems in the allocation of jhum plots before the cultivators had to face difficulties.

Experience of this 3D modelling activity in Meghalaya has aroused keen interest in other HKH countries, and new models are planned for 2004. 3D modelling of plots in the Chittagong Hill Tracts of Bangladesh was undertaken with IFAD-ICIMOD collaboration.



P-3D model development for natural resource management by local communities in the buffer zone of Norkrek Biosphere Reserve in Meghalaya, India