Workshop Proceedings

The workshop proceedings can be subdivided into two parts: 1) reports on the experiences of individual country projects and 2) presentations on approaches and technologies for developing a consolidated methodology for the rehabilitation of degraded lands.

Country reports reflect the varying biophysical conditions of the project sites, socioeconomic status of area residents, government policies, and team capabilities (training, manpower, and financial resources). As this workshop was held in the initial months of the project's first phase, not all participants were familiar with ICIMOD's specific objectives and approach. Country reports, therefore, may be seen more as background papers rather than project descriptions.

The approaches and technologies presented may have or may not have been attempted by the country teams. The purpose of their inclusion in the workshop was to spark interest and discussion on their usefulness and appropriateness. It should be noted that ICIMOD has provided basic guidelines to be followed for rehabilitation of the sites, but that development of a more detailed model is a process requiring all participants to reflect on the learning acquired from mistakes and successes during the project period. Refinement of the guidelines can occur only in the second workshop. In the meantime, country teams should proceed to enact the approaches outlined by the guidelines as best they can, given their abilities and access to data, manpower, and other resources.

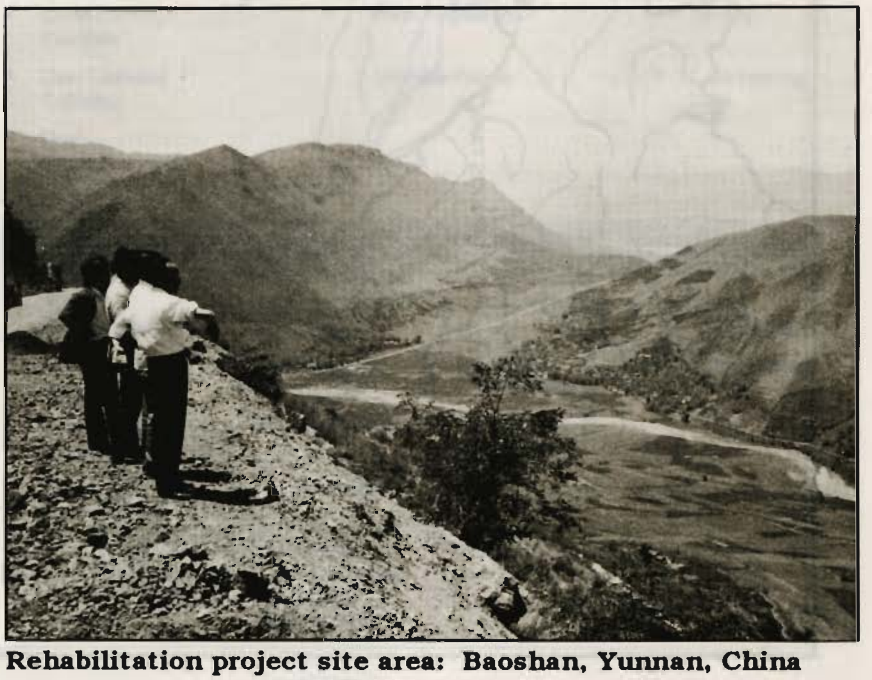
Country Reports

China

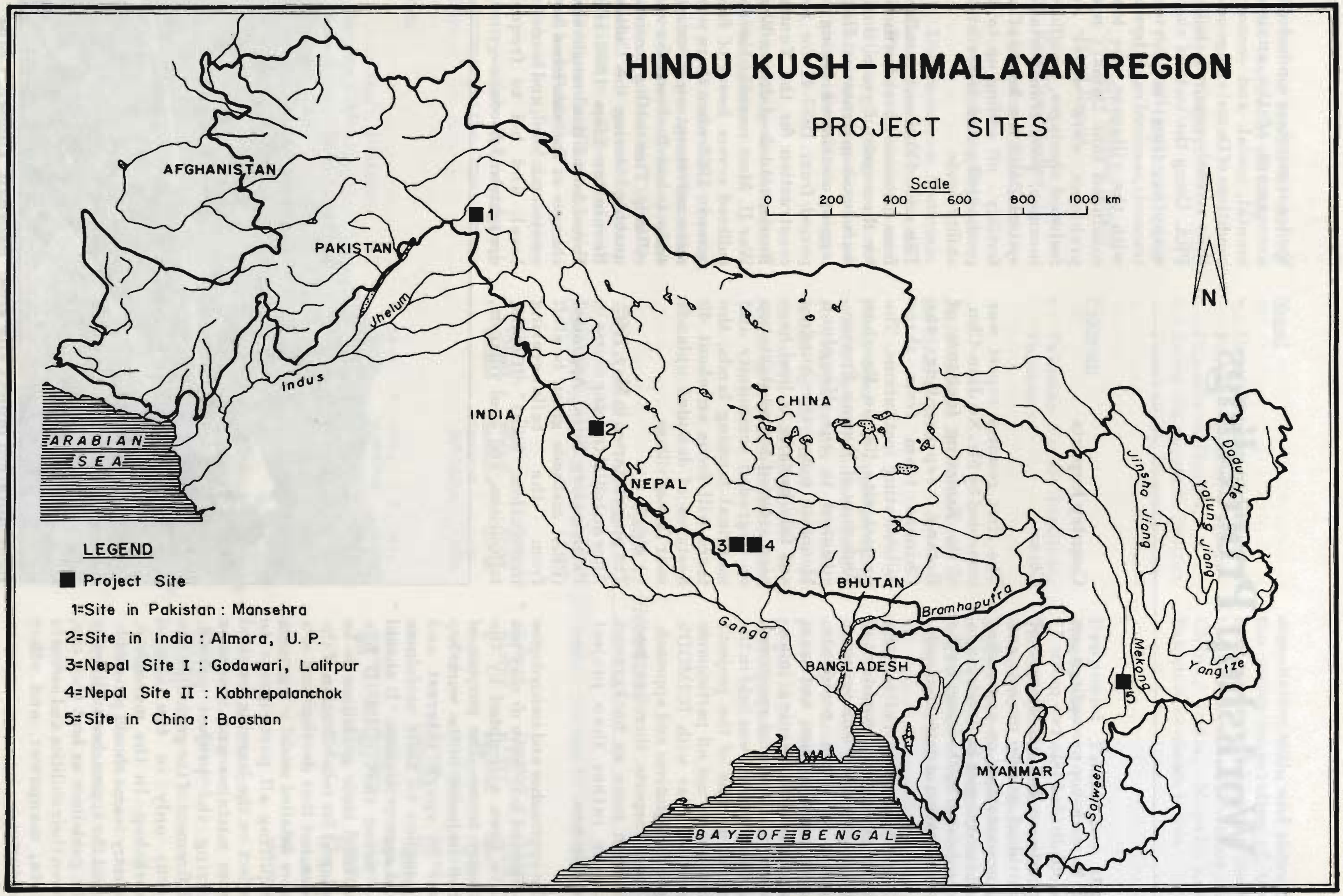
The first country report was presented by **Mr. Xu Jian-Chu**, of the **Kunming Institute of Botany**, representing the Chinese team from three collaborating institutions. The project site lies in Baoshan Prefecture of Yunnan Province, situated in the Hengduan Mountain range. One hundred and fifty hectares of land have been selected for rehabilitation on degraded community and marginal farming lands; the team will focus on about 40 hectares of denuded uplands near Damai village.

The project started in May, 1992. After an initial training course in Participatory Rural Appraisal (PRA) methods given to staff from the collaborating institution, local officials, technicians, and local villagers, the team members conducted an assessment of the environmental, social, and economic conditions of Damai village using their recently acquired skills in PRA. Using the tools of sketch mapping, time-line history, transects,seasonal calendars, etc with the villagers, the team concluded that Damai's main problems were water and fuelwood shortages, insufficient incomes, poor transportation systems, and low levels of soil fertility - all adding up to low productivity and low sustainability levels.

This area of Yunnan has suffered from sustained forest destruction for thousands of years, during wars between dynasties. Heavy logging continued during the period from 1937-41 for road construction for the Yunnan-Burma road used during World War II. Most recently, the area suffered severe losses of forest cover in 1958 when there was a mass movement on a national scale to cut fuelwood for steel refining. This cutting continued unabated during the Cultural Revolution from 1966-1976. Forest denudation brought about changes at the watershed level, ecosystemic level, and household level, and led to frequent droughts and floods.



Rehabilitation project site area: Baoshan, Yunnan, China


HINDU KUSH-HIMALAYAN REGION
PROJECT SITES
Scale
0 200 400 600 800 1000 km
N
AFGHANISTAN
PAKISTAN
Jhelum
Indus
INDIA
CHINA
NEPAL
BHUTAN
Bramhaputra
Ganga
BANGLADESH
MYANMAR
Salween
Mekong
Yangtze
Jinsha Jiang
Yalung Jiang
Dadu He
ARABIAN SEA
BAY OF BENGAL
1
2
3
4
5
LEGEND
Project Site
1=Site in Pakistan : Mansehra
2=Site in India : Almora, U. P.
3=Nepal Site I : Godawari, Lalitpur
4=Nepal Site II : Kabhrepalanchok
5=Site in China : Baoshan

Problems identified through PRA techniques were grouped under the headings of: forest denudation, land mismanagement, weak institutions, and low incomes. For each of the causes contributing to these problems, the team has come up with measures for rehabilitation. These measures include engineering controls, vegetative restoration, improved farming practices, strengthening of institutions, and provision of income-generating opportunities.

The team has constituted a committee of farmer representatives and local officials which has completed the construction of contour lines and canals, for the purpose of planting multipurpose tree species, and furrows between the contour lines for planting nitrogen-fixing shrubs and crops. Broad-leaved species will be planted in the upland area, and tree crops for income generation will be planted on the lower slopes during the next rainy season. A nursery has been established, and palm trees and forage crops planted along terraces for bank stabilisation. Soil samples have been analysed and three runoff plots set up for monitoring purposes. Farmer-to-farmer visits are planned for later this year.

A series of slides demonstrated the severe degree of overgrazing and complete lack of forest cover in some areas of the site.

India

Dr. B.P. Kothyari of the G.B. Pant Institute of Himalayan Environment and Development in Almora, Uttar Pradesh, presented the report of the work completed by his team to date. Dr. Kothyari stressed that the project had just begun in March 1993, so that he would draw on experience from similar projects of his Institute to present the report.

The selected site is located in the Kosi Valley in the Almora District in the Kumaon Himalayas, approximately one km from the village of Katarmal, at an altitude of 1,600-1,800 metres. The hilly landscape consists of both abandoned agricultural terraces as well as community lands previously used as community pasture lands until the early 1970s.

The approach of the Institute team is to first understand the causes of degradation, then restore the land to its original state through the application of a technology package developed by the Institute. As determined by the team, the reasons for land degradation in this area are: migration, land fragmentation, annual clearing of shrubs, tree cutting, fire, soil nutrient erosion, decreased water resources, reduced soil fertility, and land abandonment. This information was obtained through household survey techniques and through census data.

Table 2: Measures for Rehabilitation of Degraded Land Identification of Problems

Problems	Forest Denudation	Land Management	Weak Institutions	Low Income
	• Surface Erosion • Mud-Rock Flow • Flooding • Drought	• Crude Farming Practices • Over Fuelwood Collection • Over-Grazing	• Weak Regulations • Unstable Policies	• Poverty • Less Farming Input

Measures	Engineering Control	Vegetative Restoration	Improvement of Farming Practices	Enforcement of Institutions	Income Generation
	• Checkdam • Reservoir Rehabilitation	• Nursery Development • Communal Reforestation • Multipurpose Hedgerows • Biogas Demonstration	• Contour Cultivation • Alley Cropping • Organic Fertiliser • Crop Rotation • Soil-Water Conservation and Soil Fertility Enhancement • N-Fixing Trees/Crops	• Tenure Security • Farmer Participation • Community Participation	• Cash Crops/Trees • Home Garden

Water-harvesting technology is being used in Almora, U.P., India, at one ICIMOD rehabilitation project site

The Institute has a standard methodology through which to rehabilitate degraded lands, and it includes the following steps: mapping; determination of soil genesis; determination of site characteristics; soil and land amendment through application of manure; selection of plant species, with input from villagers; collection of hydrological data; collection of data on soil microbial components; introduction of cash crops; selection of inputs, such as manure, water, and microbes; and monitoring the improvements.

In summary, the Institute's programmes for rehabilitation are based on three components of research, development for protection measures and soil and water improvements, and education for awareness amongst local inhabitants. The team has planned for the initial five years of project activities and hopes that the work can be sustained over a ten-year period.

Nepal - Site I, ICIMOD Complex Site, Godawari

A report made on the progress at one of the two sites in Nepal, the ICIMOD Complex at Godawari, was presented by **Mr. Bal Ram Bhatta**, an ICIMOD staff member. This 30 hectare plot, just 15 km southeast of Kathmandu, was provided to ICIMOD by the Government of Nepal to develop for trials and demonstration purposes. Once well stocked with valuable tree and other plant species, the forest has been degraded to one of fewer and less useful species through continuous removal of desired trees, grazing by livestock, and fire. Hardy, agressive, 'useless' weed species now dominate the area which still has maintained organically rich soils.

The site can be physiographically divided into three distinct ecological zones, each of which is to be managed differently:

- flat land/ valley floor for intensive farming - consisting of weedy vegetation on rich soils of swamp and grasslands, this area is to be used for floriculture, horticulture, fisheries, apiary, nurseries, etc;
- intermediate gentle slope area for conservation farming/ agroforestry (SALT I, II, III and IV) - using models of SALT technologies, this area will be planted with fruits, vegetables, medicinal plants, fodder trees, shrubs and grasses, cash crops, and nitrogen-fixing hedgerows; and
- high steep slopes for forestry - this area will be intensively managed as a natural forest to encourage natural regeneration and improvement of stand quality. Harvesting and utilisation techniques will be tested here as well.

In addition, watershed management and water harvesting technologies will be applied and monitored at various points throughout the area.

On-site demonstration of fruit-tree planting at the Kavre site, Nepal

To date, the ICIMOD team has completed mapping exercises and has begun the baseline surveys on soils and biomass. A nursery has been established, and the area is being protected through a combination of measures of biofencing, social fencing, and guards. Work has begun on the preparation and planting of SALT models.

Nepal Site II - Kavre District

Prof. Suresh Raj Chalise of ICIMOD presented the report on Nepal Site II which consists of two sites in Kavre Palanchowk District, east of Kathmandu. Both sites are seriously degraded due to changes in land use that occurred in the 1960s, when malaria was brought under control and forests came under the pressure of large-scale movements of people from the uplands. Since then, indiscriminate felling of trees and open grazing by livestock has prevented the recovery of these forests, resulting in large pockets of highly degraded lands within this district of Nepal.

A key factor in the selection of these areas for rehabilitation measures was the keen interest shown by local residents to participate in such efforts. Support from the District Forest Officer and from a Mountain Resource Management project (associated with ICIMOD) in the area were also attractions for choosing these sites. After considerable deliberations were made on how to best ensure people's participation, it was decided that the most appropriate collaborating institution would be the two local Users' Groups formed to manage the forests; as is allowed and promoted by recent HMG forest legislation. The Users' Groups have already started to protect the area from grazing and illegal encroachment and will be responsible for implementation of the Project's activities.

A workshop was held to train members of the Users' Groups in PRA methods and on how to identify and prioritise the key problems which should be addressed by the project. Other training sessions have focused on the use of A-frames to establish contour lines, and on nursery establishment and management. Both groups have set up nurseries through voluntary contributions of labour. Baseline surveys, including those of socioeconomic conditions, will be carried out soon.

Villagers collect litter from community forest land for compost, Kavre Palanchowk, Nepal

Prof. Chalise emphasised the importance of keeping in mind the issue of long-term sustainability when designing and implementing rehabilitation programmes. Technical support and guidance, an improved supply of basic need items, possibilities for cash income sources, and uses of new technologies are the appropriate forms of assistance that this project can provide to the Users' Groups of Kavre Palanchowk District.

Pakistan

Due to the late arrival of Pakistani participants, the country report for Pakistan was presented by **Mr. Balaram Bhatta** of ICIMOD. Mr. Bhatta had recently returned from an initial visit to Pakistan to develop the project proposal with staff members from the collaborating institute, the Pakistan Forest Institute (PFI) in Peshawar.

The site selected for the project is at Bagar Mung, in the Mansehra District, falling in the catchment area of the Tarbela Reservoir on the Indus River. Reservoirs and dams being constructed on this river are endangered by high siltation rates from the degraded watershed areas of the Indus and Jhelum rivers.

Preliminary work on the topographical survey has already begun. A vegetation survey will also be conducted, and a soil and land use map prepared. Water flow and sediment yields will be monitored at the outlet of the catchment. Climatic data are available from a nearby meteorological station, and rain gauges will be set up within the catchment area.

Different treatments will be provided according to the slope, soil condition, current land use practices, and owners' wishes concerning lands within sub-catchment areas. Options for project activities include: terrace improvement, multi-purpose tree planting on terrace risers, sloping agricultural land technologies (SALT) with horticulture and nitrogen-fixing species, pasture improvement with grasses and fodder trees, timber tree planting. checkdam construction, fish pond construction, and apiculture.

The project team will consist of seven staff members with expertise in various technical subjects and watershed management. Buildings, laboratories, and library facilities are available in Peshawar and at Shinkiari near the project site.

Approaches and Technologies

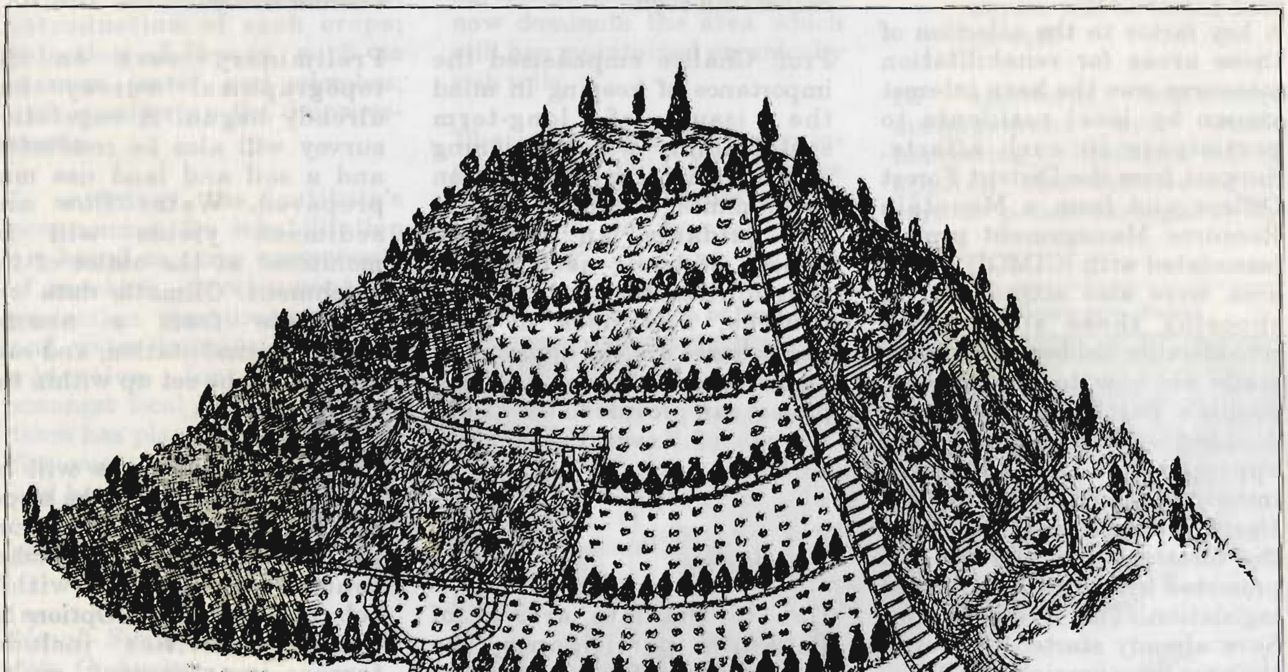
Nepal Mountain Resources' Management Project and Methodologies Adopted for Monitoring Soil and Water Erosion in the Project Area

Mr. P.B. Shah, Coordinator of this Cooperative Research Project, began his presentation with slides demonstrating the project site and its activities. The Jhikhu Khola watershed, some 40 km east of Kathmandu lies in a densely populated area where land use has been intensified through a triple cropping regime on valley land, accompanied by a high level of fertiliser and pesticide use. With sponsorship by IDRC, this research project was initiated to identify and quantify soil erosion, hydrological/sedimentation, and soil fertility processes in relation to land-use changes. Since its inception in 1988, the Project has compiled a considerable inventory and process-oriented data base for initial evaluation by setting up a climatic, hydrological, sediment, and erosion monitoring programme; conducting socio-economic surveys using Rapid Rural Appraisal techniques; and using a Geographic Information System (GIS). A multidisciplinary team was assembled to conduct the research.

Data on water flow, sedimentation, and erosion were evaluated at three levels: watershed (11,000 ha), sub-watershed (600 ha), and erosion plot (0.01 ha). A separate monitoring system was set up for each component.

Mr. Shah explained that sediment originates from the following sources: upland cultivated fields; degraded lands; stream banks; long-term storage areas, such as paddy fields; and non-agricultural structures such as roads and irrigation canals. Outward sloping terraces contribute significantly to sediment loads.

Sediment is transported through drainage networks and human manipulations, with differing rates according to the season, year, or event. Measurements of water, sediment movement, and erosion are collected at hydrometric stations throughout the basin. Erosion plots were established on sloping terraces to monitor rates of soil erosion from site-specific areas with differing slope, aspect, land use, and landform. Detailed site surveys were carried out at 10 cm contour intervals for soil analysis, cropping sequences, fertiliser application, and response, etc.



Trial Plots

Water Storage and Harvesting Technology for Rural Development in the Indian Himalayas

Dr. B.P. Kothyari of the G.B. Pant Institute of Himalayan Environment and Development shared the experiences of his Institute with water storage and harvesting methods through a slide and talk presentation. Emphasising that technologies must be simple, cost-effective, productive, and acceptable to local residents, he pointed out that sloping areas limit the potential for water harvesting. Water can be stored for limited domestic use - not for irrigation purposes.

By constructing tanks with sloped walls appropriate to hill conditions, water for use in nurseries, tree plantations, and vegetable gardens on degraded lands can be provided, even during the dry season. The simple addition of water can raise the productivity levels of vegetables and fodder trees and grasses significantly. Dr. Kothyari presented a series of diagrams detailing the construction of such water harvesting tanks and the sedimentation tanks which are built alongside them.

A new technology for nurseries has also been used and promoted by the Institute, employing seedling trays instead of the commonly used plastic bags. This technology was found to reduce the amount of soil required and to cut transportation costs. Post-transplantation survival rates were also found to be higher with seedlings from the seedling trays.

Biological Technology for Rehabilitation of Degraded Mountain Lands Caused by Soil Erosion and Debris Flow in Yunnan, China

Prof. Qiu Xue-Zhong of the Kunming Institute of Ecology presented many slides of the project site in Nanjian County, Dali Bai Prefecture, of northwest Yunnan, showing how biological control methods have been incorporated into traditional engineering approaches to control debris flows.

The slides showed the extreme degradation of the area and the damage caused by the mud and rock flows. Since 1990, a team of experts has been attempting to contain several deep gullies through various alterations of checkdams built with local materials of bamboo, stones, and vegetation to halt their spread. Trial plots of introduced species of *Eucalyptus, Cassia siamea, Cajanus cajan, Acacia mearnsii*, shrubs, and grasses have been established along the contour lines; bamboo is planted in the gully bottom. Sedimentation tanks have been constructed every 100 sq.m. in the trial plots.

Group Discussion

Social Aspects of Rural Resources' Management

Hand-in-hand with biological and engineering techniques to regenerate degraded lands is the need for social methods to understand and address the conditions and concerns of local residents. **Ms. Jeannette Gurung** presented some of the methods used to gain the participation of local villagers in planning, implementation, and monitoring of project activities.

Most degraded lands belong to the category of common property resources (CPRs). These lands have lost their productivity because of growth in population and consumption rates, exploitation by persons from outside the community, and breakdowns in the management controls traditionally enforced through consensual regulations, traditional leaders, cultural taboos, and so on. As the resource is continually subjected to these and other pressures over time, the CPR is degraded, the indigenous practices and controls over its use are abandoned and forgotten, the communities themselves cease their conservation-oriented practices, and the cycle spirals downwards.

It is only through the will and actions of community members themselves that these lands can be made productive again. Therefore, their participation in projects right from the beginning is imperative for successful results. This has been proven after a history of failures in such projects around the globe has shown how mere technical measures applied to land rehabilitation have neither been effective nor sustainable.

It is important for project staff to identify the appropriate actors to involve in project decisions. They must determine who is in control of the land, who makes decisions related to its use on a daily and long-term basis, and who depends on its products. Often it is the poorest of the community who are most dependent on CPR resources; women in this region are often the users and decision makers. These groups should be brought fully into the process, as should leaders of local organisations, community leaders, and those who possess knowledge related to the traditional ways of managing the land.

The staff of rehabilitation projects can use various methods to understand the community's resources and structures, and to establish rapport with them. PRA provides a set of tools for and guidelines on how to communicate with rural people. The process of identification and development of users' groups has been described by the Nepal Australia Community Forestry Project in its publications. Participatory Assessment methods provide for maximum participation by community members in assessment of their own problems, identification of solutions, and monitoring of results. A review of indigenous knowledge related to resource management is a method through which one can learn about the knowledge base on which to build with new technologies. This can best be conducted with the assistance of 'key informants' from different groups of users. Farmers can then be introduced to a 'menu' of new technologies from which they can select those with which to experiment. Income-generating activities can be introduced to provide immediate incentives to participants and to assist the poorer users. Mushrooms, honey, fruits, nuts, mulberry leaves, resin, medicines, fibres, and craft items, have been harvested from CPR land throughout the HKH Region to bring in significant cash resources to mountain communities.

Prerequisite to this people-oriented approach, however, is the reorientation of project staff to be responsive to the needs of local people. Skills in communication are required, as well as a degree of respect for the knowledge and lifestyles of rural people. Community participation does not mean "getting those people to do what we want."

Action Research for Community Forestry

One social method for involving people in the rehabilitation process was described by **Mr. Bill Jackson** of the Nepal-Australia Community Forestry Project (NACFP). Action Research has been adopted by this forestry project in Nepal as a learning process approach for translating concepts and plans into action for rural development.

Action Research is a participative method involving local people and requiring deliberate and conscious reflection on project experiences so as to learn from errors and make changes in plans accordingly. It is a holistic approach to a problem, allowing for the variation and complexity that characterise social systems and for the incorporation of local people's perspectives that may otherwise go unheeded.

The NACFP began in 1978 with a conventional approach to establishing plantations , then shifted in the 1980s to a participatory development-from-below approach by focusing its efforts on bringing villagers into the planning and implementation process. After observation and reflection, another shift occurred with the realisation that the objective of improving community forest management by local users was still not being met. As the staff experimented and looked for factors limiting their success, they recognised several other aspects that required attention, and developed plans and models accordingly.

Mr. Jackson concluded that, because action research can embrace both the hard sciences and soft sciences, it is a valuable approach to problems related to human - natural environment interactions.

Sloping Agricultural Land Technology (SALT)

Sloping Agricultural Land Technology (SALT), a soil conservation-oriented farming system developed in the Philippines, was described by **Mr. Bal Ram Bhatta**, as one technique to rehabilitate degraded lands. SALT is an agroforestry technology to diversify farming on hilly lands and increase biomass production through simple, low-cost practices. It aims to reduce soil erosion and build up soil fertility levels through propagation of nitrogen-fixing tree, shrub, and grass species and slope stabilisation measures. Different models of SALT have been developed to meet the priority needs of specific sites for crops (SALT I), livestock and fodder (SALT II), forestry (SALT III), and multipurposes (SALT IV).

ICIMOD introduced SALT in Ningnang County, Sichuan Province, China, as an experimental pilot project which began in 1991. The project area, covering 7.8 ha of degraded land, has been planted with nitrogen-fixing trees on the contours as hedgerows and cash crop species in between the contours. This technology has now spread to farmers outside the project area.

Mr. Bhatta emphasised that SALT is not intended to replace the terrace system, such as that predominant in much of the HKH Region; rather it is a system to improve the productivity of lands above those terrace lands where terraces cannot be constructed and maintained.

Permaculture Techniques

Mr. Raju Shrestha of INSAN, Nepal, gave a slide presentation on the principles and techniques of permaculture as an approach to a return to sustainable agriculture suitable for degraded lands in the HKH Region. INSAN has developed three demonstration farms for permaculture to serve as research and demonstration sites and to provide seeds and advice to local farmers. It carries out training on permaculture design on a regular basis.

Questions/Discussion from Workshop Participants

Questions from the participants following the presentations on technologies and approaches were on the comparison of erosion levels between terrace farming and SALT systems; the selection of proper species for the hedgerows of SALT models; the costs of constructing water harvesting tanks; the type and effectiveness of fencing used by the NACFP; and the wisdom of the new technology for seedling propagation which may not provide sufficient good soil to justify the plantation of seedlings on difficult sites; the production of fodder plants from the confined land areas of the project sites in terms of a larger number of livestock; and the costs of landslide control technologies, as well as the costs of biogas technology.

A request was made for suggestions from the Chinese participants on practices which could be used in other country projects. Suggestions were as follows:

Workshop group discussion

- select deep-rooted, drought-resistant species which are fast-growing; indigenous species and are preferred due to their resistance to harsh conditions;
- experiment first with selected species in the first year before wide-scale promotion and use local well-adapted species for cash-generating plantation.
- transport fertile soil or compost into the planting holes before planting, use large-sized seedlings for planting; investigate seed-germination rates before sowing if direct planting of seeds is carried out in the field;
- place fertile soil in the contour lines and plant indigenous grasses there, building ground cover with grasses and shrubs in the first year of the exercise as a key to the control of soil erosion; and
- use improved biogas technology which is available in China - a one-family biogas facility costs only two hundred US Dollars for construction.

Field Trip

The second day of the workshop was spent visiting field sites in Kavre Palanchowk and Godawari. The District Forest Officer of the Kavre Palanchowk District, **Mr. Poudyal**, gave the participants an introduction to the Community Forestry Programme in Kavre - its history, guiding principles, goals, and activities. He stressed that the forest user group management plan is the starting point for work; this plan is developed through participatory methods with the community members and the DFO staff. Kavre District now has 77 such plans for management of 1,300 ha by user groups. Nurseries are also managed by users to meet the requirements for plantation and private land plantings (for which seedlings are sold to farmers for one rupee each). The programme goals for 1992-93 were to increase income- generating opportunities and to support small farmers.

Following the briefing, participants journeyed to one of the ICIMOD project sites in Kavre, stopping along the way to view a sacred forest protected entirely by local residents. Prof. Chalise briefed the participants on the rationale behind selection of the site as well as on the on-going collaboration with the Forest Users' Group in implementing the project. The soil erosion testing station of the Mountain Resource Management Project was observed as well. From there, the group travelled to Godawari to view ICIMOD activities on the site of the ICIMOD complex. **Prof. Lu Rongsen** gave a presentation, summarising activities to date and those planned for the future development of the site. Participants demonstrated an interest in a number of introduced and local species planted on two types of agroforestry plots. Some participants suggested that the Godavari site is not regarded as "degraded land" but "degraded forest" and that emphasis must be placed on biomass production and cash-generating production for demonstration purposes.

Workshop participants visiting the ICIMOD field site at Godavari

Working Group Presentations

After two days of plenary sessions and a one-day field trip, working group discussions were organised on the following two days. Three working groups were engaged in methodological discussions with the purpose of consolidating methods and measurements for project implementation and monitoring. Reports from each working group were presented at the workshop. These reports are outlined on the following pages.

Bamboo Checkdam

Working Group I: Method of Baseline Studies and Methodologies of Monitoring

This group recommended that the following data be collected for baseline surveys and monitoring.

☐ Mapping of the Project Area

- Location Map1:10,000 (for all project sites)
- Contour Map(Topographic Base Map) 1:1,000 contour intervals - optional depending on the availability of expertise and original maps
- Site Plan Map 1:500 specific map if any 1:200 (special purpose optional) for comparison

☐ Soil and Water Status

- Soil

a) *Physical Characteristics*

i) Soil texture
ii) Soil type (colour, description of horizon, classification)
iii) Soil depth
iv) Bulk density
v) Infiltration, water holding capacity or field capacity
vi) Soil moisture

b) *Chemical Characteristics*

		Optional
i)	Soil pH	
ii)	Organic Carbon%	
iii)	Total N	
iv)	Total Phosphorous	P_2O_5 total or available
v)	Potassium	K_2O
		Micro/trace elements

Soil analysis from three depths
(i) 0-10cm; (ii) 11-20cm; (iii) 21-30cm

At least 10 samples from each site according to standard methodology

c) *Biological (Microbial)*

		Optional
i)	Fungal	Population of dominant species, and changes over the project period
ii)	Bacterial	
iii)	Actinomycites/symbionant	

Sampling of the soil from 0-10cm

d) *Earthworm Population*

i)	Population count	20 x 20 x 10cm quadrant
ii)	Costs	5 replicates

- ☐ **Water**

- Availability of water in any form: (spring, river, etc)
  i) Within the study area
  ii) Near the study area

Quality

Record water discharge rate - regularly (high and low flows)
Qualitative test - toxicity

- Storage Management (water harvesting and storage technology)

- ☐ **Inventory of Existing Bio-species and Biomass Production**

- Inventory

a) *Flora - ground cover and trees*

i) Density
ii) Frequency — For grasses - 1 x 1m
iii) Abundance
iv) A/F ratio — Random sampling, quadrant
v) Relative density
vi) Relative frequency — Trees - 50 x 50 m
vii) Concentration of dominance

b) Fauna - dominant species, base line information
c) *Ethno-botanical information*: use all available relevant data and information, history

- Biomass Production

a) *Ground flora* - Sampling size will be similar to (a)
b) *Trees and shrubs* inventory of flora

Biomass production should be from the following resources:

i) leaves
ii) stem (branches and fuelwood)
iii) wood (timber)
iv) underground (root, tuber)

- ☐ **Hydro-meteorological data collection**

- Data source may be
  i) National agencies
  ii) Recording station at the site or in close vicinity (that area)

  Parameters; follow national standards
  - Temperature
  - Precipitation
  - Humidity
  - Disasterous events
    - high intensity rainfall and disasters induced
    - hailstorms
    - snow
    - high winds

These events may be measured by approximation according to local farmers of the affected area. Note past history of above events.

Rain collectors to record rainfall patterns and pH variation (acid rain)

Optional Recording/Equipment
- Automatic recording station
- Radiation, sunshine hours
- Wind speed
- Soil temperature

Hydrology

A. Monitoring and Data Collection
   - Streamflow - measurement at regular intervals
   - Sediment output - sediment traps
   - Soil erosion plots - not less than $10m^2$

Optional

- Sediment traps in gullies
- Bedload traps
- Water analysis (rainwater)
- Tipping bucket

Recording should be done by a technician from that area.

□ **Socioeconomic Data of the Site Village**

- Dependency of the villagers/users on the project site or nearby area for:
   - fodder (grass)
   - fuelwood
   - timber
   - leaf litter
   - minor forest products (sal leaves, mushrooms, etc)

- Human population
   - Livestock population/composition
   - For this, secondary information/data should be used

□ **Indigenous Management of Natural Resources**

- Religion
- Culture
- Ethics

-Rules and regulations of local institutions and their effects
-Indigenous technology regarding management of the resources and their effects

□ **Video Film Record**

- A complete sequence should be recorded from project initiation to project termination
- Photos should be used to record changes
- The film should be self explanatory
- The film should record main activities
- Final editing will be completed by ICIMOD

Discussion: Several participants questioned the need for detailed surveys as proposed by this working group. It was suggested that items should be prioritised, and others listed as optional, given the available time and resources. The need for simple technologies was brought up, so as to identify replicable approaches, but the role of research was also appreciated. As a compromise, it was suggested that activities/parameters be listed as either required or optional, given the requisite resources. The costs of such research must also be kept in mind.

Group II: Socioeconomic Aspects of Rural Resources' Management

The second group presented an overall rationale and strategy for measurement of socioeconomic factors, then gave a list of some possible variables and indicators by which to measure them.

A. Why discuss social aspects?
B. What are the social variables to measure?
C. What are the indicators for monitoring?
D. What strategies should we use for collection and use of social data?

A. Collection of socioeconomic data for three purposes

- To provide the project team with an understanding of the community
- To provide baseline data for monitoring and evaluation
- To provide opportunities for maximum interaction with the community in order to gain their participation

B. Variables	C. Indicators
• Number and composition of households	• Members of the household contributing income or labour, or consuming household resources, and their sex and age
• Ethnic affiliation and homogeneity	• Members belonging to which ethnic groups or castes; religion, language, cultural facts of ethnic group
• Education/literacy levels	• Education levels, ability to read and write
• Landholdings	• Size of privately-managed holdings and spatial arrangement
• Tenure system for private and common lands	• Government-regulated and informal system of land ownership and use
• Water resources	• Water availability
• Food self-sufficiency levels	• Food levels are in excess, sufficient, shortage, or chronic shortage
• Income sources and levels	• Sale of products and handicrafts from forests; wealth ranking by observable characteristics, i.e., type of roofs and windows, radios, etc.
• In and out-migration	• Number of members engaged in temporary and permanent in- and out-migration and time spent outside community; remittances sent home
• Labour availability	• Seasonal calendar and labour demands; length of time required to collect load of fodder/fuelwood now versus before the Project
• Off-farm opportunities	• Off-farm activites engaged in by community members and income received
• Marketing system	• Nearness of markets; what is purchased and sold there by whom? exploitation by middle men
• Transportation and communication accessibility	• Roads, communication resources
• Energy sources	• List of energy sources and amounts consumed
• Use of forest resources	• Headloads of fodder/fuelwood comsumed; percentage collected from private versus common lands
• Pressure from outside on forest resources (nomads, markets, refugees)	• Cases of conflicts
• Livestock numbers and types	• Number and type of fodder-consuming animals per household; nutritional status of livestock; milk production; changes in feeding and grazing practices over time; change in percentage of feed harvested from private versus common lands over time

B. Variables	C. Indicators
• Local organisations/institutions	• Presence of local organisations and their ability to enforce sanctions, or change them as required
• Local leaders or authorities	• Reliance on outside sources, i.e., police, for conflict resolution
• Government or non-government offices providing extension services to community	• Project/staff, extensionist working in project area and services provided
• Political pressure	• Signs of political activism
• Participation by actual users	• Attendance at group meetings of members of subgroups, i.e., women, poor, landless; their roles in decision-making during planning and implementation; how many households receive benefits?
• Equity in decision-making and distribution of benefits amongst users of degraded land	• Who gets what and how much at harvest time? Are different subgroups of the community satisfied with their share?
• Cultural and religious factors	• Cultural taboos, values that affect behavior related to conservation and use of natural resources
• Attitudes of local people regarding project activities	• Interest in forest conservation; availability of other sources of forest products; evidence of adoption of technologies on private lands by farmers' own initiative; people's perceptions of change over time; has life become easier or more difficult?

D. Strategy

- Assemble Project Team from different disciplines
- Train team in PRA methods, communication techniques, participatory approaches for:

<u>collection of baseline data using:</u>
- PRA techniques
- secondary data sources
- observation
- informal interviews
- identification of and meetings with user groups (subgroup meetings sometimes required)
- identification of and interviews with key informants
- random sampling method to cross check data and gain more specific, quantifiable data
- understanding of indigenous knowledge

<u>gaining people's participation through:</u>
- PRA, identification of problems and solutions with community members
- planning for activities with them
- building on indigenous knowledge
- providing immediate benefits to them, even if not directly linked to project objectives
- providing continual training opportunities, both on-site and with cross-farm visits
- proceeding slowly with simple technologies
- flexibility

Discussion: Again, participants raised concerns about the time and financial resources needed to undertake such thorough assessments. However, one participant noted that, with the inclusion of local people on the team, and the use of PRA methods, the collection of such data would not be as lengthy as it appeared to be. It was added that time with villagers was also necessary to build trust and rapport and could be used for data collection as well.

Group III: Technologies for Land Rehabilitation of Degraded Mountain Ecosystems

Group III outlined the information needed for baseline surveys and presented considerations in the choice of technologies to be promoted. Some suggested technologies, both biological and engineering, were also described.

- **Baseline survey**

  - **Soil**
    - Texture; sand, silt, and clay
    - Structure
    - Organic matter
    - Micro-/Macro-Organisms
    - Colour (to determine predominant elements)
    - Depth
  - **Water**
    - Precipitation
    - Groundwater
    - Natural springs
  - **Slope Degree**
  - **Aspect**
  - **Altitude**
  - **Vegetation**
    - On site
    - In surrounding area
  - **History Of Land Use**
  - **Pressure On Site At Present**
    - Grazing
    - Mining
    - Collection of biomass
    - Lack of alternative sources
  - **Land Tenure**
  - **Local Institutions**
    - Level of participation
    - Interest in management

- **Considerations For**

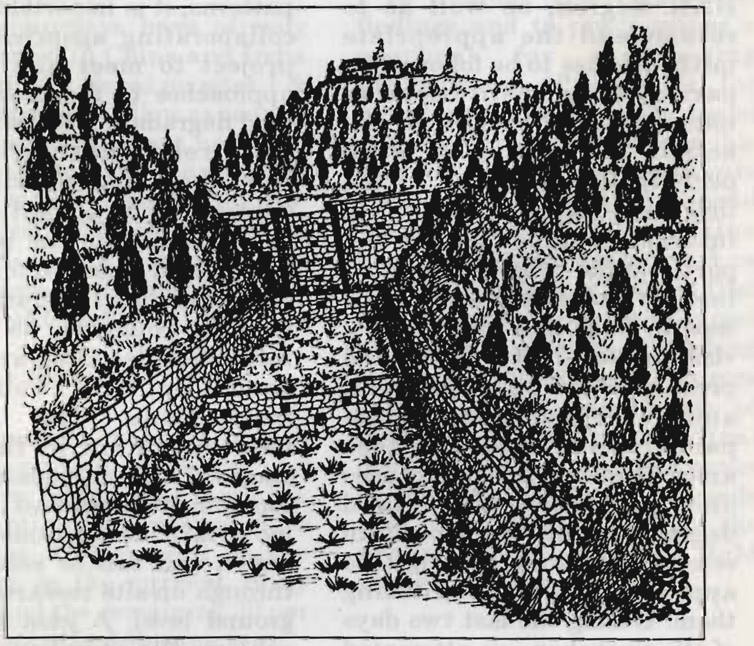
  - A. **Biological Technologies**
    - Agroforestry
    - SALT
    - Agriculture
      - intercropping
      - mixed cropping
      - crop rotation
      - earthwork
      - mulching
      - planting pattern
    - Mixed species' afforestation
    - Division of landscape demands

Table 1: Technologies

Biological	Engineering
Sustainable	Small-scale
Locally acceptable	Simple
Species	Transferable
• Multipurpose	
• Deep-rooted	Use of locally available materials
• Diversified	
• Fast growing	Must be integrated with biological techniques
• Specific to successional stage	
• Local	Low costs
• Nitrogen-fixing	
• Good quality seeds, saplings, cuttings	
• Compostable	
Composite Technique Implementation	

- B. Engineering Technologies
  - Checkdams
    - Bamboo - stone - wire
    - Stone-masonry
  - Diversion channels
  - Drop structure
  - Trenches
  - Water Harvesting
    - catchment ponds
    - recharge groundwater

Discussion: One participant from Nepal noted that, in the Community Forestry Project, technologies were limited to simple ones, since by law they must be implemented by the local user groups. Again, the suggestion was made to prioritise lists of activities for research, limiting them to those necessary. A different view was expressed by those who believed that "rehabilitation" of land required a rigorous research approach. The baseline survey listed in this group presentation can be seen as supplementory suggestions to the Group I presentation.



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