

## Workshop Discussions

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The discussions of the Workshop centred around three main themes :

- Pressures on Watersheds
- Management of Watersheds
- Policy and Planning Framework

To set the pace of the Workshop, as well as to emphasise the need for progressive and cumulative discussions, the Workshop commenced with the presentation of special reports of the recommendations of two recent international meetings:

- *Integrated Watershed Management in the Asian Region*, East-West Center, Honolulu. January 1985 ( presented by Dr. Christopher Gibbs )
- *Expert Consultation on Watershed Management*, FAO, Kathmandu, February 1985 ( presented by Mr. L. S. Botero )

The first focused on policy and institutional issues ; the second concentrated on strategies, approaches, and systems for integrated watershed management.

The key Workshop papers contributing to the development of themes and issues for the Hindu Kush - Himalaya were review papers on Bangladesh, Bhutan, China, India, and Pakistan. The Hindu Kush - Himalaya Region is vast, with great variation in altitude, latitude, climate, ethnic composition, socioeconomic conditions, and political systems. Field conditions are characterised by diversity both at the macroscale and the microscale.

While these variations were reflected in the papers, discussions, and ideas generated at the Workshop, it was also noted that the Region has many common attributes, such as inhabitation predominantly by subsistence farmers, inaccessibility due to poor infrastructure facilities, and widely scattered settlements. Other features of this mountainous region include high altitude peaks, deep valleys, difficult access, high rates of soil erosion and mass wastage under high rainfall conditions, high wind velocity and wind erosion on semi - arid plateaus, overgrazing, shortage of fuelwood, and severe environmental difficulties.

## **Theme One : PRESSURES ON WATERSHEDS**

### **Natural Forces**

The Hindu Kush - Himalaya is one of the youngest mountain systems in the world, thus subject to high rates of natural erosion. Rivers originating in the Region carry much more silt than those originating elsewhere. Furthermore, natural prevailing conditions contribute to serious erosion and watershed instability. The concentration of heavy rainfall for short durations, long steep slopes, long dry seasons, and intermittent periods of high speed winds are notable natural factors which contribute to the erosion and mass wasting. While monsoon rains affect a large portion of the Hindu Kush - Himalaya, high velocity erosive winds are most common in the northwestern part of the Himalaya.

The view was expressed that the sediment generated and delivered by the natural processes is so immense that the intervention of humans may have negligible impact on erosion and sedimentation rates. This view was forcefully countered by others who felt that because human beings and livestock are concentrated in narrow belts of 500 to 2,000 m elevation, the impact of their intervention is highly significant.

It is, however, recognised that not all types of mass wastage mean loss of land resources. Many of the cultivated sloping fields are colluvial deposits and alluvial fans. The process of land resource loss and creation by natural forces has been and continues to be very dynamic. Many types of geomorphological changes are going on in these mountains, about which our understanding is limited.

### **Demographic Pressures**

It is generally believed that population pressure on the fragile and vulnerable mountain resources is causing serious degradation of the mountain areas. Forest and grass cover has to a great extent protected the mountains from their natural susceptibility to erosion. Humans, in their search for arable land, fodder, firewood, timber, and minerals have removed that protective cover. High population densities of 1,432 persons per square kilometre of cultivated land in the Indian Himalaya, and 403 to 1,723 in watersheds of Pakistan and elsewhere, are reported. Even in situations where population pressures are not generally high (e.g. Bhutan) local hot spots occur where humans cause severe deterioration of the watersheds.

Due to agro-ecological as well as socioeconomic variations, the nature of human interventions is also variable (e.g. shifting cultivation in northeast India; greater emphasis on grazing and animal husbandry in the drier semi - arid Pakistan Himalaya and Tibet; large - scale settled agriculture in the middle hills of Nepal, Sikkim, Uttar Pradesh, and Himachal Pradesh in India; and grazing and transhumance practices in the alpine and the sub - alpine zones of the Nepal and Indian Himalaya).

Questions arose as to the ways and means to manage the human population. Some spontaneous and unplanned migration does take place (often of males). Though this is not a significant phenomenon in total numbers except in Nepal, it is highly significant with respect to socioeconomic impact. The possibility of a large transfer of excess population to areas of productive land and economic opportunity is remote, due to unavailability of surplus arable land. Therefore, efforts have to be concentrated on increasing the productivity of available resources through efficient and ecologically sound management, and creating off-farm employment opportunities while simultaneously promoting family planning measures to reduce population growth rates.

### **Livestock Pressures**

Livestock population is another key factor leading to deterioration of watersheds in the Hindu Kush - Himalaya Region. The livestock population increases steadily, keeping pace with human population growth. Nepal is reported to have the highest livestock density per unit area of cultivated land in the world. The continued increase in livestock population results in intensive and extensive overgrazing of pastures, degradation of forests, complete removal of vegetative cover, and compacting of the soil.

Well-established grazing systems are practised by sedentary agriculturalists and nomadic pastoralists. The increase in cultivating marginal lands and grazing in forests and pasture lands disturbs conventional grazing rights and transhumance practices. The voluntary sharing of, and restrictions/controls on, grazing developed by local people are being disturbed, leading to conflicts of interest as well as deterioration of watersheds. One of the current key issues of watershed management in Bhutan, China, India, Nepal, and Pakistan is unregulated and unrestricted grazing practices. The problem of fodder deficit, particularly in the winter months, is common throughout the Region.

### **Development Pressures**

Construction of roads, building of dams and reservoirs, power generation, mining, logging operations, and the establishment of industries, have created influences leading to severe degradation of watersheds. Along with bringing about direct and indirect increases in demands on natural resources, these activities are frequently carried out with political and economic imperatives overriding technical and environmental considerations.

Urbanisation and tourism also contribute adverse pressures on the environment. Establishment of an equilibrium between the positive and negative pressures exerted by the processes of development in the resource - constrained mountain economies has proved to be an elusive exercise.

## **Techniques and Management Practices**

Mountain people have responded to the challenges over the centuries, in ecosystems varying from dry cold desert to temperate alpine zone and sub-tropical/temperate valley. They have practised agriculture, agroforestry, and animal husbandry, and managed forests, soil, water and other resources. Considering the excellent land terraces, unique methods of developing and maintaining irrigation channels in the hills, appropriate cropping patterns and crop varieties, and selection of trees for agroforestry practices, for example, one can but wonder at the wisdom and intelligence of these farmers.

Yet, several signs of improper resource management are also seen : maintenance of unproductive livestock and inadequate animal feed, construction of outward sloping terraces, excessive lopping of trees for fodder, wastage in the use of firewood, setting fires to pasture and forest grazing lands, and increase in frequency of shifting cultivation, for example. The causes of such actions are not limited to technical parameters, but relate to broader socioeconomic and political issues, which may involve land tenure systems, property rights, pricing structures, credit policies, export - import policies, and overall development strategies.

Some conflicts in developmental activities were also pointed out. For example, fruit tree planting in the hills is considered proper conservation - oriented development. However, it depends heavily on forests for packing materials, which leads to deforestation. Research to find alternative cheap packing materials was emphasised as a solution, rather than discouraging horticulture development in the hills.

It was also pointed out that the study of glacial lake outbursts is necessary in planning for hydropower and irrigation schemes in the Hindu Kush - Himalaya, in order to take into account sedimentation, water flow, and possible catastrophes.

## **Socioeconomic Pressures**

All mountain watersheds, but particularly those of the densely populated Hindu Kush - Himalaya, have inherent biophysical and socioeconomic constraints which impinge on the pace, quality, and level of development. Some of the major constraints include : isolation, inaccessibility, widely scattered settlements, poor infrastructure facilities, and lack of monetisation.

These constraints and the absence of alternative income and employment opportunities compel the growing population to continue working in and depending on the agricultural sector. The agricultural sector itself is subject to constraints such as limited arable land with highly fragmented holdings, extension of cultivation to less productive marginal and steeply sloping land, decline in the use of organic manure, virtually no application of chemical fertilisers or other improved agricultural inputs, and lack of markets and marketing facilities. Highly unequal land holdings and insecurity of tenancy

seriously hamper the conservation activities. Poor or landless households have to rely on the forests and public lands for livestock rearing, and they are inclined to use them indiscriminately. Any restrictions upon such access to forests and public lands will immediately affect their livelihood ; legal sanctions will not solve the problems of conservation without an assault on poverty itself.

## **Theme Two : MANAGEMENT OF WATERSHEDS**

The previous section dealt with various pressures on watershed resources and the consequent degradation of watershed conditions. It has clearly emerged from the discussions that with increasing population, the pressures on natural resources, such as land, forest, and pasture, will continue to grow. The **sustainable productivity** of the natural resource base, and as a result that of hill agriculture itself, is seriously threatened. The Region is trapped in a vicious cycle of declining resource productivities, reduced economic growth, low investments, and great pressure on limited resources, leading to deteriorating environment and further decline in resource productivities. The resulting poverty and low level of development are accentuated and reinforced by many factors. Similarly, while physical features and rugged terrain pose serious constraints to infrastructure development, many diverse and small agro-ecological zones prevent wide applicability of improved agricultural technologies.

In this context, it is evident that management of watersheds has to be undertaken with the main objective of reducing poverty within the watersheds; welfare of the watershed inhabitants should be the most important concern in any watershed management programme.

At present, many watershed programmes are narrowly focused on improving the physical conditions of the watershed itself, seldom taking account of **upstream - downstream interactions**, or agricultural and non - agricultural linkages. They also tend to have a pronounced sectoral focus, rather than a comprehensive view of the total farming system.

The discussions on watershed management issues are presented in four broad areas :

- Natural Resource Management
- Infrastructure Development and Mining
- Natural Watershed Hazards
- Institutional Innovation and Organisational Changes

### **Natural Resource Management**

The main objective of resource management is to bring enhanced resource productivity on a sustainable basis. The management must effectively deal with the complex interactions manifested in the existing use of land, forest,

and pasture. The food - fodder - manure - fuel linkages in the hills constitute an important area of focus. Land use involves trade - offs within food, fodder, and energy production. Watershed problems also arise from simultaneous overuse and under - utilisation of resources. For instance, overuse of forest resources results in deforestation, erosion, and landslides ; whereas, over - mature forests have increased forest fire hazards and water quality problems.

Erosion, loss of topsoil, landslides and nutrient leaching, over the years, have reduced soil productivity and consequently food production in the hills. Due to physical and human pressures on natural resources, hill agriculture is in a state of transition. There is a need to understand these changes and to assess potentials for further increases in agricultural production.

**Land Use.** Extreme views were expressed regarding the changes in agricultural land use. Some maintain that cultivated area in the hills has increased rapidly by bringing **marginal and sloped land** under cultivation. Others have pointed out that such changes have been limited to particular areas. At present, lack of reliable land use data makes it difficult to draw definite conclusions, although the general perception was that more land has been brought under cultivation. A sound data base on land use is essential to formulate effective **land-use policies** for watershed management.

Given the limitations on the expansion of potentially productive land, agricultural development will have to be more intensive than extensive. In this context, improvement of **land-use efficiency** often requires effective implementation of land reform, so that inequity of land distribution can be remedied and tenancy rights secured. This is likely to induce farmers to improve their management of land resources. It has been indicated that soil and water conservation measures, particularly in conjunction with irrigation, can result in more intensive cultivation of land since the farmer's risks using costly modern inputs such as fertiliser, pesticides, and improved seeds are considerably reduced. Such a process can lead to expansion of food production and crop residues ; the latter can augment fodder supplies and considerably reduce livestock pressure on forest and pasture. Similarly farm biomass can substitute for fuelwood from the forest. Such complementarities between agriculture and water resources are to be fully exploited.

Land - use capability assessment, and classification of land according to watershed hazards, provide the basis for management of land to improve economic conditions as well as ecological stability. Curative measures are needed, especially for those watersheds regarded as **critical hot spots**. Preventive land and soil conservation measures can be applied more or less uniformly over the rest of the watershed. Hot spots, such as marginal lands and sloped terraces, which are prone to soil erosion and landslides, may need to be removed from crop cultivation and brought under tree cover through horticulture, agroforestry and afforestation schemes. Land use diversification away from cereal crops has to be made possible through the provision of physical infrastructure, improved technology, marketing, and credit services.

**Forest and Pasture.** Shortage of fodder is a key problem in hill areas, followed closely by scarcity of fuelwood. Simple closure and fencing of forests as measures of management may not address these problems and may even be counterproductive. One proposed remedy is to replace cattle by buffalo to reduce the grazing problem. This, however, frequently entails overcoming social constraints and may require introduction and adoption of forage crops in the hill farming system.

Due to growing livestock populations in agro - pastoral and transhumance zones, the combined grazing pressures on some mid - altitude forests and pastures have increased tremendously. This has been caused by lowering of transhumance grazing areas in winter and raising of the summer pastures. Forest and pasture in such areas have shown rapid decline in productivity. Indigenous regulatory institutions of pasture and forest use have become ineffective in these areas due to **overlapping jurisdictions**. An integrated programme of pasture improvement, livestock breeding, and institution development should be focused on these **high pressure zones**. Similarly, agroforestry and fuelwood-fodder plantations are needed in the agropastoral zones to reduce fodder scarcity. It has also been indicated during discussions, that stall feeding would be acceptable when land use is extended throughout the year, with the introduction of suitable crops for fallow periods. Thus, it has become clear that the fodder situation can be improved only when a commensurate set of agricultural policies related to crops, livestock, and agroforestry are adopted to transform the farming system.

Fuelwood demand curtailment, reforestation, and afforestation programmes constitute another important area. It was indicated that fuelwood demand can be curtailed by adoption of improved stoves. However, some participants indicated that the adoption and utilisation of improved stoves has suffered due to lack of appropriate designs.

Reforestation and afforestation programmes, through community involvement in planning, planting, and harvesting can greatly ease the problem of fuelwood supply. The success of community forestry, with the innovations of **social fencing**, and with strong community participation, has been encouraging and its replicability in other areas needs to be tested. It was indicated that **resource security** is a key factor in ensuring the participation of villagers in community forestry programmes.

**Water Resources.** Water resource development in the Region is dominated by large power and irrigation projects, which mostly benefit the people of downstream regions outside of the watersheds. These large projects, however, generate local costs which are to be borne by residents of the watershed. It was emphasised that water resource development in the watersheds ought to be carried out in a manner complimentary to the improvement of hill agriculture. In this respect, water resource development objectives should be to provide irrigation water and energy to the watershed communities, for the improvement of agriculture and development of small - scale industries. The great potential for small - scale hydropower and lift irrigation schemes was also mentioned as a means of improving economy and ecology of watersheds.

## **Infrastructure Development and Mining**

The management of infrastructure development and mining activities in the context of watershed management primarily focuses on **preventive measures**. The major objective is to reduce adverse environmental impacts on the watersheds from the construction of roads, irrigation canals, power dams, tunnels, large reservoirs, and mining and quarrying activities. Furthermore, increased road access often induces commercial mining, quarrying, and logging activities which have adverse ecological impacts.

Environmental impact assessment of infrastructure and mining projects in watersheds is crucial. However, the methods and techniques for assessment of direct environmental impacts are not fully developed. In the majority of the watersheds of the Region, data required for such assessment is non-existent. Lack of knowledge about various biophysical processes constrains the design of an appropriate data base for **forecasting future impacts and designing preventive methods**.

Due to high costs associated with analysis and adoption of remedial measures, often environmental impact analyses are deliberately ignored in designing and implementing infrastructure and mining schemes.

Appropriate legislative and procedural changes are needed to ensure that all infrastructure projects conduct environmental impact analysis before their implementation. Research on ecologically sound infrastructure technology for the mountains is essential.

## **Natural Watershed Hazards**

Nearly all watersheds face natural hazards, such as forest fires, quake-induced landslides, river damming and dam bursting, flash floods, mass wasting, and glacial lake outbursts. To effectively deal with such catastrophic events, early warning systems should be devised.

It has been indicated that delineation and mapping of flood, landslide, and acute erosion zones has generally not been carried out. Also, human activities and growth of river valley settlements have considerably increased such hazards.

Forest fire hazards can be considerably reduced by eliminating forest burning practices, and landslides can be prevented through afforestation and stabilisation of vulnerable slopes. Similarly, glacial lakes can be drained to a safe level. Such preventive measures can be taken only after basic data on these hazards is made available through primary data collection and field research. Thus, there is a need for field research, mapping, and assessment of various hazards. In the context of large dam projects, afforestation schemes, and infrastructure investments, preventive measures can substantially reduce the risk of natural hazards.

## **Institutional Innovations and Organisational Changes**

The need for more effective institutions and organisations, both at the national and community levels, was repeatedly stressed. The desirability of a national and/or regional watershed authority has remained controversial. There are a wide spectrum of possible institutional arrangements, ranging from a coordinating body to an all encompassing planning and executing agency with respect to watershed management.

Techniques to deal with the biophysical aspects of watershed management are generally well known, however the organisational and institutional innovations needed to implement them are not adequate. Given the scale of watershed management problems, governmental agencies with limited budgetary and manpower resources are unable to cope with watershed management at the local level. Watershed plans, which do not explicitly take into account the potentials of local institutions and non - governmental organisations are likely to fail ; government agencies must learn to become enablers of local action, rather than the actors themselves. The planners and technocrats often presuppose that local residents are mismanaging natural resources. However, improved terracing on private lands and forest and pasture management on community lands have been the response of the farmers to maintain the stability and sustainability of the agro - ecological system for centuries.

It was pointed out that the axe, the sickle, and the plough are far less dangerous weapons for environmental damage than the sociopolitical processes that use the farmer and the environment for political gain. More emphasis is needed on positive incentives instead of negative control, and on planning through popular participation rather than top-down approaches. The local residents must be able to control and share benefits from watershed management schemes if they are to cooperatively participate. Given the opportunity to organise, hill farmers can bring forth cooperative movements like *Chipko*, to safeguard their own livelihood and interests.

**Non-Governmental Organisations.** The main role of the non-governmental organisations is to create greater awareness of watershed problems among policy and decision makers, and to help the farmers to organise themselves. Non - governmental organisations can play the vital role as an intermediary between farmers and development agencies in facilitating the transfer of resources and technology, and in providing training. Such organisations can also play catalytic roles in inducing people's participation in managing watersheds.

**Indigenous Institutions.** The role of indigenous institutions primarily lies with the regulation and management of common property and natural resources with open access, such as forests, pastures, and water. As already indicated, the replicability of many community schemes, including forestry and irrigation, depend to a large extent on the effectiveness of the indigenous institutions to induce people's participation. Many traditional cooperative

institutions have decayed on account of penetration of markets, nationalisation, and changes in government legislation, with the result that "tragedy of the commons" situations prevail in many open access community resources. Revival of such institutions often requires that the resource security and benefits derived are assured at the household, group, and community levels.

### **Theme Three : POLICY AND PLANNING FRAMEWORK**

Watershed management requires a coherent planning and policy framework which includes not only those policies directly concerned with watershed resource management, but also other development policies. In order to bring about ecologically sound development, there is a need for long - term plans and policies for natural resource conservation and management. Such plans and policies should be designed within an overall national development context and should pay particular attention to supporting policy measures, such as reducing population growth, increasing off - farm employment and income, development of alternative energy resources, and minimising adverse environmental effects of infrastructure development, urbanisation, industrialisation and commercial agricultural activities.

Also, improvements in resource management are greatly influenced by broader socioeconomic and political factors, which may involve land tenure systems, property rights, pricing structures, credit policies, export - import policies, and overall development strategies. Effective land-use policies can provide an integrative framework for overall management of natural resources. In this regard, land capability assessment and land classification are crucial for designing and application of policies related to diversification, and intensification of land use for food and cash crops, horticulture, fodder, and forage crops. Similarly, livestock policies related to selection and improvement of breeds, gradual elimination of unproductive animals, along with appropriate policies and institutions designed for the management of common property resources, such as forestry, pasture, and water, will complement land-use policy.

A lively debate ensued during the Workshop concerning the need and efficacy of viewing the **watershed as a planning unit**. No firm conclusions emerged as to whether this would provide the stipulated planning and management benefits, although it was made clear that watersheds provide a logical choice for comprehensive analysis and study of watershed problems and solutions. A concern was voiced as to the practicability of restructuring administrative boundaries for the sake of carrying out watershed planning. Gaps in data, information, and knowledge were thought to be serious constraints in planning and management efforts. It was indicated that the Region has very few hydrometrological stations and networks. Similarly, inadequate data on vegetative cover, land use, watershed conditions, and intensities of resource use has so far prevented a comparative analysis of

human and animal population pressure vis-a-vis the carrying capacity of the agro-ecological systems. This has further constrained land - use policy formulation and implementation processes, and consequently has reduced the effectiveness of watershed management efforts.

The role of donor agencies should be to build institutional capabilities in planning, research, and training at the national level, and management capacity at the district and local levels. Often, donor agencies are directly involved in the planning and implementation of watershed projects frequently undertaken with large financial and technical assistance. This has often accentuated the **dependency syndrome** both at national and local levels and has greatly reduced the local initiative and capacity for self-help. Therefore a built-in mechanism should be introduced in such projects to generate local resources to partially meet the cost of the project and also to develop local capacity to manage the project. Watershed projects often require long-term commitment of resources. Donors should extend their commitments for longer periods than the usual five years, if necessary. When watershed project funding has to discontinue before the completion of the project, it must be recognised that initial investments may not yield the expected benefits.

### **Project Planning, Implementation, Monitoring and Evaluation**

Watershed management projects have multiple objectives encompassing goals of both development and conservation. These projects have multisectoral and multipurpose characteristics, often incorporating multiple uses for a number of watershed resources, such as land, forest, and water. Furthermore, watershed projects tend to be extended over wide geographical areas and often require long-term commitments. This demands a comprehensive approach in planning and implementation. The formulation and planning of such projects must entail an integrated approach, with appropriate emphasis on the various sectoral components/activities of the project. Project feasibility studies in this context require information on the technical coefficients and parameters of the various project components. An appropriate method for valuation of these coefficients and parameters into benefits and costs is needed. However, environmental effects which entail indirect and long-term benefits are difficult to quantify and incorporate in project analysis framework. For instance, afforestation projects generate direct and quantifiable benefits, such as forest products, and indirect benefits, such as increased water yields and reduced erosion and landslides. These indirect benefits are difficult to assess. Thus, the need for development of methodology to assess and evaluate such indirect benefits is crucial. Incorporation of both direct and indirect benefits of these projects will enhance their economic feasibility, and thus attract the attention of policy and decision makers in their favour.

Implementation of watershed projects is often constrained due to lack of coordination among different sectoral development agencies. The merits and demerits of two types of institutional arrangements to implement watershed projects were discussed. One consists of an autonomous watershed authority with full executive powers, where the sectoral agencies' personnel are

seconded to this authority and are directly under its administrative control. The second arrangement consists of the type of structure where the lead agency, particularly the Department of Watershed Management or Forestry, coordinates project activities carried out by the sectoral agencies without bringing them under the administrative control of the lead agency.

Lack of trained manpower at the project site and delayed disbursement of funds from the centre to the field were identified to be the main hindrances in project execution. Also, low salary and inadequate incentives do not attract professionals to work for watershed projects in remote mountain regions. Similarly, farmers need to be compensated for the contribution of their labour to the projects, and for loss of income resulting from watershed conservation measures and new resource use policies, such as prevention of cultivation on marginal, steeply sloping, and erosion-prone lands, or restricted use of degraded forests. The compensation could be direct income payment or provision of alternative employment opportunities.

Monitoring is often weak or lacking in watershed management projects. Project implementation can be substantially improved through proper feedback from regular monitoring; this should be incorporated into project design. In many watershed projects, there is a long gestation period before project benefits are realised. Impact evaluations done during the early stages cannot assess total benefits and costs. There is a need to conduct such evaluations at an appropriate time, when the full impact of the project is considered to have been realised. Methodologies for both monitoring and evaluation of such projects should be developed.

### **Research, Extension, and Training**

The need for research, extension, and training was highlighted for effective planning, implementation, and policy formulation. Research and training infrastructure is generally inadequate in the Region; moreover, national capacity in this area with respect to watershed management is at a low level.

The long-term research needs for effective watershed planning and management encompass a wide range of areas. Research on technology related to agriculture, livestock, forestry, pasture, and other areas is deemed necessary to improve productivities. Methodology research on land capability classification is also considered necessary. Research on landslides and erosion processes, mass wasting, and glacier dam bursts is important in the context of water resource development. Research on population migration and local institutions is needed for the development of suitable population policies and institutional innovations. Another important research area is systemic interactions among energy, agriculture, livestock, pasture, crops, and related technologies. Finally, policy research particularly related to impact of land use changes, transfer and adoption of technology, and the effectiveness of institutional measures is necessary. (See Recommendations for elaboration of priority research areas.)

Organised extension agencies are needed for the implementation of community afforestation, soil conservation, and erosion control schemes, which require dissemination of new techniques and methods. Such agencies are currently non-existent; the development of a cadre of **watershed extension workers** has to be launched through an extended training programme. Given the diverse nature of technical training, various kinds of extension workers may need to be trained. At present, limited training facilities exist to cater to this need in the Region.

The documentation and dissemination of research findings, training methods, and successful technology adoptions are needed. Exchange of information and experience among professionals of the Region will greatly help the transfer and dissemination of appropriate technologies. The participants strongly felt that the documentation and exchange of information on various aspects of watershed management should be central to regional cooperation in the Hindu Kush-Himalaya Region.

#### - Training and Systematic Information Exchange

While most of the concerns expressed in discussions during the plenary sessions and group meetings have been reported in the Workshop Discussions, specific suggestions made by the working groups are presented below:

#### Policy and Project Priorities

1. Watershed management requires a coherent policy framework which includes not only those policies directly concerning watershed development but also those which have indirect effects. Because of this need for a comprehensive type of watershed management, the First Project Group has recommended that the Government should - with plans to examine watershed management in the national development context, and pay particular attention to the following policy measures, such as encouraging diversification of rural income, increasing off-farm income, promoting development of alternative energy sources, and the mitigation of the negative environmental effects of other development activities such as road building, urbanisation, and commercial agriculture.
2. Some participants voiced the opinion that in order to effectively plan, coordinate, and implement watershed policies, a separate Watershed Authority needs to be created, under which specific watershed organisations will be required, with legal authority, to work across societal and administrative boundaries to deal with whole watersheds.
3. Intensive watershed activities, involving such curative measures as engineering structures and relocation of agricultural activities, should be confined to critical watersheds with severe erosion where high-value investments must be safeguarded. In these areas, watershed authorities may be required to take on comprehensive implementation of activities spanning a number of sectors.