

This last working session was chaired by Dr. A.N. Puri. The topic, Sustainable and More Productive Mountain Agriculture, was presented by Dr. A. Joshi. Dr. Joshi's presentation was followed by three presentations on i) 'Applying Sloping Agricultural Technology' (Professor Pui Sheung), ii) 'Sustainable and More Productive Mountain Agriculture' (Professor C.R. Verma), and iii) 'The Environmental and Economic Role of Silviculture in the Mountains'.

The presentations were followed by discussions on the issues raised by mountain agriculture in the changed socio-economic context and the identification and promotion of successful success stories.

The sessions were
organized by ICIMOD
with the following caution:
The success stories
presented are highly

Discussions and Main Conclusions

This section contains the discussions and main conclusions derived from the 'Thematic and Spot Presentations'. Discussions were led by a panel of three experts (different for each paper) before opening the floor to symposium participants.

The first working session was chaired by Professor A. N. Puri. The topic, 'Population and Employment Changes in the Mountains' was presented by Dr. A. Joshi. Following his presentation Dr. Joshi led the presentations: i) 'Gender Issues in Mountain Development' and ii) 'Management of Mountain Tourism: The Case of Nepal'. This was followed by a discussion on the major issues pertaining to population and employment challenges in the mountains. The major issues raised during the discussion have been summarized below.

Population and Employment Issues

The major issues of transformation in the employment structure of the labour force, overwhelmingly high dependence of the labour force on traditional agriculture.

The impact of increasing dependence on the husband and the increasing role of women in household decision making.

The increasing dependence of household income from seasonal migration and non-farm sources, but the concentration of non-agricultural activities in

First Working Session

The first working session was chaired by Dr. A.N. Purohit. The topic, **'Sustainable and More Productive Mountain Agriculture'**, was presented by Dr. N.S. Jodha. Dr. Jodha's presentation was followed by three spot presentations on i) **'Applying Sloping Agricultural Land Technology'** (Professor Pei Shengji); ii) **'Contribution of the Asian Hive Bee to Crop Production and Income'** (Professor L.R. Verma); and iii) **The Environmental and Economic Role of Seabuckthorn** (Lu Rongsen).

The presentations were followed by discussions on the dilemma faced by mountain agriculture in the changed socioeconomic context and the identification and promotion of replicable success stories.

The discussions centered around appreciation of the approach adopted by ICIMOD's MFS programme, besides recommending caution concerning the promotion of replicable success stories and advising proper testing. The recommendations highlighted the following points.

- ICIMOD should continue its efforts towards building a pool of successful replicable experiences and follow their replication through proper applied research, training, dissemination, testing, and demonstration activities.
- ICIMOD should continue its efforts in applied research on the sustainability issues of mountain agricultural development.
- Since the utility of the mountain perspective framework as an effective tool for planning resource management has been demonstrated, efforts should be continued to ensure its wider application.
- To forge effective partnerships in implementing its mountain agricultural programme, ICIMOD should continue with its efforts towards building capabilities and strengthening collaborating institutions in member countries.
- The development of mountain agriculture should be viewed holistically since there is a linkage between the plains and the mountains.

Second Working Session

The second working session was chaired by Professor W.V. Uff. The topic, **'Population and Employment Challenges in the Mountains'**, was presented by Dr. Pitamber Sharma. Following his presentation Dr. Sharma gave two spot presentations: i) **'Gender Issues in Mountain Development'** and ii) **'Management of Mountain Tourism: The Case of Nepal'**. This was followed by a discussion on the major issues pertaining to population and employment challenges in the mountains. The pertinent issues raised during the discussion have been summarised below.

- The high population growth rates.
- The sluggish rate of transformation in the employment structure of the labour force; overwhelmingly high dependence of the labour force on traditional agriculture.
- The paradox of low carrying capacities on the one hand and the imperatives for large supplies of household labour on the other.
- Rising contributions to household income from non-traditional agriculture and non-farm sources; but the remunerations are not significantly different from

- Policy responses to the challenge of population and employment have remained generally weak; sometimes inconsistent and counter-productive over time; and have tended to ignore the objective conditions prevailing in the mountains and the role of the government in the provision of infrastructure, extension, and marketing.
- In view of the problems faced and the lessons that can be learned from some relatively successful cases the following issues emerge.
 - The need to build on the links between farm and off-farm activities.
 - The need to build on comparative advantages; intervention mechanisms should particularly focus on comparative advantages.
 - The promotion of off-farm employment has to be seen in the context of food security.
 - Infrastructural development needs to be commensurate with the type and level of economic activity.
 - The role of market and market information mechanisms needs to be enhanced.
 - Local-level institutional mechanisms need to be strengthened.

- The emphasis needs to be on local resource-based and skill-enhancing human resource development.
- The gender concern has to be brought to the centre stage of the development agenda, in general, and of the population and employment agenda in particular; without making women full participants and beneficiaries in the development process (and exploring the processes and mechanisms to do so), the central issues in human resource development cannot be addressed.
- The government policies with respect to population and employment in the mountains should be governed by the need for economic transformation; they should not be conceived as residual policies.

Areas Needing More Focus in Future

- Labour-intensive, high-value products (traditional agro-processing, cottage industries as well as non-traditional rural industries).
- Employment promotion through environmental regeneration activities.
- Promotion and management of eco-tourism.

- Market town development and expansion of rural services.
- Assessment of the human resource development (HRD) profile and poverty in mountain areas for the development of ground-based and prioritised policies and programmes. Focus on gender issues (particularly on issues related to health, education, opportunities, activity roles, and decision-making); need to develop and incorporate **Gender Impact Assessments** in all projects and programmes (including those of ICIMOD).
- Assessment of policy/strategy issues regarding:
 - decentralisation,
 - liberalisation/privatisation,
 - environmental constraints to off-farm employment, and
 - population control and migration.
- Assessment of ICIMOD's role in terms of influencing policy, management, and implementation; ICIMOD's comparative advantage lies in the area of management so emphasis should be on providing assistance to countries of the HKH Region in this area.
- Development of an Action Plan to respond to the population and employment challenge in the mountains.

Third Working Session

The third working session was the opening session on December 2nd, 1993. Professor Li Wenhua chaired the session and **Mr. B.B. Deoja presented Topic A - 'Planning and Management of Mountain Roads and Infrastructures'**. Dr. A. Junejo then presented **Topic B - 'The Role of Energy and Related Technologies in Mountain Development'**. The presentations were followed by discussions. The pertinent issues arising from the discussions have been summarised below.

SESSION A

- Lack of awareness (e.g., 25% of the roads in Nepal are washed out every 4-5 years)
- Lack of proper initial studies (e.g., engineering-geological study, environmental impact assessment, and road network planning)
- Lack of proper standards and technology. Often road designs depend upon the conditions laid down by the donor countries.
- Low design estimates but high construction and maintenance costs involving long periods of construction.
- Need for a Mountain Risk Engineering approach in the design of infrastructures.

- Mountain development is a huge, dynamic system needing the people's active participation.
- Risk management of roads based on good databases and proper determination of priorities.
- Road maintenance is an ongoing process and there should be a system to regularise it.
- One of the causes of failures of engineering structures was poor design, as a result of not taking natural processes and hazards into due consideration.
- Structures are not flexible and cannot be replaced at low cost after being damaged.
- Lack of proper studies and plans for construction of roads (roads are very close to river beds and are on the terraced slopes - but not on flat terraces).
- Cost-benefit analyses applicable in developed countries may not be useful for the Hindu Kush-Himalayan Region, as the region needs to develop its infrastructure first. Therefore, the approaches should be based on high initial costs and low maintenance costs.
- Highways and roads should be planned in areas where geological conditions are more favourable, and the donor agencies should understand this.
- Problems of political interference.

- Lack of environmentally-sound technology for road construction.
- Institutional constraints.
- Roads are pre-conditions for the development of mountain areas.
- There should be master plans and extensive databases that can also be stored on a computer.
- The Mountain Risk Engineering approach is not always a high cost alternative.

TOPIC B

- Low but increasing level of energy consumption per capita
- Considerable environmental stress; environmental degradation
- Longer time spent in fuel collection
- High input of animal energy
- Subsidised commercial fuels not having the desired effects in terms of protecting the welfare of the weaker sections.
- A number of renewable sources exist, e.g., micro-hydro, mini and small hydro, biogas, and low-tech thermal application of solar energy, wind energy.
- Conservation of biomass is possible by use of improved cooking stoves.
- Under certain conditions, solar conversion to electricity gasification, briquetting of low quality unusable biomass is possible.
- The progress so far in tapping these potential sources has not been very satisfactory.
- Government policies, such as investment, pricing, fiscal, and monetary incentives, are important.

- Decentralised approaches; user-manufacture interaction desirable.
- Research and development support required
- Donor and international agencies could play a role in technology transfer and knowledge sharing.
- Programmes for promotion of appropriate energy technology are dependent upon effective dissemination.
- The people's felt needs are important.
- Governments should be the facilitators.
- It is essential to look at water resources in totality.
- There are political biases against alternative technologies.
- The design and maintenance aspects of alternative technology are important.
- It is essential to look at water resources in totality.
- There are political biases against alternative technologies.
- The design and maintenance aspects of alternative technology are important.
- How can these technologies be cost-effective?

Areas Needing More Attention in Future

- Cost-reduction through an appropriate mix of research and development activities.
- Identification of an appropriate dissemination framework.
- How to ensure more active participation of the people in management as well as in cost sharing is an important factor.
- How to attain increased allocation in these areas in the future is also important.

Fourth Working Session

The Fourth Working Session was chaired by Professor K.J. Beek. The topic, '**Natural Resource Management in Mountain Environments**', was presented by Professor Pei Shengji. Following the topic presentation were two spot presentations: (i) '**A Micro-level Environmental Analysis and Monitoring**' (P.B. Shah) and (ii) '**Promoting Participatory Agro-forestry**' (Jeanette D. Gurung). The spot presentations were followed by a discussion of major issues in natural resource management in the mountain environment of the Hindu Kush-Himalayas.

The discussion was in two parts and the principal issues raised are noted below.

Part I: Highlights of the Paper and Spot Presentations

- Global concerns for environmental degradation in the HKH were dominated by 'gloom' and 'doom' scenarios in the 70s, because of the uncertainty and 'dilemma' owing to the inadequacy and even the conflicting nature of facts and figures.

- These concerns led to the establishment of ICIMOD in 1983 and the search for a holistic and integrated solution to mountain problems in the 1990s, based on dependable data and facts.
- Constraints in Natural Resource Management in the HKH are due to both:
 - natural factors (geology, climate, erosion, natural disasters, etc) and
 - man-made factors (over-population of man and animals, improper management of land and soil, degradation of forests and loss of biodiversity, and the growing scarcity of water).
- Integrated approaches to natural resource management are the best hope and some of ICIMOD's programmes are already indicating positive impacts; examples: Ecological Rehabilitation of Degraded Lands (an IDRC-funded project in India, China, Nepal, and Pakistan).
- Because the watershed is a natural and a planning unit for natural resource management in the mountains, management of natural resources within a watershed should be accorded high priority. ICIMOD is already working in this direction.
- For integrated development, local use of natural (particularly forest) resources and biodiversity must be considered in order to encourage industrial development at the local level, while conserving biodiversity (*in situ*).
- A combination of local indigenous knowledge and modern technology will probably provide the best answer to the problems of sustainable development and management of natural resources in the mountains.
- The scale of operations should be small enough and acceptable to people, particularly in light of the lack of a relevant scientific database on natural resources.
- Establishment of a scientific database on the natural resource base should receive high priority, particularly on land, soil, climate, water, forests, and biodiversity.
- Regional and international cooperation and donors' support are required in the search for sustainable development.

Part II: Comments and Suggestions Concerning the Management of Natural Resources

- An integrated perspective on sustainable development is required.
- The problems are not technical but institutional and managerial.
- What should be done versus what can be done?
- The IDRC-supported Action Research Programme involving people (micro-level) is a good beginner.

- ICIMOD could be a vehicle for regional development by developing closer links with national institutions.
- Documenting success stories and dissemination are essential.
- Livestock and rangeland management components are lacking in ICIMOD's programme on Natural Resources' Management.
- Medicinal plants: exploitation for potential commercial value should be encouraged.
- Documentation of resource information existing within the HKH Region, e.g., agro-climatic zones, ecological maps, etc is essential.
- Ecologically suitable areas for intervention should be identified.
- Sharing of technology at the regional level should be encouraged through ICIMOD.
- Aquatic eco-systems (e.g., lakes) should be mapped for management and conservation of natural water bodies in order to avoid pollution and degradation of these resources as they are of spiritual significance and important for tourism and for drinking water supplies.
- Biodiversity should be preserved (including plants and animals).
- Genetically-engineered plants and animal species should be controlled and screened before releasing them for wider use.
- Animal husbandry/animal resources were not given adequate attention in the review paper; this is important especially because, for the high mountain areas (fragile areas), animal husbandry is a major component.
- A clear picture of the problem needs to be formulated with people's participation in order to develop a strategy for resource management.
- Think globally act locally.
- Ecological studies are important for sustainable development.
- ICIMOD programmes should give priorities to the following areas:
 - biodiversity,
 - global change, and
 - sustainable development.
- Micro-level studies incorporate indigenous knowledge and provide benefit for the people.
- What is the management structure at the local level for people's participation?
- What are the financial arrangements for local level action research?
- ICIMOD should provide support for the preparation of a prospective Agricultural Master Plan for Nepal and also for other regional countries if needed.
- What can ICIMOD provide in terms of financial and technical support for work in remote areas?
- Indigenous agroforestry techniques that could be transferred, e.g., trees on paddy fields, should be explored.

The Fifth Session was chaired by Mr. R. Rajamani. The topic, 'Integrated Planning for Mountain Environmental Development', was presented by Dr. M. Banskota. This was followed by two spot presentations: (i) **Local-level Planning Using GIS: The Analysis of Service Centres in Lalitpur District** (Prمود Pradhan) and (ii) **GIS Applications for District-level Assessment of Livestock Conditions and Development** (Hubert Trapp).

The presentations were followed by a discussion. The major issues arising from the discussion have been given below.

Major Issues in Integrated Planning of Environment and Development

- Integrated Planning of Environment and Development continues to face many conceptual and practical difficulties in mountain areas. The main challenge for the future lies in changing our development machinery, which has not only overlooked the question of needs of the majority of people, but has also substantially altered the environment. As the environment is beginning to ring many alarm bells, it is urgent that steps be taken to make our development efforts congruent with our environmental needs.
- There are two main sides. One side focussing on the **environment** is urging for more protection, conservation, sustainable use of natural resources, greater harmony with nature, recycling, cooperative lifestyles, recognition of the role of women in environmental care, and appropriate technology. The other side is still driven by a powerful force of economic growth involving control over nature, greater use of natural resources, high technology, and urban industrial expansion.
- In order not to end as ecological refugees, there must be better integration of the environmental and economic sides. Both have strong positive components, and these must be carefully assessed and promoted, based on the needs of specific areas. Achieving this will require major efforts at different levels.
- A beginning has been made to integrate environment and development through recognition of the role of mountain areas. Efforts have focussed on awareness and sensitisation, preparation of specific plans and programmes, changes in laws, and development of institutional capacity. Efforts are also being made at the sub-regional and local levels. The most encouraging examples of green development are from local-level efforts. These efforts indicate very significant changes from the past, but much more needs to be done.
- Measures to further strengthen integration of environment and development should focus on improving mutually supportive roles of plans and projects with

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plans focussing on providing long-term guidelines and laying the basis for successful project design and implementation. Guidelines should focus on identifying territorial opportunities and constraints, resource utilisation, meeting basic needs, and institutional strengthening. Projects on the other hand should be designed on the basis of the needs of the households, farms, village ecosystems, towns, and districts.

- An exercise conducted by ICIMOD for district-level integration of environmental and development concerns showed how existing information can be used to prepare broad spatial profiles that can serve as planning guidelines.
- Much more effort was needed to strengthen integration from below. The focus needs to be on growing from within; self-reliance; starting small and building on past achievements; and improving the planning, monitoring, and implementation capacity at lower levels. There is a need to translate micro-level knowledge into the planning process and build a base for micro-level planning which often has been neglected.
- GIS as an instrument for the integration of environmental and economic concerns in planning; information as a key resource in integrated planning exercises; and the need to look at other tools in addition to GIS are important considerations.
- ICIMOD needs to adapt planning models from other countries/regions to the HKH Region. ICIMOD should work as a facilitator because ICIMOD cannot do everything but rather must work through networks and set examples.

Conclusions

There is a need to re-orient the planning framework and planning instruments to the needs of sustainable development. The planning process has to be multi-layered and central, or institutional planning has to be complemented by regional and micro- or village-level assessment and planning. The mode must be participatory so that people's needs and aspirations are recognised, but they should be asked to keep in mind the imperatives of the environment as much as those of development. The planning process must focus on basic activities at village level, use techniques to improve overall productivity, and lay down guidelines for the use of natural resources. Project planning must be based on similar considerations and focus on farms, ecosystems, watersheds, service centres, and district development areas. Institutional strengthening, particularly in the use of tools like GIS and Environmental Impact Assessment, is a must. ICIMOD can play the role of a facilitator in the planning process as well as the strengthening process through networking with governments, institutions, NGOs, etc.

Sixth Working Session

The Sixth Working Session, which was the concluding session, was chaired by Mr. Remo Gautschi who gave the following summary of the main conclusions arrived at during the Symposium.

Chairman's Summary (Concluding Session) Dr. Remo Gautschi

During these two days many different issues have been raised by the Prime Minister's inaugural address, the keynote address, the different country statements, and the theme papers of the Symposium, including the discussions that followed.

There were also strong offers of cooperation and the discussions provided a rich harvest of ideas, issues, and critical remarks not just for ICIMOD but also for the Board and the Support Group to consider for the future of ICIMOD, as well as for mountain development efforts.

ICIMOD was founded ten years ago with very high expectations from all the parties concerned. The Centre had to start from scratch and quickly develop itself as a viable institution amidst a whole range of conflicting demands and pressures from the scientific community, member countries, and donor agencies. It is important not to overlook this fact as the Centre has had access to limited resources only and was given a huge mandate and there were widely varying expectations. The activities presented by the Centre during the past two days have demonstrated that, even with a modest infrastructure, it has successfully mobilised human resources in the region and outside in many different fields. As one who has observed ICIMOD evolve over the years, I was happy to note that the quality of ICIMOD's work has been improving substantially over time. The presentations made by the staff were excellent in coverage and quality, and the Director General and his team deserve to be congratulated along with all the earlier staff and the previous Director General.

There is little disagreement with the issues raised by different speakers. There are still many important questions that need to be debated. How should ICIMOD balance its priorities among international, regional, and national focusses? The strong Nepal focus at present has been pointed out and future activities in other countries should be enhanced substantially to strengthen regional cooperation, including sharing of experiences with other mountain systems such as the Andes. It has also emerged that ICIMOD's linkages and interactions with other

international agencies in terms of division of labour and exchange of ideas have been limited and need further development. The Symposium also indicated the need for partnership and division of work with existing national, regional, and international agencies working in the mountains.

The future credibility of ICIMOD will depend critically on carrying out a few activities well - rather than paying superficial attention to many problems and issues. This would mean more focus and concentration in a number of strategic areas. This concentration and focus however does not mean overlooking relevant and key components for promoting integrated approaches and development. After all, this is the mandate of ICIMOD and, at times, some of the activities reported were still dominated by sectoral thinking and approaches.

ICIMOD has identified many potential technologies and approaches appropriate to mountain areas. Some of these have been around for a fairly long time. The real question is why have they remained unpropagated and unused so far? This brings us to the extremely important point of facilitating the implementation of good ideas, technologies, and approaches. It is therefore enough to identify these potential solutions and leave it at that. Greater attention also must be given to addressing the specific institutions and agencies that could begin implementation.

The scope of ICIMOD's activities requires greater focus to match the resources available with the Centre - focus on areas where it can make the most effective contributions. The strong technology focus needs to be better matched with the need for greater integration into activities, including more attention of the socioeconomic and institutional aspects.

Some issues, such as women, deserve higher priority. It is important to emphasise the need for greater communication and dissemination of collected, extracted, and synthesised knowhow.

In conclusion, ICIMOD's role is that of a facilitator and it must convince others to adopt the sustainable options and solutions to Integrated Mountain Development that it thinks are sustainable. It must therefore sell its ideas through much more effective communications and dissemination mechanisms.

Finally, I would again like to thank the Director General and his crew for a very interesting and well organised 10th Anniversary Symposium.