



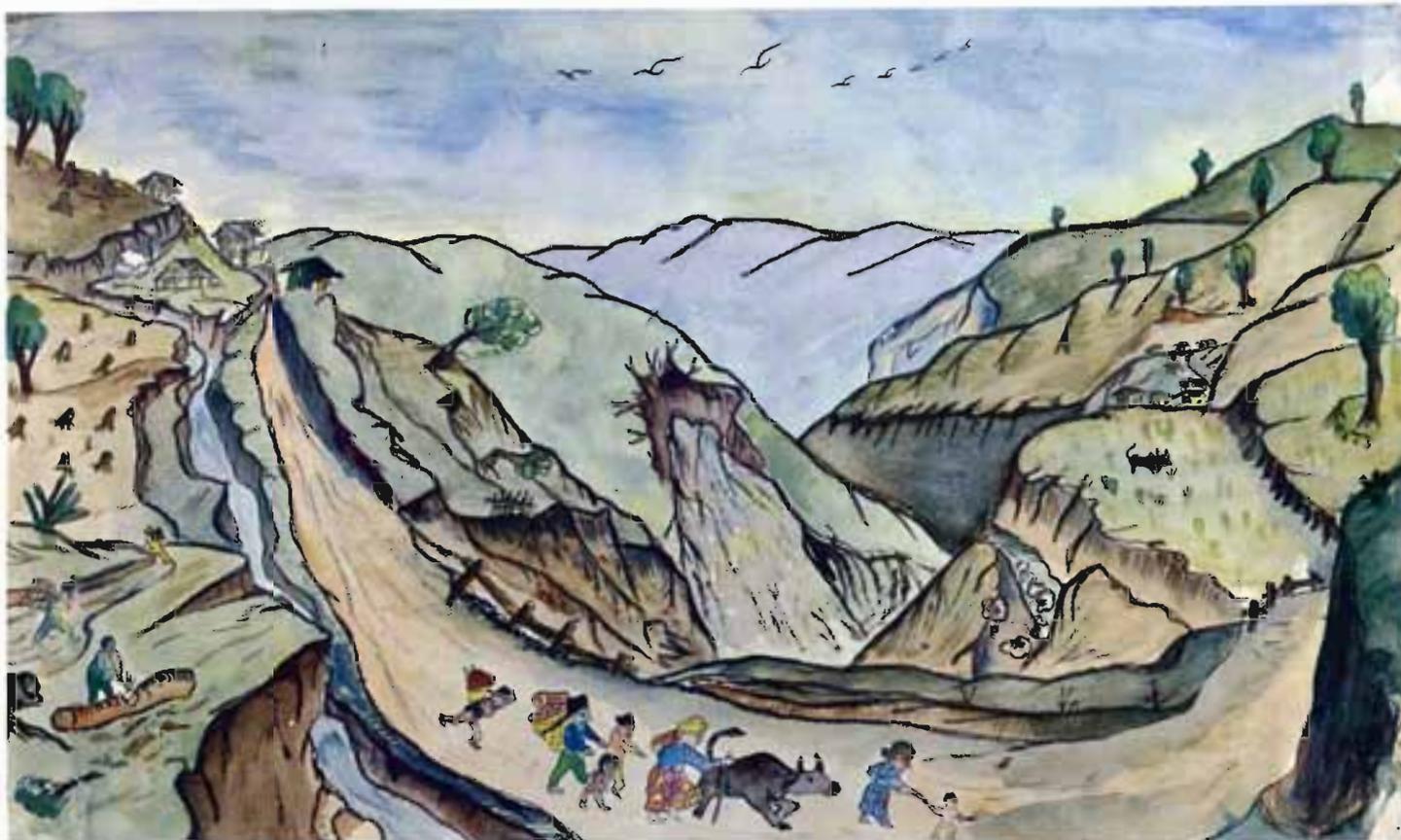
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International Centre for Integrated
Mountain Development

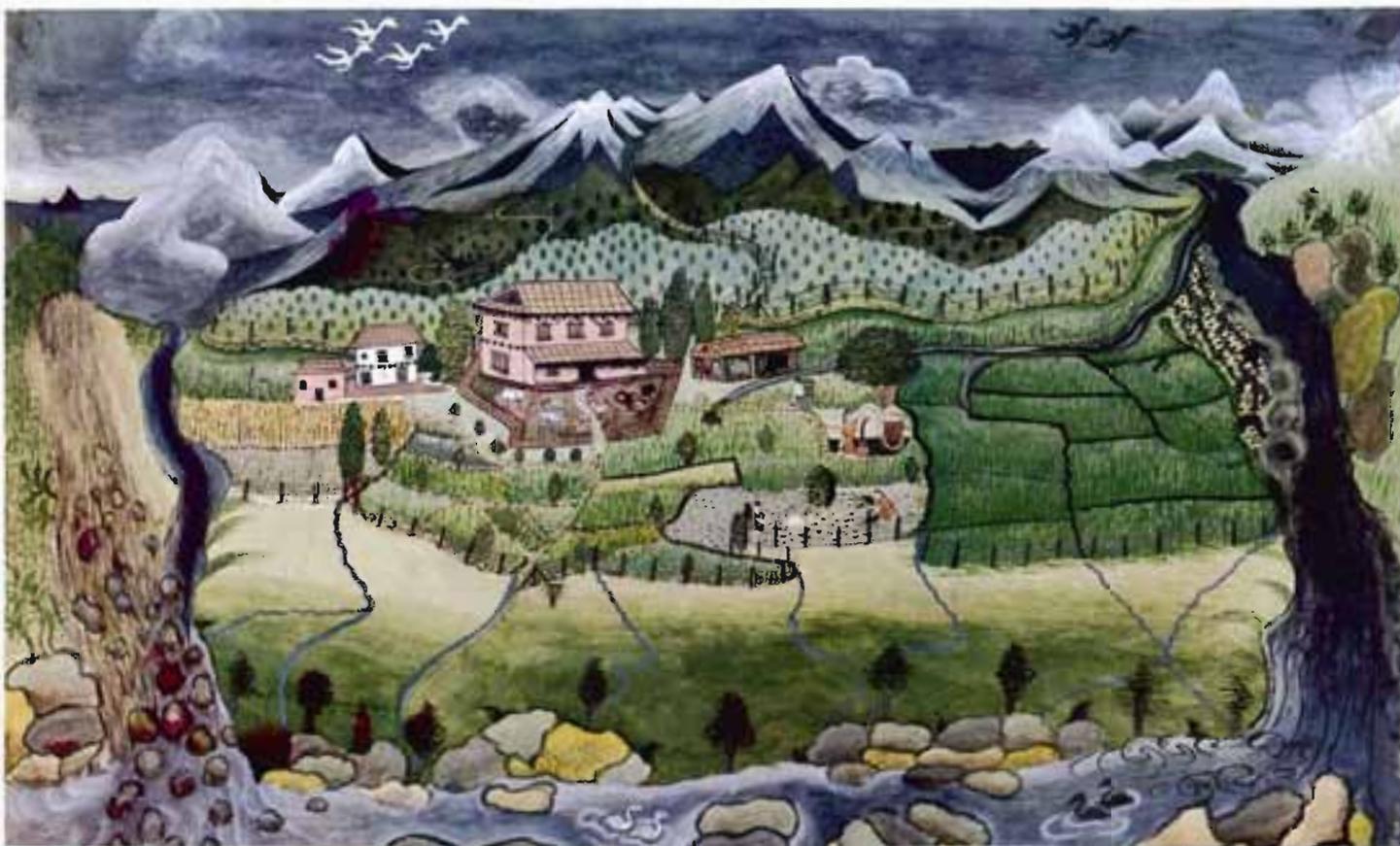
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Kathmandu, December, 1983

MOUNTAIN DEVELOPMENT : CHALLENGES AND OPPORTUNITIES





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**Mountain Development:
Challenges and Opportunities**

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of the
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FOREWORD

The ICIMOD Symposium and Inauguration, which were held in Kathmandu between 1st and 5th December, 1983, were not just professional meetings, but were unique occasions. They were both serious professional exchanges and celebrations for the coming into being of an idea, one that was conceived almost a full decade ago.

The Inauguration, so ably planned and executed by the Preparatory Committee, under the Chairmanship of the Hon'ble Fattah Singh Tharu, Minister of State for Education and Culture, was the culmination of years of hard and painstaking work by many individuals and organisations, both in Nepal and in the other participating countries of the Hindu Kush-Himalayan region, as well as in the sponsoring countries and at UNESCO in Paris.

The Board of Governors of ICIMOD is specially grateful to the Right Honourable Prime Minister of Nepal for performing the actual Inauguration Ceremony; to His Excellency Dr. Amadou-Mahtar M'Bow, Director General of UNESCO, for his personal participation and enthusiastic support; and to Dr. Maurice Strong, Chairman of the Board of Canada Development Investment Corporation and former founding director of the United Nations Environmental Programme, for delivering the keynote address.

It is unfortunately not possible in a document of this nature, which records only the speeches by our distinguished guests and the technical presentations by the expert delegates, to include the names of everyone who helped make the functions so successful. The Board of Governors offers its sincere thanks to everyone who participated both inside and outside the conference rooms. In this we include the organisers, the officials of His Majesty's Government and of various Aid Agencies and non-governmental organisations who assisted and co-operated with us so well, the members of the SATA Group who staged the enjoyable and instructive drama, and the hundreds of school children from all over Nepal who took part in the Painting Competition on the child's-eye view of their mountain environment. Last but not least, I would also like to place on record our special appreciation and thanks to Mr. Peter Gueller, Regent of ICIMOD, for his contribution in organizing the Symposium and Inauguration.

To everyone I say again thank you. I am sure we will all join together in wishing ICIMOD, now that it is so satisfactorily launched, every success for the future.

Dr. Ratna S.J.B. Rana
Chairman of the Board of Governors

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**PART I
SYMPOSIUM**

Symposium Opening Address

Fatteh Singh Tharu,
Honourable Minister of State for Education and Culture

Your Excellencies, Members of the Board of Governors, Distinguished Participants, Ladies and Gentlemen,

I take it as a matter of personal gratification and, of course, great privilege and honour to be asked to open this symposium, "Mountain Development 2000: Challenges and Opportunities", on the eve of the inauguration of the International Centre for Integrated Mountain Development.

Allow me to greet the distinguished and learned participants from all over the world, including the Hindu Kush-Himalaya region.

The symposium which opens today is significant in that we are here to speak with and listen attentively to each other in an atmosphere of creative input towards building a unified and common platform for enhancing our own development and prosperity and for the proper conservation of resources for our generations to come.

We have, in fact, realised the need for such a common platform and we are here assembled with sincere gesture and dedication to achieve the objectives we have outlined. To our great fortune, experts from other mountainous countries—and international agencies, as well—are here to stimulate, guide, and help us in a realistic manner. As such, this is an historic occasion for all the countries and peoples of the Hindu Kush-Himalaya region.

This region—the source of the Indus, the Ganga, the Brahmaputra, the Irrawaddy, and the Hwang Ho-Yangtze River systems—is not only the repository of natural resources of various kinds and magnitude, but it has been identified, in view of the majestic mountain chains, eternal snows, and varied vegetation, as the source of inspiration for dynamic manifestations and creative activities.

The great civilizations of the Indus and the Hwang Ho thrived here. Ancient and medieval history records a great many developments of lasting character in this region. Historical records reveal that these civilizations and their traditions cared for a balanced relationship between life and nature and for the management of resources. Thus, partnership with Nature was the practice of the ancient past as well as the message of the saints who meditated in the mountain caves and thick forests.

According to scientists, the Hindu Kush-Himalaya is geologically young. The extensive glaciers and the snow-fed rivers are the resources in dynamic expression. Under the prevailing circumstances, the magnitude of rock decay, erosion, and destructive mechanisms are notably high. In view of this, we learn that periodic adaptability and change in continuity are the rules of Nature.

Developments in science and technology have brought their own repercussions. The consequent growth of human populations and the notable increase in magnitude of the exploitation of resources have brought forth serious disturbances in the balance which Nature restores periodically in a given geological epoch. Such frequent imbalances could not be corrected and the impact of human activities has begun to increase tremendously—so much so that in the mountain lands, which are marginal in character, pressures on land have begun to grow significantly. Resources are being depleted and degraded and the human population is on the verge of starvation. Actual physical survivability is being threatened.

These problems are evident in frequent landslides, erosion, flood, and drought resulting in malnutrition or starvation. In such times, countries of the region feel that whatever developmental activities and projects there are, in the long run, are not enough. These activities must be supplemented and coordinated by measures taken in keeping with objectives developed on the regional level. Accordingly, it is a matter of great pleasure for me to open this first regional level symposium.

I do hope that deliberations on the major themes and discussions connected thereto shall proceed smoothly in an atmosphere of cooperative input and realized foresight. These deliberations shall be helpful in identifying the major problems and in finalizing the work programme of ICIMOD. If this is achieved in these four days, ICIMOD will be able to have the clear sight and adopt the work plan recommended by this symposium.

This could be an appropriate base towards finding a lasting solution to the problems of the region by developing and gradually enlarging the activities of ICIMOD. I, therefore, hope that the countries of the region will respond to ICIMOD's call with a sincere attitude and a sense of cooperation and interdependence.

I wish the proceedings of the symposium and the subsequent results all success, and hope that the distinguished participants from outside shall have a safe, sound, and profitable stay in Kathmandu.

Allow me to repeat my words of welcome to the distinguished participants.

Let us remember that it is through these united efforts of scientists from both within the region and outside that ways and means will be explored to raise the quality of life of the people in general.

Thank you.

Mountain Development Towards 2000: Challenges and Opportunities

Ratna S.J.B. Rana

Vice-Chancellor, Royal Nepal Academy of Science and Technology, and Chairman,
Board of Governors, International Centre for Integrated Mountain Development
(ICIMOD)

I am very grateful for the privilege of making a presentation on "Mountain Development Towards 2000: Challenges and Opportunities" before this distinguished gathering. Everyone here will perhaps agree with me that this topic can be approached from various perspectives. I propose to centre my discussions on some principal issues rather than present you with a catalogue of facts and figures.

The first issue that I wish to dwell on relates directly to the topic itself—the mountains. They have been worshipped, climbed, settled on, photographed, mined, or, to put it briefly, they have been put to different uses by mankind to satisfy its changing needs and greeds since time immemorial. Why, then, should we be concerned about them when we have so many other important things to worry about?

Firstly, the mountains, striking in their stark immutability and their massive grandeur, are, in fact, among the most fragile eco-systems on earth. Lately, we have been finding that they have been over-exploited and over-used.

We have become concerned because the disruption we have been causing in the mountain environment has been far more serious than is voiced by the cries of dismay by trekkers who find some beer cans in our mountains. What we have to understand is that the mountain eco-systems in the tropics are fragile and, thus, unusually sensitive, even to small disturbances. When environmental disruption occurs in the mountains, it accelerates rapidly. Then the costs and efforts of reclaiming nature's work of millenia are immense and formidable. Often, the consequences may be irreversible. Can we allow this to continue?

Secondly, what happens in the mountains has profound effects on the plains below. Changes in mountain vegetation and soils influence the water regimes in the lowlands. Droughts, floods, and siltation in the plains are not isolated from the watersheds in the mountains. If there was a time when we thought that the well-being of the plains or lowland areas was based on what went on within their own borders, our understanding has now changed. Today, their well-being may be threatened from far away places—the mountains. Hence, it is up to all of us to be aware of the importance of the highland-lowland interactions and to be able to identify them. At stake is the fate of not only those who live in the mountains, but also of those who, in many ways, depend upon these areas for their well-being.

Thirdly, socio-economic development projects, particularly involving large scale engineering works, do not always produce a positive impact on mountain environments. Development history is replete with examples of well-meaning projects leading to negative impacts on the environment. Water resource development, mining, road construction, and even tourism and recreation projects in mountain areas may produce adverse environmental consequences. Our concern, therefore, is to prevent the

undesirable environmental impact of development projects before, rather than after, their implementation.

We have yet another, far more important reason to be concerned about the mountains. They contain significant numbers of the world's poor. Perhaps they are not only poor but getting poorer all the time.

What are the reasons behind this? Is it because mountains include areas of high altitude and accidental relief which are very difficult for human occupation? Rugged hill terrain also inhibits transport and communication required for the development of markets and the provision of services in these areas. These are only some of the reasons, however, as there are quite a few mountain areas with pockets of comparative prosperity.

Altitude is only one aspect of the impact of mountains upon population. The volume of mountains, their type and ruggedness, their impact upon climates, the presence of valleys and passes, the direction of the slopes, and the relationships of mountains to other neighbouring areas all affect the degree and nature of human occupation.

Mountain populations, much more than lowland populations, have evolved economically, socially and biologically in close relationship with their physical environments. Many achieved a degree of equilibrium or balance through adaptation to difficult conditions over a long period of time. Now, that balance of a "genre de vie" has been threatened.

Rapid population growth in mountain regions has meant increased competition for limited resources. The forests have been cut down; the slopes almost stripped of vegetation. They have been used as fuel for individual homes and for new construction, heating, and lighting. The people are poor and can afford no other energy source. This nature's gift is also the cheapest, as well as traditionally understood. As a result, deforestation goes on. The precious soil of the mountain slopes is washed away by the rains towards the lowlands, silting up rivers and causing floods. Halting the destruction of the forests is not easy task, but we must do it in order to prevent the further deterioration of mountain environment.

The problems of population pressures in the hills have been underlined by many writers. Population continues to increase, so the woods are stripped even more quickly as time passes. Farmers are forced to build terraces, even on precarious mountain slopes, so that they may plant a few more rows of potatoes or maize; erosion follows in the wake. A visitor is bound to marvel at the labour that has gone into it but may not realize that there is a clear limit to the areas that can be safely terraced.

With the expansion of population and farming areas, the number of animals also increases. The result is overgrazing, putting additional pressures on the high mountain slopes. All

these factors combine to increase soil erosion and, consequently, reduce the productive capacity of the mountain areas. This is happening at a time when we desire just the opposite.

I would like to point out that mountain population pressure is not necessarily a recent phenomenon. It has certainly been accentuated in our part of the world, however, by the upsurge of population growth, largely through rapid decline in mortality and sustained high fertility. One may be tempted to put all the blame for the present state of mountain environment on the increasing population. I would like to submit that this has been an important but, not by itself, the only factor. I will return to this point at a later stage.

The extension of cultivation, pastoralism, lumbering, and collection of firewood has led to deterioration of the mountain environment. Consequently, the people have looked to other areas for their livelihood. While a net export of labour to the lowland areas, as in my own country, has continued as a form of balance of payment between the mountain and plain areas for a long time, mountain populations are now experiencing permanent out-migration, not only to lowland agricultural areas but also to cities. Migration is not always freely available as a solution to population pressure in mountain areas, however. We must work out alternative solutions while we still have time.

Traditionally, of course, migration within the mountain areas from low to high slopes in different seasons, known as transhumance, has been common. Lately, the migration from mountains has been quite different in direction and magnitude. If this is allowed to continue, we might sentence the mountains to a future of chaos. In this case, our concern should be to preserve our own interests while preventing the deterioration of the mountain environment.

It might be said that the issues raised—environmental degradation, energy, population, development—are the same the world over. To answer those who may ask why we should be discussing such common issues, let me say that the mountain environments are so fragile that any upset of their delicate balance has immediate consequences. Indeed, in some places the environmental balance may have been already disrupted beyond any hope of restoration.

Certainly, the mountains are not homogeneous entities. There is a great deal of diversity amongst them. Most mountains present great diversity in topography, climatic conditions, and in flora and fauna. Besides, the terrain and elevation are variously perceived by peoples in different mountain areas and the use of mountain lands is influenced by these perceptions. Even though a large number of highly differentiated environments may occur within a small geographic area, every valley and hillside may not be a unique case. Despite the diversities, there are a number of common problems. The difference may be only in scope and the urgency with which they have to be dealt.

Our concern becomes particularly relevant when we consider the Hindu Kush-Himalaya—the highest and largest mountain system in the world. Great relief and steep slopes in these mountains combine with huge contrasts in climate, soil, and vegetative cover, according to altitude and terrain. For these very reasons, when environmental deterioration begins, it accelerates rapidly, aggravating the process of site destruction, such as erosion and landslides.

There is also another obvious reason for our concern: the interrelation of the Hindu Kush-Himalaya with the adjacent plains, which are some of the most densely populated areas in the world.

The Hindu Kush-Himalaya are relatively young mountains in

geological time. Human cultures in these mountains, on the other hand, include some of the most ancient civilizations, one or two of which are virtually extinct, while others have survived, changed, and developed. The flora, fauna, the high mountain peaks, glaciers, and mighty river systems present a wide array of ecological conditions and habitats, parts of which are still unexplored. Over the last century, civilization has gradually spread into this region. Population increase and imprudent exploitation, as everywhere else, have had their effects on the environment.

The task of all concerned, therefore, is not to try to put the clock back, but to provide the catalyst for sustained economic and social development leading to a new environmental balance. The challenge is to find solutions to these problems—development within a fragile ecological and resource base, modernization among unevenly disseminated peoples, and integration of socially and culturally diverse elements.

The problems facing the people of this mountain region are not entirely of their own making. Mankind today has become more conscious of environmental degradation and ecological damage, as well as the potentials of alternative ways for improving their own well-being. The challenge here is to evolve patterns of development which are not only economically feasible but environmentally sound. The ultimate problems of development are not only the socio-economic, logistical, or administrative barriers in this region, but the cultural barriers presented by the centuries-old traditions of the mountain people.

As I have mentioned, the problems of environmental deterioration in these mountains appear urgent enough to warrant immediate attention. Against the background of the population growth in these areas, the problems appear even more acute and the need for intervention quite urgent.

In order to appreciate this we do not need to look ahead very far and speculate about the consequences of population growth in these mountains. Let us just consider the year 2000 and ask, "What are the resource and environmental implications of population growth at the turn of the next century?"

The impact of population growth, as well as that of other variables, may be viewed from at least two perspectives. Firstly, we may compare how things are today with how they are likely to be in 2000 A.D. Secondly, we may compare two possible situations that may arise in the future.

With regard to the first perspective, I think that differences in reasonable population projections appear relatively small. I might hazard a guess that between now and the year 2000, population may increase roughly between 25 and 40 per cent.

From this vantage point, the important question is how to cope with an increase within this general range. On the other hand, if we are in the year 2000, the difference between the two estimates is likely to appear much more significant.

Population growth affects resource needs and the environment largely through the economy. Our starting point, then, may have been the development of a picture on a sector-by-sector basis of what the economy might look like in the year 2000. Accordingly, we could have developed different scenarios, further assuming, say, high population and economic growth, low population and economic growth, and the two intermediate cases. Of course, common to all those scenarios, we would also need to assume many other variables, such as changes in productivity and consumption patterns, aggregate savings rate, and so on. Results from all of these exercises, I tend to think, would be rather academic, however interesting, with one unflinching conclusion:

increase in population which will obviously close off options. There will be less land per person, less choice, less room for diversity, and less room for error. Apart from these few comments, I doubt if we can usefully speculate further.

While a reduction in population would be a blessing, it would hardly be a panacea, at least not by the year 2000. During that time period, more direct attacks on problems of poverty and environmental degradation in the mountain areas will be needed, in any case.

I hope that by now I have been able to establish the legitimacy of our concern for mountain environments. If so, the next logical issue I wish to raise is this: Where do we go from here? What can we do to safeguard the mountain environment so that the people here can enjoy better living conditions? I believe we can take several steps now that will make a difference.

Firstly, we must recognize that poverty, which strains the supporting capacity of the local environment, and lack of technology and development itself are at the root of the environmental deterioration in mountain areas. Thus, our approach should not be guided by a soft-headed desire to repeal technology and reinvent the Garden of Eden. Rather, we must utilize the enormous potential of the mountain areas in responsible conservation-oriented ways. Without slowing down the pace of economic programmes, we can and should avoid or mitigate some of the environmental damage that economic projects can cause. We should understand that there is no such thing as complete or absolute check or control. If we are to make use of the environment, there is also a price to be paid. This is the trade-off about which we should be careful. Many may like this choice; for those who do not, there will be fewer alternatives left.

Secondly, economic development that is ecologically sound should go hand-in-hand with cultural change. The full participation of local people in their own development must be a principle of our method of work. Often planners from outside will learn a great deal about sound, time-honoured conservation practices from local people. Planners may need to adjust to suit cultural norms or adapt to logistical and energy constraints. Although all cultures are in the process of change, in the last analysis, our focus should be to learn from the local people and train them to manage their own environment and adopt better living standards.

Thirdly, the interdependence of the hills and the valleys in almost all sectors of development and at all levels of administrative units calls for new forms of mutual aid and co-operation. It is the erosion of the mountains which leads to excess run-off of water and floods in the valleys. It is the lack of food in the hills which forces people to migrate seasonally to the plains to trade and earn a livelihood. Here, also, we have a challenge and an opportunity to manifest this interdependence: Present the problems to the people and the participating national scholars and administrators of the mountain areas and mutually seek solutions.

And, finally, there is a clear-cut need for an integrated approach to mountain development. Integration, of course, is a hackneyed term, perhaps more honoured in principle than in practice. The modern world, in its quest for knowledge, has evolved a vast spectrum of specializations and scientific disciplines. As recently as 15 years ago, people trying to work out environmental balance had no conceptional framework to direct their efforts. Now, environmental science has emerged and there are a number of universities which offer academic programmes in these fields. Mountains, studied as discrete systems, can

benefit from these developments. If oceans have oceanography, why cannot mountains have a field of study that is uniquely theirs? Here again is a challenge and an opportunity to integrate or bring together all relevant specialities or approaches to bear upon the problem of mountain development.

Although the problems of mountain environments may be viewed from different perspectives, we can all agree on some common elements: land degradation, out-migration of mountain peoples, deforestation, siltation, and flooding downstream, and so on. Likewise, the measures required to deal with them appear differently to various groups involved. The technicians in compartmentalized government departments may deal only with that part of the problem which involves their professional expertise. For instance, a forester may only be concerned with planting more trees and protecting the existing forests. An irrigation engineer may be concerned primarily with proper sites for constructing dams and digging canals. Likewise, an agriculturist will pursue his own narrow course, while a park ranger will be concerned with preserving his own territory. But our experience so far has shown that going it alone with such approaches is not likely to solve the problems of mountain environment and development.

If we are to look at the approaches taken by other groups we find similar disjointed efforts. Bilateral and multi-lateral aid agencies may only seek narrow technical solutions and may overlook their social and economic implications. Social science researchers and scientists may be so wrapped up in their theoretically tidy dissection of a local phenomenon in their specialization that they may appear to ignore the rest of the world. For any scientist who is an outsider, discovery of the relations of his discipline may, of necessity, have to be through the eyes, ears, and the language and perceptual screens of the local people. Of course, this may seem to be less true of the natural and physical sciences than the social sciences. But, like the Eskimos who have perhaps twenty distinctive words for snow, the Himalayans may have twenty fine distinctions for yaks. In short, not only the discovery but also the development of this mountain region may not be possible without the full participation of the mountain people.

The local leaders may be concerned with current economic and political power and about strengthening their own positions. The government, as everywhere else, may find itself busy working from what may be called "crisis and squeaking wheel" principles. In the short term, this may be understandable, but our kind of problems demand long-term consideration. This may be inherently political in nature. First and foremost, we must convince leaders at all levels that solutions to problems of mountain environment and development are feasible and to their advantage.

And, finally, let us look at the mountain dwellers themselves. Most of them are subsistence farmers and herders. The fulfillment of their need for food, fuel, and shelter from the existing resource base has already strained the supporting capacity of the local environment. Overgrazing leads to deterioration of the food base; lack of water or misuse of it to desertification; terracing for additional cropland to soil erosion and landslides; and satisfying the need for fuelwood to deforestation, erosion, siltation, and floods. Even though the mountain dwellers may not be able to express these things in our terminology, I think they perceive the changing situation around them. They certainly are not ignorant of what is happening but what options do they have when they are trapped in the vicious circle of poverty? What can they do, other than continue what

they have been doing for generations and to move out to other areas if they cannot make a living?

For individuals or families, the main concern is to meet the immediate basic needs. For the majority of them, the rising tide of expectations has perhaps been no more than a mere struggle for survival. Naturally, they will emphasize the short-term solutions to improve their everyday situation. If they do not consider the long-term situation, it is precisely because they have no protective cushion between the short and the long term. That is a fact of life which we must face. Besides, is it not true that in all walks of human life, short-term considerations tend to win over long-term benefits? In mountain development, I think it should be the other way around. For this we must first stabilize the immediate conditions of want by building on traditional skills and ability and convince the mountain dwellers of what is in their best interests for the short as well as the longer term.

We can all agree that, by and large, there exist technical solutions for many specific development problems in the mountains. We may be far behind, however, in our socio-economic understanding of what is required to fit these technical packages into local patterns of life, as well as to foresee unintended consequences of new programmes and new tech-

nologies. What is needed now is mutual co-operation to identify effectively what is known, what needs to be learned, and how this knowledge could be passed on to different interest groups to co-ordinate actions for solving the problems of mountain environment and development. This is yet another unique opportunity for us to pursue an integrated approach. Any progress made in this direction will, I would think, pay handsome dividends to overall mountain development.

I am aware that I have perhaps raised far too many issues and touched on them rather briefly. My purpose in raising them in this somewhat prefatory manner may be judged not only by the views expressed, which may appear differently to different individuals, but by the desire to stimulate discussion. If the present symposium finds it worthwhile to discuss any of these issues, I shall consider myself amply rewarded.

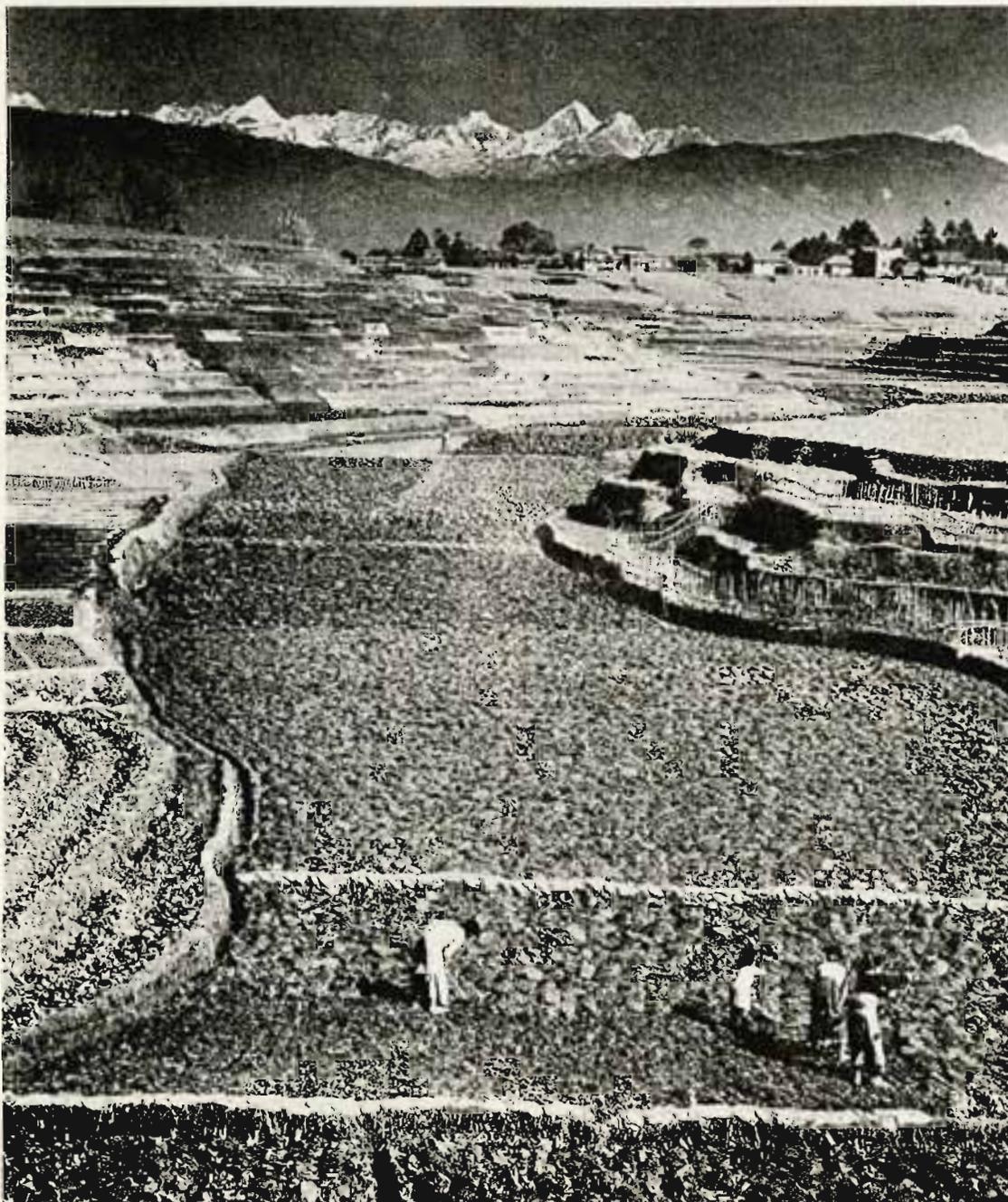
In closing, may I echo a sentiment as well as an appeal: Let integrated mountain development eradicate poverty, protect the environment, and, with forethought for the future, generate the will to manage wisely the resource base of the mountains mankind has neglected to its loss and peril.

Thank you

Introduction to Country Statement Section of Symposium

The following section contains views on conditions in the Hindu Kush-Himalaya and the state of development, as seen from the individual perspectives of the countries in the region. These statements have been excerpted and summarized from the addresses and papers presented at the Symposium or material published subsequently.

This section focuses on the challenges, problems, and progress of mountain development as experienced by the member countries in dealing with their particular portions of the mountain environment. The comments also direct ICIMOD's attention to special needs of each country and list some expectations of ICIMOD.



Country Statement—Afghanistan*

The Hindu Kush dominates the topography of Afghanistan, reaching southwestward out of the Pamirs into the centre of the country. In the east and southeast, mountains and hills extend to the international boundary. In the north, they extend to the Northern Plains and the flood-prone flatlands of the Amu Darya (Oxus River) on the USSR border. Approximately 60 per cent of the country's population lives in the mountains. The Hindu Kush also controls the economy of Afghanistan, supplying timber, minerals, pasture lands, and water for hydroelectricity production and irrigation. Fuel provided by trees and shrubs meets over 50 per cent of Afghanistan's domestic energy needs, the demand for which is leading to deforestation and increases in fugitive dust in the atmosphere.

Afghanistan covers about 65.22 million hectares, of which approximately eight million hectares are arable—and only about half of this is cultivated annually. Agricultural land is scarce but water is scarcer still, which limits cultivation. Water is the key to life in Afghanistan and the snows of the Hindu Kush are the source of most of it.

Stability of the Hindu Kush is vitally important to Afghanistan for soil conservation, afforestation, and prevention of sedimentation in water storage facilities, among many other needs. Stability is important for maintaining hydroelectric generation, irrigation water supply, and a healthy environment for timber and fruit trees. Pistachio, for example, which grows wild in the

mountains, is a large earner of foreign exchange for Afghanistan.

The concept of integrated mountain development is extremely important to Afghanistan, of which about 80 per cent is in mountains and hills. Ecologically and economically sound management of mountain environments is necessary to improve the lives of the people who live there and for improved production from resources, such as forests. Combined efforts of the countries of the region, with assistance and co-ordination of ICIMOD, can be very helpful. Care should be taken, however, to insure that ICIMOD does not become only an academic centre. ICIMOD should become a centre to which the countries of the region can look for technical assistance and guidance.

Documentation is an excellent idea, the primary purpose of which should be the sharing of information. Member countries should be kept aware of important development practices in the region so that they may benefit from relevant experience gained elsewhere.

Seminars, workshops, training, and the provision of expertise will assist greatly in evolving and implementing integrated mountain development plans. Experienced consultants could visit the countries of the Hindu Kush, assess the resources, and suggest lines of action. Training or workshops could then be organized to deal with the particular needs of each country.

Country Statement—Bhutan*

Bhutan covers approximately 46,000 square kilometres, of which about 31,399 is forested. Bordered by China on the north and India on the south, Bhutan lies between 26° 40' and 28° 15' north latitude and between 88° 45' and 92° 10' east longitude. The country is largely mountainous with lowlands in the south. Elevation varies from 158 metres to 7,554 metres at the highest point in the northern mountains. Administratively, the country is divided into four regions, comprising 18 districts (Dzongkhag) which are sub-divided into 202 blocks. Roads serving the mountainous areas total 1,900 kilometres.

The total estimated population is 1.2 million. Thimphu, the capital, has 20,000, and Phuntsholing, on the Indian border, has 13,000. The remaining population is widely dispersed, with an average density of about 24 persons per square kilometre.

Bhutan's Gross Domestic Product (GDP) in 1980-81 was Nu. 985.6 million (U.S. \$98.56 million), annual per capita income was Nu. 839 (U.S. \$83.90). The economy is largely subsistence with barter a common medium of exchange. Agriculture, including forestry and livestock, accounts for 54 per cent of the GDP and 95 per cent of the employment.

Forests constitute one of the major resources of Bhutan and are vital for the environmental balance and economic development of the country. Conservation and sound uses of forest resources are extremely important. Bhutan has adopted a National Forest Policy focussing on the following programme areas: Forest Conservation, Afforestation, Resource Survey, Utilization, Wildlife and Recreation, Forest Administration and Training, Investment, Revenue, Research and Publicity, and Forest Law.

A national inventory of land use and vegetation has been carried out. Non-forested lands permanent snow and glacier areas, barren lands, water covered areas, and valley, terrace, and traditional shifting cultivation—account for 15,200.9 sq. km., or 32.61 per cent of the total land area. Forested land includes: areas classified as forest land but without trees—alpine meadows and scrub land (5665.75 sq. km.); and tree covered forest land—conifer, upland and lowland/tropical hardwood, and plantation (25,733.65 sq. km.). Total forest area covers 31,399.4 sq. km., or 67.39 per cent of the country.

Animal husbandry is an important part of the agricultural sector. Cattle provide draft power and milk. In higher regions, yaks provide transportation, milk, and meat. Sheep, pigs, and poultry are also important.

Although livestock are well adapted to local conditions, productivity is low. Bhutan's Fifth Five Year Plan emphasizes increased productivity through improved breeding and management of livestock, and better nutrition through the Pasture, Fodder, and Feeds Development Programme.

Of the 31,399.4 sq. km. of forested area, 9,020 sq. km. has been set aside as sanctuaries, national parks, and wildlife reserves. The Department of Forests has proposed an additional six reserve forests for southern Bhutan amounting to 485 sq. km.

Existing and proposed reserves and parks will account for 20 per cent of the total land area of Bhutan.

To protect the mountainous environment of Bhutan, the Forest Department has made the following land-use proposals:

- all level land and slopes below 20° should be reserved for cultivation and settlement;
- areas close to settlements with slopes between 20° and 45° should be used for orchards;
- areas included in the above categories but, for some reason not suitable for cultivation or orchards, and slopes above 45° should be maintained in permanent forest cover;
- areas above 4,000 metres should be maintained as alpine pasture with rotational grazing allowed under the Pasture Development Programme;
- fuel, fodder, and fruit trees should be planted on boundaries of cultivated areas and in buffer belts between forests and settlements.

Social forestry will also be promoted in order to create an awareness among rural households of the need for better forest management and to increase the supply of fuel, fodder, and timber. Each household will be encouraged to plant ten trees on its own land with trees supplied by the Government. During the Fifth Plan, the Government will expand and improve forest nurseries and distribute 400,000 trees.

Under the afforestation programme, a World Bank financed plantation effort is underway in the denuded forest areas of southern Bhutan, comprising 40 sq. km. The objective is to improve the degraded area and increase the supply of wood for industry and fuel for domestic use.

The mountainous topography of Bhutan requires special efforts to preserve the forest cover. Some of the problems faced by Bhutan in preserving forests are:

- shortage of trained technical and professional forestry personnel;
- lack of experience;
- lack of public awareness of the need for forest conservation due to the low literacy rate;
- lack of communication;
- forest fires—the majority of which are deliberately man caused;
- shifting cultivation—a traditional practice in the south and eastern regions—depletes forests and damages soils through repeated slash-and-burn activity;
- un-regulated and migratory grazing.

The Government of Bhutan has undertaken a programme to reduce the damage caused by shifting cultivation. A systematic survey is being made of the affected areas and the percentage of land that can be converted to permanent fields and terraces is being determined. Incentives to discontinue the practice are being offered to shift cultivators and, in some instances, they will be re-located to suitably developed areas. Land, housing, schools, and health facilities will be provided.

*Prepared by C. Dorji

The annual per capita consumption of fuelwood in Bhutan is estimated at 2.6 cubic metres, creating heavy pressure on forest resources. The Government is considering developing and introducing fuel efficient wood stoves and bio-gas facilities.

ICIMOD could help Bhutan in its forest and environmental development needs in many ways. Training Forest Department personnel would strengthen the Department's ability to carry out its programme. The Forest Department is also a very young agency and effective transfers of technology in areas of silviculture, afforestation, research, and communications would help greatly.

ICIMOD could help Bhutan reduce the pressure on its forests by providing guidance and assistance in developing fuel-efficient wood stoves, bio-gas, solar energy, and mini-hydro power plants. Assistance in designing and operating local manufacturing facilities for these products would be helpful.

ICIMOD could also provide expert or consultant services for specific needs. Study and observation tours for Bhutanese development personnel to appropriate sites in other countries would help in the exchange of technology and allow them to learn from the experience of others.

Country Statement—Burma*

Geographically, Burma lies between 10° and 29° north latitude and 92° and 101° east longitude. It extends 2,092 kilometres north to south and 933 kilometres east to west, encompassing 676,571 square kilometres. Mountains and hills border the north, east, and west; the land declines toward the sea in the south. The elevation varies from sea level to about 6,096 metres in the mountains bordering China. Several rivers flow from north to south, the most important of which are the Irrawaddy, the Chindwin, the Sittang, and the Salween rivers, all of which are navigable to a large extent. Burma is divided into fourteen States and Divisions, of which seven Divisions in the north, east, and west are mountainous and cover a considerable area.

The Government considers the development of these mountain and hill area very important and has begun both short and long term programmes in agriculture, forestry, education, health, and communications.

Emphasis has been placed on agriculture, forestry, and livestock development, with priorities on increased production for regional and national self-sufficiency and enhanced production for agro-industries and export.

The strategy has been to introduce the township-wide High Yielding Production Programmes. Initially, these programmes focussed on rice cultivation but, with the success of these strategies, other crops, such as maize, wheat, groundnut, and potatoes, have been added for the mountainous states where soil and climate are favourable. These areas have been deficient in rice and the Government intends to raise these regions to self-sufficiency while developing other crops.

In the hills, traditional methods of shifting agriculture have led to deforestation, soil erosion, soil depletion, and changes in climatic patterns. To counter these damaging practices, the Government is building contour bunds and permanent terraces while concurrently teaching improved farming techniques.

Long-term crops are encouraged: apples, pears, oranges, walnuts, coffee, tea, and citrus. Nurseries established in the region provide high yielding varieties at reasonable prices.

Assistance is being provided for silk worm production, a cottage industry especially suited to these areas. Sericulture has had encouraging success in Chin and Kayah states and has generated supplementary incomes.

Increased agricultural development requires increased inputs, such as fertilizer, pesticides, seeds, and implements. Supply and transport is often difficult, but the Government delivers inputs where needed at subsidized rates.

Mechanized agriculture has been introduced where the geography permits. The Government has established tractor stations and assisted village tractor co-operatives in financing, procuring, and operating their own fleets of tractors.

Irrigation is an essential part of these development efforts, leading toward increased production and more permanent cultivation. The Government has built numerous small diversion weirs and canals and is encouraging village self-help schemes to build irrigation works. Villagers provide the labour; Regional Development Funds provide financing and other inputs.

Combining agriculture and livestock in integrated farming is another approach that, if accepted, would generate additional income for people of the hills. Government livestock farms in these regions provide improved breeds. Inhabitants of these areas are being trained in integrated farming. Groups of successful cadres (trainees) who wish to establish their own farms may obtain loans.

Aquaculture has been introduced to appropriate areas in the hills. Fish breeding centres distribute new varieties of fish and provide training and advice in improved techniques.

Poppy cultivation, a persistent traditional practice in the mountainous areas east of the Salween River bordering China, Thailand, and Laos, has been banned and vigorous steps have been taken to eradicate it and replace it with more diversified crops. The Government assists in resettlement, land preparation, cultivation, and provides inputs at low cost.

Burma has abundant forests in the hill regions which contain valuable flora and fauna. These regions are also the watersheds of the country. Disruption of these areas would seriously alter the climatic patterns and adversely affect agriculture. To protect these forest resources, the Government is undertaking the following measures:

- commercial species of flora are extracted on a scientific, sustainable yield basis;
- areas denuded by shifting cultivation will be reforested, providing soil protection and additional incomes to the local people;
- watersheds, in particular those serving dams and hydroelectric stations, are being protected;
- forest areas will be protected by strict laws and additional reserve forests will be established;
- pastures and grazing lands will be planted with tree wind belts to protect and shelter cattle;
- additional Local Supply Forests will be established to meet growing fuel demands;
- fast-growing species will be supplied free for the establishment of private plantations.

In order to reduce the dependency on wood for fuel, the development and use of bio-gas facilities will be encouraged. The Government provides training, financing, and materials to support this effort.

The supply of sufficient and easily accessible domestic water is another important concern. Storage tanks have been built and water pipes laid wherever feasible.

These are some of the efforts undertaken by the Government of the Union of Burma for the development of agriculture, forestry, and livestock in the mountainous regions of the country. Similar efforts are underway in education, health, communications, and culture.

The problems of Burma's mountainous regions are numerous and complex and their solution is very important to the economy, both regionally and nationally. The papers and discussions at the ICIMOD Symposium will contribute greatly toward concepts of integrated mountain development, benefitting the region as a whole.

*Prepared by H.J. Kimlai

Country Statement—China*

It is very important for China to attend to the conservation and development of natural resources in her mountain areas. Two-thirds of her total land area, two-fifths of her cultivated land, and one-third of her population are in mountainous areas. China's mountains contain many unique eco-systems and rare flora and fauna. Her mountains also generate significant effects on the adjacent lowlands.

The Himalayas and neighbouring mountains and highlands form the Qinghai-Xizang plateau, most of which lies within the borders of China. The interest of world scientists has long been drawn to the plateau's massiveness, elevation, and geological youth. The following is a brief summary of the major characteristics of the plateau as noted through research carried out by China in recent years.

The Qinghai-Xizang plateau is the highest plateau in the world, with an average elevation of 4,000 to 5,000 metres and more than 70 peaks over 7,000 metres. Bordered on the north by the Kumlum Mountains, on the south by the Himalayas, on the east by the Hengduan Mountains, and on the west by the Karakorum Range, the plateau covers 2,400,000 sq. km., one-quarter of China's territory. It is the youngest large plateau in the world, uplifted mostly at the end of the Pliocene epoch, although movement continues in the present.

The effects of elevation, geographical extent, and the monsoon on the plateau have created extremely complex horizontal zonation. The northwest is high and gently undulating; the southeast somewhat lower with deeply eroded gorges. Annual precipitation varies from over 2,000 mm in the south to less than 20 mm in the north. Vegetation ranges from tropical forest on the southern slopes of the Himalays, through montane coniferous forest, alpine scrub and meadow, alpine steppe, and, finally, desert in the north.

Vertical zonation is sharply distinct. In the south and southeast, within a few kilometres, elevation can vary by 5,000 metres. Two systems of vertical zonation occur: the oceanic-humid and sub-humid; and the continental-arid and semi-arid. The oceanic system prevails in the south and southeast, characterized by intensive erosion, biochemical weathering, acid soils, and mesophytic vegetation. The continental system occurs in the interior, characterized by wind erosion, physical weathering, alkaline soils, and xerophytic vegetation.

Flora and fauna are highly diverse. In Xizang alone, there are 191 species of mammals, 532 species of birds, 49 species of reptiles, and 32 species of amphibians. Of higher plants, there are 470 species of ferns, 50 species of gymnosperms, and 5,246 species of angiosperms. A large number of species are relict or rare, having survived in the many diversified or isolated natural habitats. Some areas are so inaccessible that they remain in an almost virgin state, providing opportunities for establishing baseline data in eco-system research.

Cultivated land is limited, covering 0.48 per cent of the area. Any future increases are limited by hydrothermal conditions. Pasture land covers almost 62 per cent of the area. Cold alpine pasture predominates, which is grazed by hardy animals, such as yaks, goats, and sheep.

Forest covers only 4.1 per cent of the area, but the total timber volume is estimated at 14 million cubic metres, the second largest reserve of forest resources in China.

Water, mineral, and geothermal energy resources are abundant. Severe natural conditions, inadequate transportation, and other socio-economic conditions hinder the exploitation of these natural resources.

Regional differences in agricultural production are common. Cultivated land is largely in the valleys. Forests are concentrated mostly in the south and southeast at elevations less than 4,000 metres. Natural conditions are unfavourable for growth of crops, but there are exceptional cases: high isolation and a prolonged period of moderate temperatures recently produced a record wheat harvest.

Many eco-systems and habitats of the plateau are extremely fragile, especially at high elevations and on steep slopes. Human activities, such as logging and shift cultivation, have caused severe erosion and, sometimes, irreversible damage. The problems are especially evident in transitional zones between eco-systems. Management systems should be adapted to local conditions and the characteristics of the specific eco-system.

Since 1950, Academia Sinica and other institutes have undertaken a series of research expeditions to the Qinghai-Xizang plateau. In the 1973-79 expedition, about 1,200 scientists and technicians from 50 disciplines participated in the field or in the laboratory. The results were published in the 32 volume series, *Monographs of the Qinghai-Xizang Plateau*. Many other papers and books were published and a pictorial book, *Exploring the Secrets of the Roof of the World*, and several films were produced. In 1980 an international symposium on the Qinghai-Xizang plateau was held in Beijing with the participation of nearly 300 scientists from 18 countries. Proceedings of the symposium were published in a two volume set, which has been presented to ICIMOD.

Emphasis in the Qinghai-Xizang has now shifted to applied research, especially that concerned with the problems created by local population growth. Study groups have been organized in the following areas: mapping and modelling of optimal use of natural resources; integrated use of energy resources in the mountains; felling and regeneration methods of montane forests and the impact on the environment; livestock carrying capacity of various pasture types; development of hot, dry valleys; prevention and control of soil erosion and mud flows; and selection and surveying of nature reserves.

*Prepared by Y. Hanxi

Country Statement—India*

ECO-DEVELOPMENT IN THE HIMALAYAS

The Himalayan region is a complex ecosystem with varied topography, climate, and soil conditions, ranging from tropical valleys to arctic mountains. The region presents unique ecological and geological features which are being threatened by accelerated pace of development and increased pressure on land, forest, permanent pastures, grazing lands, etc. The problems of the hilly region include:

- limited availability of land leading to agriculture on hitherto forested steep slopes;
- landslides and soil erosion;
- lack of irrigation facilities and windling water resources;
- poor transportation facilities, etc.

Recognizing the need for development of degraded hilly regions and with a view to scientifically manage the natural resources in conformity with environmental conservation, the following eco-development programmes covering both—the generation of basic data, as well as field action—have been initiated.

Action Oriented Eco-Development Research in the Himalayan Region:

Taking note of the need for institutional participation, programmes of eco-development have been devised to achieve total involvement of the students and faculty members of the universities in the Himalayan region for:

- a. arresting further damage to hill ecosystem; and
- b. restoring the damaged ecosystem as speedily as possible.

Forty-two projects are now operational in the Himalayan universities for solving the regional socio-economic and ecological problems. The voluntary agencies and national institutions located in the region have also been brought into the network of field operations. First annual workshop on eco-development action-oriented research in the Himalayan region was held during 21st and 22nd October, 1983 to:

- appraise the operational projects;
- resolve difficulties faced by investigators;
- lay stress on the applied nature of the new projects being evolved;
- emphasize need for more student's participation; and
- acquaint investigators with each other's work.

Major thrust of these schemes are on:

Nursery and Seedling Banks Creation

To cope with the demand of sapling suitable for different altitudes in the Himalayas, a chain of nurseries is being created for forage crops, grasses, and other species by the universities and voluntary agencies.

Watershed Management

To demonstrate the viability of environmentally sound management of a watershed and the stream of accruing benefits,

some selected watersheds, like Dachigam in Kashmir, Gamohar and Kotgarh areas of Sutlej catchment in Himachal Pradesh, Cola catchment in Kumaon Himalayas and Rangoon, and Singtum in Sikkim are being covered for integrated development.

Ecosystem Studies

To improve the existing knowledge of natural ecosystems, studies are being carried out on structure and function of simpler and matured ecosystems, recovery of damaged forest ecosystem, productivity of grassland ecosystems, etc.

Landslide Hazard Zonation and Mitigation

Considering the incidence of landslide occurrence in the Himalayas, this project has been initiated to suggest measures for stability of slopes, mitigative measures for prevention of landslides, and evolve early warning system to prevent loss of life and movable property. The project has been initiated in the Kumaon-Garhwal region. Its findings shall be made available for application in other regions, as well.

Student Participation

In order to create environmental awareness among the youth and to ensure their active participation in field programmes of eco-regeneration, universities located in Himalayan region are being supported for activities like tree plantation, soil conservation, survey and study of health problems, etc.

Regeneration of the Himalayan Foothills

A Technical Committee for detailing with the Himalayan Foothills Development Programmes has been constituted to look into aspects of eco-degradation with a view to evolve strategy for restoration as well as field action projects for immediate implementation. The programme is being developed as action oriented pilot project for regeneration of degraded areas along the fragile Himalayan foothills for sustained development. The project envisages development of technical packages with inputs on agriculture, forestry, horticulture, animal husbandry, management of water resources, etc. Application of these packages is to be undertaken on the basis of a spatial plan for suitable location of development activities. The programme implementation is proposed through regional institutions, universities, and developmental agencies already operating in the area. Action plans are being evolved for field projects at selected locations. One such proposal is being developed for a micro-watershed in Parandal region (Jammu and Kashmir) in collaboration with the State Forest Department. Other identified sites are located in the States of Himachal Pradesh, Punjab, Haryana, and West Bengal.

*Taken from: Department of Environment, Government of India, Annual Report, 1983-84; Chapter VI, pp 48-50.

Establishment of the Himalayan Institute of Environment and Development:

An autonomous Institute of Himalayan Environment and Development is being set up to evolve integrated management strategies and demonstrate their efficacy for conservation of natural resources and sustained development of the Himalayan region. The institute will also be the focal point for integrated policy planning in the areas of research and development, training and education, public awareness, and for undertaking field action projects in the fragile ecosystems.

The Institute will adopt a decentralized structure consisting of a chain of Centres of Advanced Studies, along with field stations,

along the entire Himalayan belt. The experts engaged in the Centres of Advanced Studies would have dual responsibilities—teaching, research, and training in the parent organization, and execution of projects in the charter of the Himalayan Institute of Environment and Development. The dual responsibilities would permit initiation of the regeneration programmes without loss of time. At the same time, such an arrangement would not deprive the existing universities/research institutes of the expertise available with them. A High Level Organizing Committee is to advise on functions, research programmes, and structure of this Institute.

Country Statement—Nepal*

The Kingdom of Nepal, situated on the northern rim of south Asia, covers 147,181 sq.km. and contains a complex maze of mountains and ridges, interspersed by deep valleys and lowlands. The country can be divided into three fairly distinct regions: the Terai, between 60 and 300 metres above sea level; the hills, between 300 and 3,000 metres; and the mountains, above 3,000 metres. These physiographic extremes have resulted in narrow bioclimatic zonation with tropical, temperate, and tundra vegetation types and climates falling very close to one another. Three major river systems drain most of Nepal: the Karnali, the Gandaki, and the Koshi.

The complex problems of hill and mountain development have raised several interrelated issues. Firstly, agriculture alone cannot support the growing population. Secondly, the long-term implications of the massive emigration to the Terai must be addressed. And, finally, there is a pressing need for afforestation in the hills.

Increasing interest has been shown in developing hill agriculture. Agriculture accounts for over 90 per cent of the labour force, 65 per cent of the national income, and, until recently, 75 per cent of foreign trade. The role of the hills in the economy is significant: they contain three-fourths of the land area and over half of the population.

Approximately 0.6 million hectares are under cultivation in the hills and mountains. The average farm holding is 0.5 hectares, compared to 1.7 in the Terai. Three-quarters of the cultivable land is in upland terraces, the remainder in valleys. Population density exceeds 1,600 persons per square kilometre of arable land.

Until recently, Nepali agriculture was self-sustaining, but now agriculture productivity is declining as the growing population demands more land, more building materials, and more fuelwood. Fragile marginal land is being cultivated and deforestation is becoming widespread. The net result has been an ecological imbalance, soil erosion, and landslides.

Poor transportation, communication, and an extremely rugged topography are major physical constraints on development. These are further aggravated by socio-economic constraints; e.g., a large proportion of the population lives below the poverty line and over 75 per cent of the population is illiterate.

The livestock industry plays an important part in the hill economy and constitutes an integral part of the total farming system. Nepal's livestock population per unit of land, however, is one of the highest in Asia. Acute feed shortages, parasites, late maturity, low fertility, inadequate livestock extension services, and migration are serious problems. At present, only 54 per cent of the needed feed requirement is available and that is expected to decline to around 43 per cent by the year 2000. Good quality green fodder is available only in the wet season from June to September. In the remaining seven dry months of the year, animals subsist in a semi-starved condition on crop residues.

Migration of people from the mountain areas to the plains presents many economic, ecological, and social difficulties.

Migration may have served a useful function once, but it has drained the hills of leadership and skills needed for development. While the population of the Terai has increased, there has not been an accompanying decrease in the hill population. The growth rate has declined but the absolute numbers of people living in this region continues to rise.

Until recently, it was believed that the Terai could safely absorb the excess population of the hills. It is now apparent that there is a limit to the carrying capacity of the Terai lands. The only solution lies in the economic development of the hills and mountains themselves. Agriculture, animal husbandry, cottage industry, and tourism need to be developed. Resettlement programmes will have to be initiated in the hills, as well.

In order to reduce out-migration, rural development programmes should begin with local labour resources. Training people for new occupations as well as improving education, rural health services, water supply, sanitation, and providing rural electrification, transportation services, and market centres would help improve life in the hills.

Identification and development of technologies appropriate to hill environments will be necessary. Improved farming methods, seeds, soil fertilization, composting, terracing, animal husbandry, fruit trees, irrigation, fodder production, water storage, and alternative energy sources need to be tested for local applicability and then transferred effectively to the farmers themselves.

Forests constitute one of Nepal's major resources. With the rapid increase in population, demand has grown for more cultivable land, fuelwood, fodder, and timber—with negative results on the forests. As people seek more land and clear trees from the steeper slopes the danger of soil erosion increases.

Wood provides nearly the entire domestic energy supply for the rural people and for a large proportion of the urban population. Lack of adequate energy is one of the major constraints on development in Nepal. With no proven deposits of fossil fuels, Nepal spends almost all of its foreign currency earnings on imported oil. Even the transport of firewood to urban areas depends on imported oil.

Much wood is wasted by inefficient construction methods. In the rural areas, hewing timbers and shingles with the simple hand axe produces a great deal of wasted material. The amount needed to build a house could be reduced by two-thirds if the timber was more efficiently and economically cut.

Extracting fodder from the forests causes heavy, long-term damage. Trees can tolerate limited stripping of leaves and twigs over long periods of time, but, if stripped too severely over short periods of time, the trees will die. Unregulated cattle grazing in the forests also causes serious damage.

The amount of forest land has decreased significantly in recent years. Between 1964 and 1979, Nepal's forest area was reduced by 2.1 million hectares. If present trends continue, accessible forests in the hills will vanish within 14 years and those in the Terai in 25 years. Deforestation and subsequent soil erosion may be the most acute problem facing Nepal.

*Prepared by *M. Malla*

The 200,000 million cubic metres of water that are discharged annually by Nepal's rivers and streams have tremendous potential which has barely been tapped. Total human withdrawals amount to less than 0.5 per cent. Of the estimated 1.5 million irrigable hectares, only 0.2 million have been irrigated. Less than 13 per cent of the population has access to safe drinking water. Of the 24,000 megawatts of hydroelectric generation potential, only 122 mw has been installed. Most water development schemes, however, have been built in response to individual needs—irrigation, power, water supply—and little attempt has been made to develop them on an integrated or multi-purpose basis.

Electricity serves only about 4 per cent of the population, mostly in the urban areas. Electricity for the rural areas will be provided eventually, either through extensions of power lines, or by mini-hydel plants. In developing mini-hydel capacity, it is extremely important to carry out detailed site studies in order to avoid erosion, slope destabilization, or even destruction of the plant by floods or landslides.

Development of hill irrigation facilities is a crucial consideration for increasing agricultural production. Despite abundant water in the hills, only a small portion of the cultivated land is irrigated. Most existing irrigation consists of small diversions from rivers and streams. Structures are damaged during the monsoon season through poor maintenance, sedimentation, or by landslides. In the dry seasons, they dry up completely. Lack of construction skills or an integrated development approach has resulted in many irrigation project failures and damage to the local environment, making it difficult, or even impossible, to rebuild in the same area. It is imperative that, while executing any irrigation project in the hills, careful consideration must go into the overall effects on the environment.

The ability of Nepal's mountain environment to support the country's growing population is now in serious question. The problems have been getting worse in recent decades and unless development measures with less negative effects on the environ-

ment are found, the ecological disruption will continue with great social and economic loss to the country.

Nepal is expecting significant help from ICIMOD in bridging the gaps in environmental knowledge and in devising sound management methods for the mountain areas. Without definitive analysis of the various components of development—water, agriculture, livestock, forestry—it will be difficult to make informed decisions about their sustainable development. The complex interactions between hill ecosystems and household activities must be studied properly in order to identify viable strategies for integrated development. Nepal hopes to gain needed information through the research facilities of ICIMOD.

Nepal will seek ICIMOD's assistance in research and development of appropriate technologies for energy and local industry. This will help conserve local resources as well as generate possible alternative forms of employment.

ICIMOD research may help Nepal identify improved institutional methods for carrying out integrated development on the local as well as the national level. It is important to promote community participation in resource management, using local institutions or organizations. National or regional institutions need to understand that technical and socio-economic development strategies must be suited to the needs and practices of the local community.

ICIMOD can help Nepal by assisting the country overcome its shortage of trained personnel and lack of access to the information and experience gained by other countries, both within and outside the region. By serving as a regional information clearinghouse and a source of expertise and training, ICIMOD will help Nepal avoid duplication of efforts being carried out elsewhere and assist in upgrading the professional capability of her development personnel. Nepal will also benefit from frequent contact with international scientists and experts who will participate in the many workshops and seminars ICIMOD plans to organize in the region.

Country Statement—Pakistan*

Like other countries of the region, Pakistan's dominant mountains are the Himalayas. With local variations, the mountain environment, flora, and fauna are similar. For example, in the far north, the yak is a common beast of burden, coniferous forests are found at the higher elevations, and deciduous forests cloak parts of the foothills.

Many of the problems facing Pakistan's hill environments are similar to those facing the other countries. In particular, Pakistan's forest resources are seriously threatened. Deforestation is proceeding at an alarming rate and, unless preventive action is taken, long-term forest sustainability is in doubt. The causes of deforestation are familiar: Conversion of forest land to agricultural land, shifting cultivation, commercial and illegal logging, firewood extraction, and poor land-use practices. Deforestation has upset the balance of other resources and has caused many socio-economic and ecological problems: excessive seasonal flooding, soil erosion, gully formation, loss of life and property, drought in the dry season, degradation of agricultural land, and siltation of rivers. Forest product industries, like the sporting goods industry of Sialkot, rely on the continued health of the forest resources. Similarly, the poor people of the hills still make their living cutting firewood.

Problems in the mountains and hills cause significant problems for the lowlands and plains. Vast areas of irrigated agriculture, as well as hydro-power generation, rely on the rivers that have their source in the Himalayas. Floods due to heavy rain and snow in the Himalayan catchments can have serious effects on the lowlands.

Impairment of human health is also a widespread problem. Lack of basic community sanitation, drinking water, and primary health care, as well as environmental pollution of air, water, and

soil, are chief causes of the problem. Mortality rates due to water and soil borne diseases are significantly high in Pakistan, as in other countries of the region.

Developments relating to environmental protection are very important. Pakistan is actively addressing environmental impact assessment, pollution control, and ecological degradation, particularly with regard to mountains. Environmental awareness has grown, as evidenced by the formation of many non-governmental and inter-governmental environmental organizations. The institutional framework for sound environmental management has been strengthened, with many individual agencies being established.

An important development has been the growth in awareness among the developing nations of the region that they can learn from, the mistakes of the developed countries and take suitable steps to prevent degradation of their own mountain areas. It is in this context that the involvement of non-regional participants is welcome in ICIMOD. They bring with them wide experience of mountain development in other regions.

Management of the mountains is now seen as an integral part of the development process rather than set apart from it. There are many dimensions to the problems facing mountain environments and approaching them from any one discipline is bound to fail. An integrated approach is the most effective way of helping the countries of this region protect their mountain environments, improve the living conditions of the people inhabiting them, and safely develop the natural resources of the mountainous areas. ICIMOD should address these socio-economic and environmental issues precisely through the methodology of integrated mountain development.

*Prepared by *H. Nawab*

The Three Dimensions of Himalayan Development

Dr. J.S. Lall

We have gathered here to do reverence to the abode of the gods in a way that may seem unusual to traditionalists but which the gods themselves would wholly approve. We are here as developers, and nothing is more urgently needed in the Himalaya today than constructive measures of development. Before we start our task it is absolutely vital that we know something of the daunting variety of the Himalayan situation. Can we approach it with ready-made models conceived in distant offices? Where, indeed, should we begin? The answer can only be: On the ground, and we will never be able to comprehend the ground truth unless we shed many of the preconceptions acquired in years of happy wandering in the Himalayas, of study, and even of worship.

For each one of us here the Himalaya may have a different meaning. For the geologist it is a striking example of tectonic upthrust, for botanists a rare treasure house of species, for climbers the ultimate challenge, and for those of us who depend on them for a livelihood the Himalaya are a demanding taskmaster. The first preconception we have to shed is that the Himalaya are some kind of Eden on earth where only man is vile.

For good or ill there are fifty million of us in this Eden. We cannot be wished away. But it would be disingenuous to suggest that the changes man has set in motion are not in most cases anything other than highly adverse to Himalayan ecology. Our first task therefore will be to study the interplay between man and the resources which exist in his given piece of real estate. These are the two principal factors we have to take into account in formulating our approach to development.

To start with, the natural environment itself is differentiated beyond belief. I shall not presume to remind this learned audience of the geological, climatic, and other factors. In its great length of 2,500 km and average width of 200 km the system comprises an unparalleled range of characteristics. The mighty upward heave which created the Himalaya in four major longitudinal belts has also torn them apart in a chaotic web of towering mountain, gorge, and valley, facing every conceivable point of the compass. As if this wild diversity were not enough, as the connecting arc between what Arrian, in his account of Alexander's campaign, called the Caucasus, and the shelving hills of South-East Asia, the Himalaya at one end are temperate and at the other tropical, with an intermediate zone in which there is a shading off of characteristics.

Adopt whatever criteria we may, whether soil, climate, height, rainfall, situation, or aspect, it will be difficult to find two watersheds that are identical. Often what is most striking are the differences. Thus, only the razor's edge of the Rohtang pass divides the rich and fertile Kulu valley from the harsh cold aridity of Lahaul-Spiti. But eco-systems differ also in adjoining areas in the same zone, between Sikkim and Chumbi, for instance, or on either side of the Se La in Bhutan. Ecological differences will be found even if the ring is drawn much closer in the same environment. For example, the Dombang micro-watershed, which is a small affluent of the Lachung Chhu in Sikkim, has sizeable stands of larch in a continuous and

unbroken zone of abies. When closely studied it will be found that each watershed is sufficiently differentiated to be treated as a distinct entity for the purposes of development.

Enter man, and with him we meet the most decisive factor in the vast processes of change that have overtaken the entire mountain system. He is at once the principal beneficiary of its resources and the primary agent of change. It must be said too that man is the main sufferer of the sequence of diminishing resources which he has set in motion by his struggle for survival. I need hardly remind this audience of the enforced exodus from Mahabharat to the Nepal Terai and from the districts of Garhwal division in Uttar Pradesh virtually to every corner of India. The floods and devastation that have doubled in the plains of India in the last twenty years can be traced back to the remotest watersheds in the Himalaya, over-tilled and bereft of vegetative cover. I have tried not to load this paper with statistics. My argument is essentially simple, but to clinch the point that man is the most critical factor in the making and unmaking of Himalayan ecology, I shall repeat a table of figures from a paper by the noted agricultural economist, Dr. S.L. Shah. These figures apply to the eight hill districts of Uttar Pradesh, but they are equally typical of the entire region.

Year	Population (million)	Forest stock (million cubic metres)	Cattle units (millions)	Grass stock (dry matter) (mill. tonnes)
1981	4.787	66.00	3.40	8.86
1991	5.995	36.30	3.46	5.30
2001	7.508	19.96	3.52	3.17
2011	9.404	10.98	3.58	1.90
2021	11.777	6.04	3.65	1.14
2031	14.750	3.32	3.71	0.68
2041	18.472	1.77	3.78	0.41

(Source: Presidential Address, dated 25th December 1981 at Dharwad, Karnataka University).

As you will see, resource depletion is a stark fact. It did not happen all at once. The pressure on resources can be traced back to two different demands. The expanding local population needed ever increasing areas of land to till, and supplies of firewood, fuel, and fodder. But a much more formidable and variable demand arose from markets outside the Himalaya. It was not for forest produce only, but also its abundant waters and latent energy. The unprecedented expansion of communications and industry after the First World War was a major turning point. Three factors combined to make it easier to satisfy the intensified demand for Himalayan resources—the road, the motor truck, and the railhead. Whole hillsides of timber fell to the axe. More than anything else it is the depletion of the forests which has brought about devastating changes in Himalayan ecology. The effect on the resource situation has generally been very adverse, but because of the operation of complex local factors, the effect has also been highly diversified.

Why is this so? The short answer is that it follows from the diversity of peoples who have made their home in the hills, and even more so because their response to available resources has perforce been determined by the situation in each watershed. Even when community structures and cultural mores have been similar, nature may have been prodigal in one case and harsh in the next.

To start with, there could hardly be a more startling conglomeration of people anywhere in the world. The population of fifty million or so have been brought together in a unique contact zone from three different civilisations—from the north, south, and west. All the world's major religions have found lodgement there. These demographic and cultural movements have followed the natural passages, north to south along the river courses, and laterally, in the great transverse valleys.

There is no better example of these processes than the Kingdom of Nepal. Upheavals in the plains of Hindustan forced proud Rajputs into the interior of the middle hills, and the transverse movements were typified by the conflict of Gorkha and Malla kingdoms in the Kathmandu Valley in the 18th century. Distinctive demographic enclaves can also be found in the Tibeto-Buddhist highland valleys and the Hindu dominated areas in India, such as the polyandrous Jaunsar Bawarias in Dehra Dun district and the isolated village of Malana in Kulu. It has been surmised that these blue-eyed people are descended from stragglers of Alexander's army. We know that as he moved on he left behind the old and unfit.

Up to this point I have stressed the high degree of environmental, ecological, and human variability in the Himalayan situation as it is today. Conditions have been created from watershed to watershed that defy standard approaches. Thirty years ago the UP government in India passed the Zamindari Abolition Act. Its provisions were applied without variation to the highland valleys populated by Bhotias, whose main economic activity was trade with Tibet. When that stopped, they found they had lost substantial portions of their holdings. In keeping with the resilience of most border communities they soon turned their trading instincts to the lower valleys. Von Fuhrer Haimendorf has described how the Thakalis of the Karnali valley responded in exactly the same way to changed conditions on the border.

Even such a manifestly beneficial measure as abolition of serfdom can misfire. A few years ago, the Sulungs of Chayang Tajo in East Kameng were freed by paying off their Bangni masters. It didn't work. As one enlightened Sulung put it, they didn't know the meaning of freedom. Instead, the government should first of all have given them good medical facilities, then education, and finally independent settlement. By themselves, good intentions are seldom enough.

These are two examples of misconceived approaches unrelated to the prevailing situation. Let us take another case, of application of standard development programmes. Earlier this year the middle Teesta Valley was the scene of an ecological disaster of considerable magnitude. The facts are fresh in our minds. In the last twenty years short-sighted measures of so-called development had resulted in overloading the support capacity of this extremely fragile valley with excessive infrastructure as well as a disproportionately large influx of outside labour, all scraping a living from the soil. Disaster followed. Why? Because year after year considerations of ecological security in this particular watershed had been tragically subordinated to other considerations, even though the two could have been reconciled.

In short, even if we, as developers, should perchance forget, the Himalaya will unfailingly teach us what we need to know. Fix whatever unit we may, and I shall just say it should be a hydrological sub-system, a mini eco-system in which natural and human resources are integrally related to each other, let us start by getting to know it. This process must begin with understanding the people, their present needs and potential, their community structures and management system. Then, in association with them, the resource situation will be studied and development plans drawn up, designed for the sub-system itself, and not for a hypothetical unit conceptualized in our central offices. Guidelines will help, but standardised approaches are likely to prove expensive failures. More than anything else, let us start only with as much as the people can assimilate, using, as far as possible, local initiative, manpower and even know-how. If extension is handled correctly it should result in effective technology transfers at the level needed.

There is time only to indicate the outlines of the approach I have recommended in detail elsewhere. The goal of socio-economic development must rest on the secure foundations of resource protection, regeneration, and production in the unitary eco-systems. Forests and vegetative cover generally hold the key to the situation. Their protective value is well understood, particularly in strategic and endangered areas, and they are vital for the regulation of the water regime. Socio-economic development of the constituent micro-watersheds need not be postponed until after the resources situation in the eco-systems has been stabilised. It should go together, but, as in the case of the eco-systems, clear priorities need to be adopted so as to obviate the all too common danger of diffusion of effort. Reforestation of depleted village forests with species which satisfy the people's needs for timber, fuel, and fodder, intensive rather than extensive agriculture, and measures to control erosion and extend irrigation are some of the main items of socio-economic development of the micro-watersheds. Realistically, we cannot hope to achieve a significant increase in the support capacity of heavily populated areas without turning down the graph of population growth.

As this brief outline of development strategy suggests, a simple set of measures based on clear priorities are more likely to be within the performance capacity of the people than elaborate schemes based on counsels of perfection. Before we can hope to land on the moon, let us set up a firm launching pad. And let me make one final point. Unless we can improve the lot of Himalayan man we were unlikely to succeed in our endeavour. This imposes a tremendous responsibility on the governments of the region. They have a clear obligation to set an example in judicious resources use. Directly or indirectly, they are the biggest converters of Himalayas resources, whether the end products are wooden furniture in Singapore or electrical energy in the glittering cities of the valleys and plains.

Summary

1. Himalayan environment is a complex of three factors: the natural endowment, men, and the interactions between the two. The three together make up the ecology of the Himalaya's constituent watersheds. Because of the great diversity of natural conditions and population groups, ecological conditions and population groups, ecological conditions in each watershed are distinctive rather than uniform.
2. In natural conditions ecological balance should exist in watersheds, which are the basic hydrological units. In

practice, however, **most of them suffer from grave ecological imbalance because of faulty and also excessive use of their natural resources. There can be no lasting development in the Himalaya without man's just needs being met. Therefore the** aim of Himalayan development should be **to reconcile** ecological balance of resources in the watersheds with their support capacity to sustain human needs.

3. Development plans should follow general guidelines, interpreted and applied in the light of conditions in each watershed, rather than standard models. Because of the alarming rate of **resource depletion**, the primary objectives of development should be protection, regeneration, and production. Restoration of forests and vegetative cover hold the key to control of erosion and **stabilisation of** water regimes, which are the two most urgent **resource problems** of the Himalaya.
4. A simple set of measures and adoption of clear priorities is recommended because:
 - i. protection of strategic and endangered areas cannot wait;
 - ii. money is not unlimited;
 - iii. the assimilative and performance capacity of the local

people is dependent on the time they can spare from subsistence occupations.

5. **Priorities recommended are:**
 - i. **Resource development in the eco-system (catchment).** (This will automatically look after water regimes).
 - ii. Reforestation of depleted village forests with species to **meet the people's needs for timber, fuel and fodder.**
 - iii. **Socio-economic developments, starting with the most vulnerable micro watersheds.**
6. **Genuine community involvement is essential for success in development.** How to achieve this in each case is a test of the ingenuity of social scientists and administrators. The actual executing agency has to be put together in the light of the **heavy commitments of existing district and block staff.** They are also habituated to a style of functioning which does not easily harmonize with a mass movement at the **people's level.** Something like a **people's volunteer force** could provided both motivation and drive, provided it is drawn from the areas to be covered and not inducted from outside. If importation of outside labour is unavoidable, measures should be taken to ensure that they do not **settle down to add to the burden on the limited support capacity available.**

Factors Affecting Pressure on Mountain Resource Systems

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"Man, being the servant and interpreter of nature, can do and understand so much, and so much only, as he has observed in fact, or in thought, of the course of nature: beyond this he neither knows anything nor can he do anything."

Francis Bacon, *Novum Organum*, 1620

Introduction

With many others, including many of those millions working and living in the remote mountain areas of the Earth, I have long shared the hope that there would one day be an international centre which would focus the talent of the scientific community on the critical problems of the people of the uplands of our planet. For they are a significant portion of our human family. Worldwide, they account for perhaps as much as 10 per cent of the Earth's population and they occupy a quarter of its land surface. Throughout much of human history, they have been both isolated and disadvantaged; isolated by the difficult terrain they inhabit and disadvantaged by the unforgiving environment in which they live.

Modernization and the transformations which have occurred in the larger lowland world have only recently begun to affect the lives of upland people. These impacts have been significant and not always positive, yet study of their effects has been sporadic and limited. This organized effort to bring talent from around the world to bear upon the problems of mountain people is long overdue.

I begin with a fervent plea to scholars, administrators, scientists, and political leaders to recognize the great opportunity which ICIMOD presents to do something substantive for upland people. Through ICIMOD, knowledge can be generated and applied to critical problems which affect us all; what happens in the mountains affects both the inhabitants of the uplands and those downstream whose lives are inextricably bound up with events in the mountain watersheds.

ICIMOD must move beyond collecting data and generating studies to applying knowledge to programmes designed to improve the longterm prospects of mountain people the world over. The process of applying knowledge to human problems must, therefore, be a central concern—perhaps the central concern—of those directing ICIMOD during its formative years.

Pressures: Natural and Man-Made

An assessment of the pressure on resources must begin with definition of pressure. The primary meaning, "the action or fact of pressing . . . compression squeezing, crushing, etc.", applies to the effect of natural forces at work within the mountains. A second meaning, "the condition of being painfully oppressed in body or mind . . . the action of political or economic burdens", is also relevant as we consider the effects of man's interventions

upon man himself in the uplands. Yet "pressure", as we use it in ecology and demography, goes beyond these meanings to include the concept of sustained and increasing demands upon natural systems by plants and animals—most importantly, perhaps, by humankind.

Pressure on mountain resource systems arises from two sources: the first natural and the result of forces outside the direct control of man; the second man-made and within man's influence. This typology, which separates man from nature, has a long scientific history but has difficulties. A century ago, an early environmentalist argued that, "It is not the earth which makes man but man who makes the earth", (Marsh, 1964). Yet modern science as a humanistic discipline draws its inspiration and uniqueness from the Baconian view that it is founded on the order of nature rather than upon the primacy of man and that, "Nature, to be commanded, must be obeyed", (Bacon, *op. cit.*).

The Forces of Nature

Within limits, the man-nature dichotomy may, therefore, be a useful starting point. Natural pressures begin with the geomorphological forces which created the Earth's mountains and which continue to alter them. Tecto-physics, the relatively young science concerned with the shaping and transforming of the Earth's continents through the movement of tectonic plates, suggests that the process of mountain formation continues, and that in areas such as the Himalayas the subduction of one continent beneath another may still be proceeding at a rate of as much as 50 mm per year. This movement through geologic time affects both the height and the backfolding of the mountains. In combination with rainfall, glaciers, and rivers eroding the valleys, the long-term consequence is to make mountain hillsides steeper, less stable, and more hazardous for human enterprise. For gravity, that inexorable natural force, works upon the soil mantle to establish the shearing weight at which it must pull away from the underlying bedrock. Thus, massive slips of land, landslides, and the steady erosion of upland soils into the rivers and their transport downstream are part of an ongoing process which has continued for millions of years, and which has created the fertile, alluvial plains. Without these natural processes, the major river basins upon which the human species is dependent for a high proportion of its food could not have been formed, and would not now be annually replenished.

Natural forces—including snow, ice, wind, and the heat of the sun—account for additional pressures on mountain resource systems. Yet, it is difficult, if not impossible, to quantify precisely what proportion of the total "pressure" can be attributed to natural, as contrasted to man-made, forces. Some observers conjecture that in the Himalayas at least one half—and, in some areas, as much as 70 per cent—of current environmental damage is the result of processes which are

largely outside of the direct influence of man. The actual percentage clearly varies from one location to another through time, and depends heavily upon what is being measured.

Historical and demographic assessments would suggest that during the past century the impact of human intervention has increased as a proportion of the whole, and that the rate of that increase continues to accelerate. A basic task for the scientific community is the careful observation of natural processes over time, utilizing rigorous techniques for precise measurement, to build an empirical basis for understanding. Only with such knowledge of trends can we hope to improve future assessments, policies, and development programs.

The list of other ways in which natural forces affect pressure upon upland environments is long. Where in our catalogue should we consider plant life? What is the role of the grasses and the naturally occurring shrubs? Indeed, the trees and the forests themselves—which must now be considered in conjunction with man and his organized interventions—earlier were entirely natural. And the insects and mammals? The critically important earthworm and the lowly mole? Each has an important role in maintaining the fertility of the soil upon which mankind depends for its basic food supply. Yet, we know too little, in a scientific sense, to assign any precise measurement to the contribution of such sources to pressure on mountain systems.

What about the role of fire? It occurs naturally, but it was also among the first great natural forces employed by man to alter the environment. Archaeological evidence “seems sufficient to sustain the opinion that man has set fire to the landscape during his entire history (Stewart, 1956:p.123), and contemporary observation indicates that grassland and forest fires are often started by humans, generally pastoralists grazing in the area. They possess cultural knowledge based upon generations of experience which indicates that burning improves the pastures. They believe the ashes enrich the soil and produce abundant shoots from the old roots, thus furnishing better fodder. Swidden agriculture, dependent upon the cutting and burning of forests in a long rotational cycle, has been a primary means of subsistence among many upland peoples. Clearly, their view of fire, like that of early man elsewhere, is that it can be a positive force when correctly used. This stands in contrast to the usual view of conservationists and foresters who probably have never had to clear a forest for cultivation with simple wooden hand tools.

Beyond traditional beliefs, scientific evidence supports the view that long-needle pine and other forests are sometimes dependent upon fire for their very existence, and that over many thousands of years man, fire, forests, and grasses have evolved a pattern which, so long as it is maintained at an appropriate level, is both economically advantageous and environmentally sound. What is “appropriate”? Where is the balance beyond which man must curtail or eliminate the use of fire in his management of mountain forests and grasslands? There is a large grey area between what is purely natural and what is the result of human intervention; an area where man has learned to manipulate and use natural forces, including not only fire and water, but also plants, animals, and insects to serve his interests—often without fully understanding the environmental or long-term resource depletion costs of such interventions.

Any explanation of pressures and their impact on mountain resource systems must go beyond simple cause and effect. Even excluding human interventions, these are complex interacting systems, each possessing an internal logic and cohesiveness; each interacting with and impinged upon by a myriad of other naturally occurring and man-made systems. These systems are

always adjusting and modifying themselves in relation to each other. Thus, the term “balance”, as applied to the component elements in the natural environmental and resource systems of the mountains, must be seen in dynamic terms.

Man is only now in the early stages of understanding the interactions of these complex systems. The most distinguished scientific minds acknowledge that the “interaction uncertainties” considerably outweigh our understanding of the “laws” affecting the inter-faces of such systems. For those who live in mountain systems at a subsistence level, an absence of future-time orientation and the imperatives of survival make it difficult, even impossible, to comprehend the long-term consequences of many environmental interventions which they initiate for short-term gain or survival.

This underscores the importance of the basic task of ICIMOD to document and understand process and affects through time, and, thus, enable humans to relate knowledge to action in ways which increase understanding and well-being. Such knowledge and understanding must exist as a precursor to the establishment of sound development alternatives for upland people.

Man and His Works

In an important sense, it is the growth of human population since 1650—demographic pressures—which lies at the heart of our current dilemma. For, while natural erosion and underlying geological processes continue, there appears to be, nonetheless, a rough dynamic balance within natural systems. It is important to recognize that man's impact upon these systems may be less than we have thought. These systems are so large that man's interventions may not, as yet, have had the irreversible consequences once feared. The scale and frequency of landslides appears, for instance, to be more nearly constant through recent decades than had been previously conjectured, substantial changes in vegetative cover notwithstanding. The critical importance of careful empirical measurement of both incidence and intensity of landslides, earthquakes, floods, and other natural events over time should be evident. To date, only a beginning has been made.

It is important to distinguish between what “everybody knows” and what is empirically established. “Everybody knows” that the mountains are young; that they are fragile; that population pressure has been increasing rapidly; that people need fuel and animals need fodder; that too many trees have been felled and that, as a result, run-off rates have accelerated, silt loads have increased, downstream canals and rivers have been clogged, flooding has had greater destructive effect, and the topsoil of the mountains has been washed into the seas creating new islands in adjacent estuaries. In a few places, no doubt all of this is true. Yet much of what “everybody knows” is not scientifically documented, and some of it is probably not true.

It is important to provide empirical foundations for general assertions which have become accepted as the basis for political and resource mobilization, for our conjectures to date have been only proximate models for what is actually happening. We must now move beyond conjecture and speculation to careful scientific assessment.

The Process of Mountain Settlement

Man did not always live in the high mountains. As population grew and pressure upon lowland environments increased, human groups are believed to have migrated from river valleys and ocean shores into the mountains. Perhaps men first came to the

mountains as hunters. In addition to the search for sustenance, man also came to the mountains seeking refuge and spiritual re-creation—refuge from the aggressions of his fellow man and from starvation and pestilence, and re-creation through the spiritual affirmation which high places, across many cultural and religious boundaries, are perceived to inspire. Man's initial impact was not environmentally significant. The scale of his activities was so small in relation to the enormity of the uplands as to be of little consequence. Only when man began to take up fixed residence—when he ceased to be primarily a pilgrim or transient refuge—did his works affect the mountains.

There is little point in attempting to give false precision to a hypothetical sequence of man's intrusions into the mountains. This was almost certainly location-specific and affected by the time, technology, scale, and circumstances. Probably domestic livestock and grazing of hillside pastures came early in most places. When hunters and gatherers shifted to fixed agriculture, they no doubt began by cultivating the fertile river valleys. Presumably, immigrants brought grains from nearby lowlands, later learning to use hardier barleys, millets, and wheats occurring naturally within some uplands. Much later, potatoes, maize, and oats became a part of his diet.

The change from being hunter-gatherers to fixed farming may have proceeded through grazing to transhumance; the seasonal movement of herds and herdsmen to upland pastures in the summer months and downwards to lowland valleys during colder weather. The transition to farming may have been accelerated where swidden (slash and burn) cultivation became established. This shifting pattern of cultivation was presumably well suited for many upland areas with heavy forest cover, fragile soils, and low human population, for it permits land to be left fallow for longer periods than it is cultivated. That the system has survived to the present suggests that it continues to meet the needs of upland people.

Man learned early how to control and use both fire and water. So long as human populations remained small and settlements widely scattered, the environmental impact of man was quite limited. With the exception of religious shrines and fortresses, man's archaeological residue above 2,500 metres is scanty. His works have not constituted a source of destabilizing pressure—at least not until the present century.

A fundamental change originated with the advent of new technology based upon mechanical energy. Improved means of harnessing energy and, later, of control of early death through public health measures have had a profound effect. Human population growth during the last hundred years has been a major variable affecting mountain resource systems.

Population density, while currently secondary to geomorphological and climatic forces as a source of environmental pressure, is increasing steadily. Wherever man goes, he uses his physical and intellectual energies to bend nature to serve his ends. Where human populations are low, food production does not require that man move far from fertile river valleys or gentle, lower slopes. But, as population increases, higher, steeper slopes are clear-felled, brought under cultivation and grazing and, as in Nepal, often converted to terraced, permanent fields.

The Adaptive Technology of Terracing

The extent of terracing in the Himalayan uplands and the magnitude of the human effort required to transform steep hillsides into productive farms is so great that it requires special note. Himalayan terraces represent one of our species' great achievements, equivalent many times over to more recent

mechanically created "wonders", such as canals and high dams. Hill terraces are a much undervalued and understudied engineering feat. They make it possible for human groups to use productively an otherwise harsh environment. It may require twenty years to fully transform an afforested hillside into relatively stable irrigated terraces. The enterprise is marked with difficulty, setbacks, and occasional failure. Yet, what is worthy of note is the skill and energy which goes into their design and execution and how successful the hill farmer is in maintaining and improving his terraced fields year after year, generation after generation. Flooding, landslips, grazing of goats and cattle, drought, and earthquakes are taken in stride. With only hand tools and simple bullock drawn ploughs—but with enormous fortitude—the mountain farmer rebuilds, reploughs, reseeds, and survives. Whatever the cumulative environmental impact of his terraces, the Nepalese mountain farmer is among the great engineers and builders of all time, and by his own efforts he has found the means to control and shape his environment and to make it productive.

Little systematic study of the engineering or hydrology of the Himalayan terraces has been undertaken. ICIMOD has an opportunity to make a fundamental contribution, for terraced agriculture represents a major effort to adapt the mountain to man's increasing need for cropland. Through terracing he captures and holds the rain and, where upland springs and rivers permit, he diverts water through irrigation to insure sufficient moisture for his crops. So long as populations are relatively low, and demand for fodder and firewood permit farming communities to leave the upper slopes heavily forested, terracing is a solution rather than a source of pressure. Only when human and animal population densities increase do the hydrological forces working upon the terraces increase the potential for environmental disaster. For as trees are thinned, trimmed, and eventually felled, the capacity of the soil mantle to serve as a moisture bank is diminished. The deterioration and eventual destruction of the network of plant roots and the opening of the upland slopes to the direct impact of monsoon rains means that run-off descends in greater volume and at higher velocity to "test" the newest and steepest terraces while eroding more of their precious topsoil.

It is now recognized that the soil mantle must be continuously monitored across a range of geographical, environmental, and vegetative conditions. Soil may be our most sensitive indicator of the effects of both natural and human pressures. Yet, baseline studies have generally not continued through sufficient time to provide the data needed to assess accurately the dynamics of the processes at work. It is especially crucial that accurate monitoring be done at the micro-level; not just of landslides, but of the leaching of nutrients from the root zone of upland field, for it is this top ten centimetres upon which man is dependent.

Water is a major force acting upon the soil mantle, not only through gravity powered irrigation. Scientific understanding of mountain irrigation systems is limited. Modern irrigation engineers tend to become transfixed with the pouring of concrete, of which little is used in the small systems built by farmers to irrigate upland terraces. Yet, in many upland areas, wherever gravity systems can be installed, there is irrigation. Up to a point, these have provided an ingenious solution to man's problems of survival. But future development will require more knowledge about the dynamics of hill irrigation if substantial breakthroughs in water management are to be achieved. Soil mechanics and hydrology can help farmers understand more about the degree to which further irrigation may serve to

increase the risk of disaster rather than to improve long-term productivity and stability.

The Impact of Development

During the past fifty years, much has been done in the name of development. One of man's most obvious intrusions into the mountains has been road building. Early doctrine, possibly based on less sophisticated technology, dictated that roads be built high on the mountain sides and ridges, and that bridges be kept short. The cost to the stability of the hillsides of such high roads is everywhere evident. More recent approaches that keep roads in the valley where possible, while less environmentally disfiguring, have the disadvantage of converting high quality agricultural land on the lower slopes into roads and settlements, and require expensive bridges of great length.

Upland roads and trails expose the bare soil of the hillsides to the direct impact of the monsoon and, unless skill is shown in preparing protective drainage systems, the effects of rainfall collecting on the roads and on adjacent slopes can be devastating. More often than not, drainage is badly handled and badly maintained. In addition, because of the major earthmoving associated with road building, their construction tends to alter the slope and stability of hillsides so that the soil and underlying rock often move under the pressure of heavy traffic. Fortunately, public works engineers everywhere are becoming more environmentally sensitive and skilled at evolving appropriate road building technologies. With effort, it is possible to build roads which limit environmental damage.

The construction of dams, with large upland reservoirs, is another engineering phenomenon with great potential, both positive and negative, as it is with pipelines and electrical highlines. All exert pressure, yet, with sensitive engineering much of the negative impact can be contained and limited.

Commerce, governance and planned development penetrate the mountainous uplands following road building, improved trails, and suspension bridges. Administrative headquarters, schools, public health centres, post offices, and radio communication centres are established in or adjacent to hill bazaars. When these bazaars are connected by road to larger market areas, a change in order of magnitude begins in commerce and trade. Trucks and buses not only bring outsiders and their products into the hills, they offer attractive incentives for local enterprise to produce products valued by the outside, "downstream" markets. Often, this process begins with firewood and expands to extractive commercial forestry. Political leaders find that the way to reward their supporters and, perhaps to gain financial benefits, lies in ensuring that local entrepreneurs are granted licenses. Where minerals are found the same pattern is repeated. In both timber extraction and mining, temporary access roads may be constructed by simply bulldozing the hillsides without regard for environmental impact. Hence, the very development processes designed to stimulate short-term productivity in the mountains constitute an increasing source of pressures which affect and may, in time, erode—in both the literal and the figurative sense—the capacity of mountain resource systems to support human life.

A third critical factor increasing the instability of mountain resource systems is extractive, production-oriented development. While development, as such, need not be environmentally destructive, its impact during the past fifty years has, to a large extent, been environmentally negative.

The values of the larger world of markets and economic forces to which roads and airfields link the mountains are those which

often place a premium upon the maximization of private, short-term profit. Poor people struggling to survive in harsh upland environments cannot easily resist the enticements of immediate financial gratification. A farmer living in an over-extensively tilled and over-grazed upland with a young and growing family may find it difficult to take a long view of the environmental consequences of selling timber or firewood at an advantageous price. To suggest otherwise is to blame the victim.

Small may be beautiful, and one can cite water-powered technology, bio-gas generators, passive solar heating, and improved household stoves as means of ameliorating environmental pressures. These should be encouraged and supported; they are human scale, within the reach of those most directly affected, and they serve to benefit directly the poor and the powerless.

Economic, Legal and Bureaucratic Pressures

In thinking systematically about the sources of pressure upon mountain resources and mountain ecosystems, we should not let our zeal for small, practical, and direct interventions obscure the significance of the more macro forces; economic, legal, and bureaucratic. Commodity prices policies and exchange rates may seem far removed from the mountains, yet getting them right at national and international levels may be of greater long-term benefit to upland people and their resources than community level interventions.

As with appropriate technology, community and social forestry and, more recently, agro-forestry have come to signify efforts to help upland farmers find more productive ways of managing the resource systems upon which they depend. It is assumed that new means of organizing their resources will result in higher benefits with less harmful effects upon their environment. These initiatives could, in some cases, however, increase the incentives to deplete upland resources. Integrated mountain development approaches must, therefore, take cognizance of both micro and macro economic factors. The long-term social costs of depleting resource systems must be considered, as well as the private costs and short-term benefits.

Until the overall market system, within which the managers of upland resources make decisions, provides adequate incentives (or penalties) to make it attractive to forego or defer short-term benefits for the sake of long-term environmental stability and the maintenance of a socially determined minimum level of renewable resource stock, local level initiatives may have only short-run benefits.

Just as it is important to consider how a lowland dominated "international economic order" exerts pressure upon the upland resources which, when extracted, destabilize the environment, it is important to review the ways in which national and international legal systems may work to accelerate the depletion of mountain resources. The concept of land, forests, water, and minerals as property which may be traded, bought, and sold by individuals or new owners who have scant regard for the social and environmental consequences of their use, is one which is alien to traditional common-property practice in mountain regions. This concept is of recent origin in the uplands, being an import which came with the extension of "law and order", the settling of the land, and the fixing of titles and taxes according to lowland and, often, Western practice. Customary practice treated such basic resource systems as a trust to be husbanded by each successive generation as the custodian for future generations. Usufruct, not ownership, was the common practice.

Privatization of formerly open-access or common-property

resource systems can be seen as both a potential disaster or a potential solution to the problems of rapid exploitation. Much depends upon the values which society enshrines in social practice and law. Progressive legislation can afford upland peoples the framework within which to be more articulate politically and provide the protection they need to husband their resources to benefit both themselves and their children. Such legislative interventions may be essential to ensure both the long-run stability of the uplands and the productivity of the downstream agricultural production systems fed by mountain rivers. Yet, upland farmers are fearful of lowland lawyers. Upland people are concerned that, all too often, where hill farmers fight over land, lowland lawyers eventually become the owners. Sensitive public interest lawyers may have a role in helping build the institutional arrangements for long-term mountain development.

Urban-based government officers have often been insensitive in applying economic and legal policies indiscriminantly to upland areas. Yet, it is development donors with their enormous resources who may constitute the greatest destabilizing threat over the years ahead. Progress has been made and donors have shown increasing sensitivity to environmental problems, but the internal pressures upon donors to devise time-bound, results-oriented projects which respond to the current priorities of their own agencies, means that it is often difficult for them to take a long and systematic view of the process. ICIMOD may be well placed to assist both national leaders and expatriates working in programs of induced change to better appreciate the complexity of the interacting systems within which they must work, and the pressures which their activities may generate.

Tourism

With the increased affluence of the middle classes in the industrialized nations and increased mobility through relatively low cost air transport, a new era has opened during the last quarter century. Formerly isolated and less developed mountain nations are now accessible. International tourism, on a scale and of a character quite different from the traditional pilgrim or world traveller, is now a reality. The pressure which this exerts and its impact upon mountain resources can be both positive and negative. Awareness of the cultural heritage of the uplands may be heightened, while demand for food and fuel along major tourist routes inevitably increases the resource depletion rate. Sensitive management, concerned with the obligations as well as the desires of tourists seeking "re-creation" within the mountains, is essential. Exposed colour film may be a highly desirable export, but tourism can be exploitative if few benefits accrue to the upland people themselves.

Fortunately, responsible tourism officials working closely with national leaders and international organizations are actively seeking to evolve practices which limit and control the negative impact of trekking, high altitude climbing, and general tourism while, at the same time, making the beauty and the inspiration of the mountains more readily available to those who are attracted to them.

Summary and Conclusions

I have attempted to categorize pressures operating upon mountain resource systems by distinguishing between those which are primarily the result of natural forces, and those which are man-made. Where man has learned to use natural forces, such as water and fire, for his own purposes, there must necessarily be some overlap.

Within the broad category of human interventions, I have suggested three types of activity that can be considered separately for purposes of analysis. The first embraces those subsistence activities needed for the survival of human groups. The second are activities or values held by the larger human community outside of the mountains which establish the framework for development, extraction, and exploitation of mountain resource systems through marketing, administrative, pricing, legal, and other arrangements. The third, while related to the second, is concerned with the temporary incursions of non-mountain inhabitants into the mountains as pilgrims, travellers, climbers, and tourists.

It is not for me to suggest the means of finding solutions to upland resource dilemmas. The pressures are multi-faceted, complex and, in some instances, of geologic origin. The solutions will, I believe, be found to be equally complex and multi-faceted but, regrettably, we do not have a geologic time-frame within which to find them. Upland populations continue to grow and people's expectations continue to rise. The overall depletion of renewable resource systems accelerates, and the stability of the environment becomes less robust. We do not yet know enough about phenomena, either natural or man-made. Yet, the wings of time are beating, and we must seek the means of relating current knowledge to action. For, in many mountainous areas, poor farmers are clinging by their fingernails at the margins of subsistence.

It is all too simple to prescribe solutions with which few will disagree: massive reforestation, community control of resources, major capital investment in the development of water for irrigation and power, farm employment through agro-industry, reduced populations (human and animal), out-migration, more robust and productive upland cereals, such as triticale, horticulture, roads, transport, credit, markets, price incentives and input subsidies, appropriate technologies, decentralization. The list is long and grow with each successive development cycle of planning, temporary achievement, and frustration.

Yet, surely, those who would seek to advance human understanding of the processes of integrated mountain development must eschew any "golden key" approach. No single solution exists. No panacea awaits our discovery. The struggle will be long and the outcome will remain in doubt. Such is the nature of our Promethean struggle.

That the challenge is truly Himalayan should not daunt us. For our species is distinguished by its capacity to respond to challenge. Perhaps, in time, we come to understand that the conservation and development of the high places of our planet is the responsibility of all mankind. For the environmental stability of the upland watersheds is essential to preserve the productivity of the alluvial plains upon which we are dependent for our food. Perhaps mankind will have the wisdom to realize that within the larger global whole concessional transfers of resources from the productive lowlands to the fragile uplands must become an inherent part of the global management system for our small planet. Yet, this will only come as we reach new levels of awareness and come to understand the true nature of our interdependency. The political will to advance beyond the petty constraints of short-sighted nationalism can only come when humankind is forced by fact to recognize that we are more united by the commonality of the problems which confront us than we are divided by race, religion, ideology, or national boundaries.

ICIMOD must seek the facts and present them in compelling fashion. For, to turn again to Bacon, "Human knowledge and human power meet in one; for where the case is not known the

effect cannot be produced." This paper has sought to identify some of the cases. Godspeed to those who, in association with ICIMOD, must now produce effects.

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The Contribution of the Green Sector

Dr. Klaus J. Lampe

To be honest, the hill farmer community in the Third World not only belongs to the most neglected part of the world's population, but their prospects for profiting from research findings and development programmes are rather gloomy.

The gap between the standard of living of the hill population and those of the lower valleys continues to grow. The reasons for this are manifold, and an essential part of my paper. Our modern society with its division of labour has led to a scattering of disciplines in modern sciences, or what is labelled as such today, up to an almost Babylonian confusion of ideas.

Agriculture today is not just a single subject of specialization. Rather, one has to be a wheat or rice breeder, a pigeon pea pathologist or an entomologist specialized in citrus fruit flies. The development problems in the hill regions, however, are far too complex and, in view of the above, will not be solved on a short-term basis, not even by a larger group of subject matter specialists.

The Living Conditions of the Hill Farmer

Integrated Rural Development today is the key phrase in discussing rural development problems and, in spite of substantial progress in many areas of agricultural research, these have not been overcome. Agriculture is, nonetheless, inconceivable without its integration into a number of other disciplines which in themselves are also quite complex.

Especially in the hill regions, agriculture and forestry (in other words, exploitation of timber and fuel wood, as well as forest pastures) are decisive factors for the absorption capacity of water for drinking and irrigation purposes, ultimately, and vitally important erosion control. The health of hill region people is closely related to the proper functioning of forests as a water reservoir. Whereas medical care is admittedly inadequate in rural areas, it is, apart from the larger valleys, practically nonexistent in hill regions. This situation, especially in the curative field, will hardly change in the future, since the economic circumstances in most of the hill regions, along with the lack of infrastructure, prevent an improvement.

Efforts must be made, however, to provide village health services for man and animals which are designed, as self-help initiatives, to take over the most important tasks of preventive medicine, nutritional counselling, and family planning. Only a population which is essentially healthy will be able to preserve and develop the ecosystem hill regions in the medium-term.

Health and modern agriculture, especially in marginal areas to which all hill regions of the world more or less belong, are not feasible without modern training that is adapted to the needs of the target group. In this respect, the widely scattered farms and settlements, along with the ecological sensitivity of specific habitats, require special measures. School books that portray life in the city many hundred kilometres away from the village classroom, and which do nothing to foster understanding for country life and the features that make it worth living, are, at the most, a contribution to rural exodus, especially of the most capable sections of the young generation.

Education in the hill regions should be geared less towards

formal degrees but rather should have its main emphasis on transmitting knowledge and skills which contribute to realizing existing correlations between the various disciplines, and to promote the long-term utilization of those fragile resources. Properly trained and motivated teaching staff are needed for this purpose. How to motivate them? Is there a country with a substantial share of hill population that has developed an appropriate educational policy? I am afraid it does not exist, and you can hardly blame those who still work with the agricultural methods of their fathers and grandfathers, even though general and environmental conditions have changed today. The result is a total loss of their production base, mainly through erosion and the loss of soil-fertility.

And yet, the hill farmer seldom needs advice on the interactions of agriculture, forestry, soil, water, and erosion. More often, he is able to realize the reciprocal effects from his own observations in contrast to many roadbuilders, for instance, who will be led by short-term economic considerations—or by ignorance—to induce erosion that often cannot be stopped.

This in no way means to say that roads do not need to exist; they are, on the contrary, a prerequisite for any development whatsoever. Their construction in suitable locations should be supported, even if it may entail higher investment costs. Co-operation with the farmers in the early planning stages should also be considered. Thus, subsequent damage and maintenance costs could easily be minimized.

Only a road system, which to a great extent would have to be maintained on the basis of self-help in order to be supportable with respect to national economy, could create the preconditions for a home industry, thus providing an additional source of income to the ever growing population of the mountain regions in Asia and Latin America.

Typical of almost all hill peoples is their craftsmanship and creativity. The sensible utilization of these abilities for the national and international market and, under certain conditions, tourism, is more easily accomplished with minimum advisory assistance from outside than a larger change of behavioural patterns that might be prescribed in the scope of agricultural extension efforts. Problems here arise mainly in connection with a fair price policy that ensures quality work of high craftsmanship on a long-term basis, as well as securing smooth marketing. Promotional efforts have often failed in the past due to numerous levels of intermediate trade. On the other hand, promotion of carpet manufacturing in Nepal by the Swiss Development Assistance shows how much success is possible.

The Green—What does it Include?

If professional differentiation, with all its negative results, is to be successfully dealt with, then agriculture as an integral part of rural mountain regions needs to be defined in much broader terms than is generally accepted by the public administration. In my opinion, a productive interaction of research, development, training, and extension is only possible if the different activities the hill farmer confronts daily are also comprehended by the servicing bodies as a functional entity. The term "servicing

bodies" defines all institutions from research to administration that claim responsibility for the development of the hill regions.

Agriculture, in its broadest sense, therefore, comprises:

- all areas of plant production, including horticulture and fruit growing, plant protection;
- storage of food and feed products;
- livestock production, including animal health services;
- pasture management;
- forestry, including timber industries;
- agricultural engineering, including irrigation;
- agro-industry, at least as far as the first level of processing in home industry in small and medium-sized factories is concerned;
- aquaculture and fisheries;
- rural craftsmanship;
- training and extension programmes; and
- agro-economy on the micro and macro sector as a basis for sensible agro-political decisions on a national and regional level.

A great number of problems—and not in the area of public administration alone, with its often limited possibilities—are the result of the dispersal of the above mentioned working areas into several ministries and executive organizations. Thus, a great part of the available resources is not utilized or lost. The really damaging effect on the target group, however, is the loss of credibility which emanates from the competition of training, extension, and executive organizations.

Throughout the entire world farmers in mountain regions are even more mistrustful of the "modern" world than their colleagues in the plains, who are more familiar with it through closer connections to urban centres. Hill farmers have been deceived and disappointed too often during the course of history, their lifestyle being shaped by individuality and mistrust due to their limited mental mobility—even if there has existed exchange of information in the past as well as the present. This holds true just as much for the Alps or the Andes as it does for the Himalayas. Only those who really understand the hill farmer in his environment will be able to help him with the solutions to his problems. But understanding without mutual trust is not possible. We surely would be further advanced at the commencement of the work of ICIMOD today if researchers, administrators, teachers, and extension officers had succeeded in the past in bridging the existing gaps of understanding. Ignorance, lack of sensitivity, and also obvious self-interests prevented this.

The Production Base of the Hill Farmer

In comparing population density of the Himalayan region of ICIMOD (figure 1) to that of the European Alps, overpopulation is quite obvious. Whereas in the Alps 38 inhabitants share in each sq. km., there are almost 100 to 143 respectively to the same area in Nepal and the Indian Himalayas. Information about population density related to the total area is merely of theoretical value. Relations of fallow land to arable areas are of central importance, especially in an exclusively agricultural region.

In Switzerland, as well as in the German Alps, areas of practically no agricultural value can better be marketed for tourism than a comparable area of pasture land. But this does not apply to most parts of the world where location and the overall economic situation form a constraint to such exploitation. In view of this, any comparison of potential and actual development of hill regions in the Third World to those of the European Alps will inevitably lead astray.

The differing economic basis is made even clearer when relating the arable land to population density (figure 2). Even the densely inhabited region of Nyabisindu in the southern highlands of Rwanda, with 3 persons/ha, still lies below that of the German Federal Republic with 4.6/ha. In Nepal, with 15.5 persons/ha., three times as many people have to live off one hectare of arable land as in the highly industrialized German Federal Republic, where only 4 per cent of the total population are still employed in agriculture. You can hardly show more clearly than with these figures the obligation to intensify production efforts in agricultural areas already under cultivation, and the need to search for non-agricultural employment opportunities.

Yet, one should not underestimate the potential for an increase in productivity. There is past experience, as well as data available from Nepal, that document average and maximum yields in different regions which give at least an idea of the development potential (figure 3). According to these figures, yields of about 5 tonnes of maize against an average of 3 tonnes in the central hills, and almost as much wheat against an average of approximately 0.8 tonnes in the far eastern hills, can be obtained.

The hill farmer's limitations, however, are not adequately outlined through the availability of arable and pasture land alone. Cultivation seasons become shorter with increasing altitude and permit the growing of a few early-maturing crops only with a substantial risk of late or early frosts. Intensity and irregularity of precipitation and the influence of the monsoons in the Himalayan region represent additional unfavourable factors impairing stable yields which the hill farmer can hardly avoid.

Extended, non-vegetative periods finally force him to carefully store food, firewood, fuel, and seed. When family size is out of proportion to available agricultural area, the risk of crop failure becomes a question of survival.

The Problems of a Hill Farmer

If the production base of a hill farmer is defined as "subsistence farming on marginal locations with the necessity of maximizing yields", one has pretty well described his problems. Apart from the land/man ratio, vegetation period, and quantity of precipitation and its distribution, production is limited considerably by the low quality of land, often with little top-soil which is susceptible to erosion. Lack of capital for necessary and feasible investments; e.g., for small irrigation projects, and lack of modern means of production further restrict the scope of action for the hill farmer in the Third World. But these are not the only reasons for him to stand last in line on the list of priorities of not only the politicians in the urban centres but also for agricultural science itself.

Agricultural science on a national and international level, up to now, has bothered little and, if observed under comprehensive aspects, not at all with hill region development. The international agricultural research institutes, whose work is regularly mentioned when talking of progress in rural areas in the last 20 years, have proved of very little use to the hill regions. Single crop-oriented in almost all cases, they are unable to contribute to the specific and complex production systems in the mountains. It is surprising that international donors for agricultural research activities have not yet conceded the priority which is due to the mountain regions, in spite of the acute problems that face not only the mountain regions themselves but also areas many times greater in size along the lower courses of rivers.

Mountain regions to this day have remained places of interest for tourism more than for scientific research work; many scientific studies were selected according to the individual interests of their authors, rather than the needs of the hill people.

Unfortunately, problem-solving with respect to a sensible development of mountain regions is not stimulated by the incentive of a possible Nobel Prize, and, therefore, does not attract—with a few exceptions, however—agro-scientists of the high calibre that would be required in view of the problems.

Finally, those few on-going research programs that do exist generally refer to singular aspects only, and hardly ever are they directed towards achieving integration or interdisciplinary concurrence on problem solving. Mono-sectoral studies, however, will not solve the multi-sectoral problems of the hill farmer.

Neither has there been a scientific study of the interdependencies between mountain regions and their dependent lower plateaus through research on the river systems that comprise the entire highland-lowland ecosystem. The results of such studies could very well serve to sharpen the senses of the political authorities and decision-makers for the general economic significance of sensible mountain region development. Comparative studies on mountain regions of different continents for which relevant data have existed for a long time may prove to be especially helpful. At this point, I may refer to the studies of Aulitzky in 1974. He has examined the deforestation and the avalanche endangered areas of some regions of the Austrian Alps for the time between 1774 and 1953 (figure 4).

The farmer in the mountains, however, capitalizes little on the scientific foundation of such experiences that he is able to derive himself from observations made over generations. Thus, considerably more specific demands are put forward to research projects as specified in the following few examples.

First on the list of priorities concerning plant production, is the substitution of commercial fertilizer and plant protection products by undemanding crops which guarantee stable yields. High expectations are put here on the most modern branch of agro-biological research. Where mixed cropping systems and biological nitrogen fixation by conventional methods do not meet their targets, one has to resort to the results of genetechnological research. Maize, with its nitrogen-fixing qualities, planting of barley, the use of mycorrhiza for the purpose of chemical decomposition of phosphoric acid, which is available for wide implementation, are alternatives to the application of commercial fertilizers, a practice which is becoming more and more doubtful when it is applied in regions where transportation takes place on the back of people over long distances.

Many areas at higher altitudes can be utilized little—or not at all—because of the short vegetation periods. Thus, a logical conclusion is the shortening of vegetation periods of important crops by way of modern plant breeding. The 70-day barley, the 60-day potato are demands which have already been successfully met, as in the case of the mungbean, for instance.

What also needs to be done is a scientifically performed retrospective evaluation of the old experiences and their exploitation by scientific methods; the use of the active substances of the neem tree as a means in pest control, known on the Indian subcontinent for more than a thousand years, is just one example.

Finally, plant breeding in connection with plant sociology must develop high-yield crop varieties which will be instrumental in bringing barren land and marginal areas under cultivation again. Tree and bush crops, for instance, would not only protect

against erosion but could provide food for animal and man at the same time, and could be of use in wood and fibre production, as well as for extraction of dye and medicinal substances. In this manner, new raw materials could be produced, creating additional jobs in the rural areas without putting additional strain on the carrying capacity of the available land.

Vegetable growing would considerably enhance the nutritional basis in the mountain regions, ensuring a substantially healthier food supply. In this respect, however, research and development work is required that would take into account the particular local problems of high altitude areas. New plant and crop varieties and sensible mixed cropping, in order to fully utilize allelopathic and biozenotic properties, can open up avenues for development which have been pursued only on a rather small scale up to now.

Agriculture without integrated animal husbandry is hardly imaginable, according to the understanding of traditional European agricultural production. If the Western world in the last fifty years has renounced an experience many thousands of years old, it may very well turn out to be only a "vacation". Looked at more closely, "fertilization from the bag", the application of commercial fertilizer, is nothing more than the addition of nutrients that have their origin in organic substance. The energy required for its production from coal or oil is also nothing but a transformation of organic substance.

The hill farmer cannot afford this luxury. Wherever the fodder basis permits, cattle, buffaloes, goats, sheep, and fowl, as draught or pack animals, as suppliers of wood and meat, as egg or milk products, will take their part in keeping up the circular course of nutrients. It is the task of animal production to make this circulatory system most effective, i.e., to utilize organic substance unfit for human consumption through the animal stomach, thus contributing to the provision of proteins. Therefore, life without animal keeping is hardly imaginable in the mountains. Here, undoubtedly, reserves and potential are available that must be made accessible through multi-functional utilization. Substantial progress is possible solely through improved animal husbandry and an animal health service that would have to be developed similar to the basic principles for human health services.

Conclusion

Somewhat like the inhabitants of the desert regions, people at home in the mountain areas of the world belong to the most frugal and, at the same time, the most endangered population group on earth. Even the slightest changes within the ecosystem threaten their living environment and production base, and, thereby, their future. Not unlike the progression of the desert, the destruction of the mountain ecosystem is synonymous to endangering human life within the areas of entire river systems.

The inhabitants of mountain regions are, more than anyone else, essential parts of a highly fragile ecosystem. According to rough estimates, the life of over 800 million people depends on the long-term conservation and preservation of mountain region ecosystems. Anyone who has knowledge of these facts and still shuts his eyes to the resulting needs and necessary consequences will have to be in a position to justify his responsibility towards the coming generations, generations from whom we have borrowed this earth, for we have not inherited it.

The underlying task is not only a challenge to all of us, but it is a matter dictated by reason that calls our political decision-makers off their reserve. It would be up to them to promote the confidence of the mountain population in their respective

governments, to assist in stimulating their readiness to rely on self-help measures, and to increase their self-assurance, instead of fighting against their efforts. The sense of responsibility of village communities must be revitalized. To motivate the population—not to administer them—should be the objective of the public authorities. Setting up an efficient network of adequate services in close co-operation with the target groups would help create an atmosphere of trust in the government—a quality which is, unfortunately, lacking in the hill regions in almost every continent.

Selfishness, exploitation-oriented thinking, and dominating behaviour that lowlanders have showed against hill people in the past, have been some of the main reasons the latter feel such a strong aversion to them.

Not without particular reasons has the International Centre for Integrated Mountain Development (ICIMOD) been established in Asia. Great religions, numerous mythologies, and philosophies are rooted in the mountain regions of Asia. Contrary to our Western Hemisphere, tradition is still alive in Asia, and decision-makers in the capitals still feel obliged to them.

Maybe one will succeed in bringing the responsible leaders to realize fully the current problems and urgent needs of the hill population, and to set the necessary priorities.

The matter can't wait any longer!

The inception of ICIMOD through our mutual efforts is a good basis towards this end, and a benchmark of credibility.

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Integrated Mountain Development: The Role of Industry, Energy, Tourism, Transportation and Communication

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I am greatly honoured to have been invited to this First International Symposium and Inauguration of the International Centre for Integrated Mountain Development (ICIMOD). I am thankful for this opportunity to Mr. P. Gueller, Regent of ICIMOD, and all others connected with the organization of this event.

As you know, the central theme of the Symposium is "Mountain Development Towards 2000: Challenges and Opportunities", and I am expected to present a paper on the role of such sectors as industry, energy, tourism, transportation, and communication in integrated development within the framework of this session's theme, "The Concept of Integrated Mountain Development." I thought I knew the scope of the topic and what the contents of the paper would be until I actually sat down to write the paper. I have fairly good ideas about the role of the various sectors enumerated above in the context of a country like Bangladesh, which is mostly plains. In a mountain situation, the ecosystem is sharply different which has its peculiar implications for production and resource management systems. Socio-cultural dimensions also have their own peculiarities and dynamics. I, therefore, immediately saw the limitation of my knowledge for preparing the paper. But then I realised that this Symposium was being organized to explore ideas and review experiences with a view to elaborating further the role and tasks of ICIMOD, among other things. And I felt I could make some contribution to this process. It is, by and large, in this context that I share with you some of my thoughts and views, keeping the sectors I am supposed to cover in this paper in broad view.

In the conventional approach, development is sought to be achieved through a process of industrialization and modernization. Development proceeds as the contribution of industry and modern sectors to GDP and to the absorption of labour increases. Transportation and communication facilities are developed to support the economic transformation. The role of energy in the process is crucial because it is a driving force behind technological advancement without which industrialization and modernization cannot be achieved. As development proceeds, import expands both to support the production system and to meet the requirements of the changing consumption pattern, which requires increasing amounts of foreign exchange. The sources of foreign exchange are export and invisible earnings, foreign aid, and foreign borrowing. Tourism, the one other sector that has been included in the list of sectors this paper is supposed to deal with, has a special role to play in earning foreign exchange.

The GNP-focused modernization strategy of development has been followed by many underdeveloped countries over the past decades. And yet an estimated 780 million people in underdeveloped countries (excluding China and other centrally planned economies) were absolutely poor in 1980; the figure must be

much higher now. Half of them live in South Asia, mainly in India and Bangladesh; and the other half elsewhere in Asia, Africa, Latin America, and the Middle East. In Bangladesh, for example, over 80 per cent of the population is estimated to be below the poverty line (defined in terms of a calorie intake of 2122). The Nepalese situation in this regard may not be very much better, where the per capita income of about US \$120 is not much higher than in Bangladesh. Poverty is, indeed, the main problem faced by the large majority of the people in Nepal, as well as in Bangladesh and many other underdeveloped countries around the world.

It is now widely recognized that the conventional techno-economic approach to development with its primary focus on capital, which has so far generally produced deleterious results for these countries in that poverty, unemployment, and inequality have been very high and increasing in most of them, cannot solve their problems. A completely new approach centered on the people, who are both the subject and the object of development, is necessary. This immediately brings into focus the specific social, economic, cultural, and ecological realities faced by the people one is concerned with. These realities vary widely from country to country, and there may also be significant area-wise variations within the same country.

For people-centered development, relevant social and cultural factors must be taken into account in planning development. The process must ensure the access of individuals to productive resources and opportunities for development and must not place a burden on the ecosystem, by way of callous exploitation of natural resources and introduction of inappropriate technologies and action programmes, which it cannot carry without being irreversibly damaged. Obviously, what is needed is an integrated approach to development. It may, however, be emphasised that since mountain ecosystems are rather fragile the need for ecologically sound planning is of particular significance in a mountain situation.

But, integrated mountain development, or for that matter integrated rural development with which I am more familiar, cannot be pursued in a sustained manner in isolation. It must be an integral part of the overall national development strategy.

Keeping the broad framework outlined above in view and taking poverty eradication to be the most important national goal, I shall in what follows make some observations concerning the sectors under review.

Industry

The role of industry in development is, of course, very important; higher value added in industry is an important source of growth; capital and intermediate goods produced in the sector sustain an expanding production structure, and the manufactured consumption goods supply the consumption requirements

as income expands. But the process of industrialization must be so designed that the benefits accrue to the people at large and not to a few capitalists, local or foreign. This means that the production structure must be planned on the basis of certain principles which may include:

- The production and import of luxury goods should be banned or so regulated that their production and distribution are not profitable and even loss-making activities.

- Investment should be substantially increased for the production of those goods and services which the poorer classes consume. The resources saved by restricting production of luxury goods may be used for this purpose. In fact, deficit financing may be resorted to for financing production of consumer necessities. Since these goods and services have short gestation periods, inflationary impact of deficit financing for the purpose will be limited. These activities will also create employment opportunities on a wide-scale since these are necessarily more labour intensive and can be dispersed geographically.

- In order that the long term stability and sustained progress of the economy can be ensured and that the structural dependence on foreign countries is minimized, investment in key heavy industries (machinery tools and equipment etc.) must be increased.

Inssofar as the mountain situation is concerned, industrial activities should be planned not only within the framework of the broad principles outlined above, but also taking into account the ecological peculiarities and needs and circumstances of the mountain people. In this context, type, size and location of the activities are all very important issues.

Since poverty alleviation is the central aim, it is necessary to promote industrial activities in such a manner that there is wide participation of the poor in them as owners. This calls for promotion of small-scale and cottage industries. Such activities require small capital investments and simple technology; and people of small means and little education or training can undertake them with some assistance. Studies in Bangladesh and elsewhere show that such manufacturing activities offer a large scope of employment generation for the poor by way of both self and wage employment.

Decision on the type of industrial activities should be made within the framework of the national production strategy developed on the basis of the principles outlined above, taking into account the existing and potential demand structures. The sources of demand may be the income of the mountain people themselves, markets elsewhere within the country in rural areas and urban centres, export markets, and production linkages within the mountain sector and with activities outside. Careful market studies will be necessary to generate the information base for planning the activities to be promoted. Assistance may be necessary on the supply side also in such areas as entrepreneurship and skill development training, advice on technology, supply of credit, provision of marketing facilities, and development of infrastructural facilities. The requirements for assistance may vary from product to product and individual to individual, which will have to be ascertained through appropriately designed studies. Effective extension programmes will have to be launched to assist the entrepreneurs in starting their activities and solving their problems on both supply and demand sides, as they run their enterprises.

Regarding location, many small-scale and cottage type activities may be home-based. Depending on the ecological and topographical conditions, certain locations may also be chosen as industrial estates. The availability or potential for the develop-

ment of infrastructural facilities will also be important considerations in the choice of the location of the activities.

Inssofar as large scale industries are concerned, the question of suitability to the mountain ecology and mountain people must be very carefully addressed.

Energy

Energy is important, but it was not an issue in the development debate in the decades prior to the early 1970s. With the oil prices starting to go up steeply in 1973 at the instance of the Organization of Petroleum Exporting Countries (OPEC), the energy issue assumed a particular significance, since the unprecedented technological advancement hitherto achieved was largely based on liberal-even wasteful-use of cheap oil. Suddenly energy costs were rising sharply and the supply of its main source, oil, was also being regulated by OPEC.

A whole lot of literature is now available on various aspects of the issue, such as prices, supplies, surpluses and their recycling; adjustment processes, including conservation and alternative sources of energy, and choice of technology; and impact on development, looked at from the point of view of the importing countries, both developed and undeveloped, and also from the point of view of the oil exporting countries. Debates are now going on in international fora, both UN and NGO type, and also at bilateral and national levels on how to tackle the various energy related problems faced by the world community, as well as by particular countries and groups of countries.

The Third World countries like Bangladesh or Nepal, depending as they do on western oil-based technology, have found themselves particularly hurt by oil price increases. While they also use such commercial sources of energy as coal, hydro, and natural gas, generally, oil has been the major source. Thus, for example, in Bangladesh petroleum import consumed 63 per cent of the country's total export earnings in 1981, while the figure was only 6.7 per cent in 1972. Similar experiences have been encountered by many underdeveloped oil importing countries. Now, as these countries continue to pursue growth, which is a must for improving the standard of living of the people, their energy needs will be increasing. And particular underdeveloped countries will have to find ways of meeting those needs to be able to pursue the goal successfully. The various lines of action that can be pursued include; (i) seeking of international assistance in securing increasing import of oil; (ii) expansion and development of indigenous sources of commercial energy; (iii) improved efficiency in energy management and use; and (iv) choice of technology more in line with domestic endowment of resources, including energy sources.

Energy development in the mountain sector should be pursued within the framework of a national energy development plan. In a mountain situation, hydro may be a highly potential source of commercial energy. It would, therefore, seem, suggested that this source is properly developed, indeed, other sources, as well, if prospects are there. However, projects should be designed on the basis of, among other things, careful evaluation of locational factors, scale economies, and ecological implications with a view to minimizing unit cost without adversely affecting the ecosystem. In this context, a useful first step would be to identify and elaborate the basic factors which must be taken into account in planning exercises so as to make the projects consistent with an integrated, ecologically sound process of mountain development.

In the household and informal production sectors of a country like Nepal or Bangladesh, traditional sources of energy; e.g.,

draft animal, fuelwood, cowdung, and agricultural residue, do play the major role and will continue to do so for a long time to come. In this context, a basic issue is to improve the methods of use (improved wood burning devices-stoves, kilns) with a view to reducing the drudgery to the users and increasing the use efficiency of the materials. Particularly in the case of fuelwood, there is also the very important question of the ecological implications via deforestation. Hence, fuelwood supply and a reforestation programme should be carefully planned to maximize the supply of fuelwood while, at the same time, preserving the ecological balance.

Towards improving the level and quality of energy use by the mountain household and informal sectors, the following steps may be undertaken: (i) surveys to ascertain the pattern of use of traditional sources of energy by the mountain people; (ii) research and development for improving the devices of using these resources; (iii) generation of information base and training materials for ecologically sound planning of fuelwood supply; and (iv) extension and training programmes to popularise the use of improved devices and the need for and ways of forest development, as trees are felled to obtain fuelwood. These steps are directly aimed at poverty groups and should form a part of a poverty eradication programme.

Tourism

Tourism can be an important source of foreign exchange earning for the host country if there are historical monuments and sights and scenic beauty for foreign visitors to enjoy and shopping facilities for them to collect exotic and attractive items. Tourist spots generate employment opportunities, and local incomes rise as visitors, both foreign and from other parts of the country, come and spend money there.

But it is important that the tourist attractions are identified and properly maintained portraying their cultural heritage and natural endowments and complementary facilities, such as hostels, transport, and shopping centres are developed. Appropriately designed publicity drives should also be mounted to popularise the attractions.

In a mountain situation, scenic attractions should be plentiful. What may be necessary is to select the spots and sights and create the appropriate tourist environment to attract visitors. But care must be taken so that the mountain ecosystem is not damaged in the process and that the tourism development is planned as an integral part of the overall mountain development strategy. Care must also be taken so that tourism development does not promote social and moral degradation.

Transport and Communication

Needless to mention that transportation and communication play an important role in the development process by facilitating movement of people and spread of information and ideas. Hence, development of these facilities must be carefully built into the integrated mountain development strategy.

Conclusion

It has been contended that the mountain development strategy should be formulated within the framework of the overall national development strategy. What kinds of activities and what approaches in respect of industry, energy, tourism, transportation, and communication may be incorporated into an integrated mountain development strategy have been indicated. The focus has been on ecologically sound integrated mountain development and eradication of poverty. It has been suggested that, if poverty

alleviation is a serious goal, development process must be people centred and access to productive assets and opportunities for development must be ensured for the poor.

ICIMOD can play an important role in this process by undertaking and assisting others interested in undertaking such activities towards integrated mountain development as surveys to generate the data and information base, preparation of guidelines covering various sectors, and appropriate action programmes in the areas of extension, training, and awareness building.

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Alternative Energy Sources for Integrated Mountain Development

Gyani R. Shakya and Dr. Jibgar Joshi

The existing sources of energy in the mountains are being depleted at a very fast rate and mountain environments are facing an immediate danger. Energy plays a crucial role for integrated mountain development. However, the problem of energy development and conservation cannot be seen in isolation. It is to be seen as a part—albeit a very important one—of the total integrated system for mountain development. Almost all other sectors; e.g. transport, industry, agri-development, housing, are energy consuming. With population increase and concomitant increase in human activities, energy needs have increased. The relationship of man with his habitat has changed tremendously at the cost of the environment.

Mountains are beautiful and majestic. In the past, life used to be much healthier in the mountains than in the lowlands and the necessary resources were easily available and sufficient. Now, with modern medicine and health facilities, transportation and communication facilities, modernization in farming, and other urban amenities in the lowlands, life there has become easier and more comfortable than life in the hills. In the mountains, available resources are depleting at a fast rate on the one hand and urban amenities like health, education, transport, and other facilities are lacking, on the other hand. The hill people are finding life more and more difficult due to soil erosion, landslides, declining productivity of land resulting in food and energy shortage, and population growth.

The principal sources of energy the mountain people use today are forest products (firewood), agricultural wastes, animal wastes, and, to a far less degree, water power. Muscle power (human) is used always and animal power is used for farming. Solar energy is used to a certain extent for drying agricultural produce and timber for construction purposes. At present, firewood is the most important and extensively used energy source, accounting for more than 90 per cent of the energy demanded in the mountain regions.

Firewood is used for cooking, heating, animal food, alcohol making, processing of food, wool dyeing, and a variety of other purposes. Firewood is available almost free of cost, the only cost being the cost of labour to collect, although its extensive use and misuse by the people is surely going to have far-reaching repercussions in the near future. This present situation implies that any alternative energy to firewood for the poor population in the mountains will become feasible only if the alternative is almost free of cost. Because of the total dependency on Firewood as a source of energy, coupled with rapid population growth, the rate of degradation has reached alarming proportions. In Nepal, the comparison of maps and aerial photos show that the forest has been reduced from 60% to 30% in thirty years. In many places, the desertification process has already started. Mountain environment, in particular, is now characterized by rapidly decreasing vegetation coverage with the concomitant landslides and erosion. As the population in the mountain regions is increasing, these ecological problems will become more and more severe. For instance, according to Forest Resource Survey,

the hills and the Himalayan region in Nepal require 15, 074 sq. km. of plantation compared to 3,780 sq. km. in the Terai area. In the hills, the forest area needs to be more than doubled. The average growing stock per hectare has reduced from 2,564 cu. ft. to 1,769 cu. ft. per ha. in the hills in the course of the past 13 years.

Given the resource constraints, it is very difficult to create big centres of development in the mountain regions. The settlement patterns are extremely varied, scattered, and dispersed. The population of settlements does not exceed a few thousand. Because of formidable transport conditions and extreme hardships under which the people are struggling for survival, it is not possible to establish big energy stations to cater to the energy needs of a considerable area. Most of the settlements, on the other hand, are rapidly decaying and they are so poor that it is virtually impossible to own such energy units for their own local demand. But decentralised energy implementation programmes will be more effective, as the development and use of appropriate technologies depend largely upon local needs in relation to local socio-cultural system. This is true for other energy consuming sectors, like tourism and industry, as well. While centralised energy development programmes are not feasible on the one hand, a very small settlement may not be able to sustain and use even a moderately sized energy unit. The trade-off between these two diverging requirements is, in fact, concentrated decentralisation. A policy of concentrated decentralisation will, thus, have a wider application. Energy development programmes have to be launched at selected small centres and growth points where other activities can also be located.

The ecological crisis cited earlier can be avoided through energy development and use programmes. Energy plantations and energy cropping programmes are essential, but these may not be adequate. It is essential not only to produce more firewood but also to make a much more judicious use of this ecologically important natural resource. Misuse of this source is to be completely checked and alternative sources must be explored. The following measures become imperative:

- optimum use of forest production in building construction;
- national export policy for forest production and policy implementation;
- inter-regional (intra-national) trade policy on forest products;
- more efficient and effective use of firewood for domestic and local consumption;
- exploration of alternative energy sources.

Of these measures, this paper is primarily concerned with the last two. It deals with alternative energy technology to ensure a more efficient use of firewood and development and use of alternative energy sources.

Alternative energy sources for the hills are water, solar energy, bio-gas, alcohol, gasification, pyrolysis, charcoal, and geothermal. Besides the methods of reducing firewood consumption, the most important AER (Alternative Energy

Resource) is water, then solar, wind, bio-gas, human and animal power. To consider any of the forest products (presently used or not) as AER is a delicate matter and has to be approached with much careful planning and control. The following AET (Alternative Energy Technology) can be considered for the hills with reference to Nepali experience.

Improved Cooking Stoves:

In Nepal, the most important source of energy for cooking and heating is firewood. The energy problem of the rural and hill people can be alleviated by improving its use. Traditional village cooking stoves are being improved, not only for better efficiency, but also for improving lifestyles by avoiding health hazard and making rooms cleaner and smokeless. That is why awareness of the use of improved stoves has increased. About ten institutions are concerned with research and implementation of improved, smokeless stoves. The present use of prefabricated fired clay stoves may not be the only suitable solution for wider application in the mountain region due to difficult transport network and unavailability of potters.

A majority of the mountain population has been using simple tripods (Odan, Agena) for cooking. These also provide them with room heating, a source of light, and drying of grains and mattresses. This is one of the most inefficient methods of using firewood. Due to this type of complex need and also socio-cultural reasons, people will not easily accept any presently available improved designs of stoves. We have to consider that any new idea should be socially acceptable, as well, and its quality should be maintained.

Based on discussions with the local people, it is found that a semi-tripod type of the cooker is acceptable. The front half of the semi-tripod cooker will serve their usual purposes and the other half could be used as the source of heat for the second pot. The use of a chimney can be made optional.

A lot of firewood is being consumed for cooking animal feed. Even in the areas where the closed type of stoves are used, cooking food on the tripod is the normal practice. This is due to bigger sized pots and also cultural practice in some places. A simple portable, closed stove with grate should be appropriate for this purpose.

Presently, available improved fired-clay stoves could be used by lower hill people who are already using traditional stoves. The last variety of stoves can be build *in situ* as improved mud stoves with cast iron grates and cast iron rings for the pots. These will serve tea shops, restaurants, and bigger families. However, the grate and rings can be very useful for other stoves, as well, because by adding one of the rings even smaller pots will fit into it and the grate will greatly help combustion. These grates and rings are locally manufactured.

Efficiency can be maintained if people clean their chimneys regularly. Therefore, the people should be instructed and encouraged to keep the chimneys clean.

Solar Energy:

Solar energy has been used since time immemorial for drying of agriculture products. The speciality of this source is that it is a constant source available everywhere to everybody free of cost. The application of solar energy has been very successful in the use of solar water heaters. Several hundred solar water heaters have already been successfully operating in different parts of Nepal. Of course, it is not suitable for low income people, but it is good for the higher income groups: hotels, lodges, industries, and hospitals. It could also promote mountain tourism. These

units can be manufactured in a standard mechanical workshop with some skilled labour. In these areas with problems of freezing, a modified type of system with anti-freeze has been developed. Simple solar water heaters have proved to be functional at an altitude of 8900 ft. above sea level.

Several solar dryers of various designs are working in different parts of Nepal. They are being used for drying ginger, apples, apricots, mushrooms, herbs, and seeds. These units can easily be manufactured in the mountain regions with locally available materials and skills, except for the transparent glass or plastic sheet which must be imported.

Solar dryers are of great importance for the hills. But the present design may not be appropriate for all the variety of needs. The dryers should be designed with the capacity of producing optimum temperature and airflow. The mass transfer of moisture which takes place during drying is a very important process for getting a high quality product. A close co-operation of food technologists and agriculturists with the designers of the solar dryers will ensure a better application of this technology to produce quality products.

Solar electricity is being widely used for telecommunication in Nepal and its application is of importance. The cost of solar electricity is coming down, whereas, the cost of other technologies are increasing. Although it will still be an imported item for the hilly region of developing countries, intensive research for its wider application becomes highly relevant.

Passive solar application has to be emphasized for proper utilization of solar energy in new buildings for heating and cooling.

Hydro-power:

The potential of hydro-power in the hills is the highest for both the short and long run. It is renewable and usually available in abundance. For many years, the work has been done mainly in the development and manufacturing of cross-flow turbines with an output of 10–50 HP. Some work has also been done in the field of propeller turbines and overshot or breastshot water wheels. More than 140 turbines of different capacities have been working mainly for mechanical power generation for primary food processing; a few of them for electricity generation.

Traditional mills (ghattas) have been in use for grinding grain all over Nepal for generations, and have been serving the local population to full satisfaction. These are generally integrated with hill irrigation systems. For the last three years, much attention has been given to the improvement of these ghattas which are made of mainly wood and stone.

For oil pressing, a local device (Kol) is used, for rice hulling a "dhiki" is used, and for home grinding in small quantities a "janto" is used. It is believed there are more than 30,000 traditional mills still functioning in Nepal. But due to the growth of population and resulting increase in demand, a technology is needed for oil expelling and rice hulling.

A new approach was started three years ago with the so-called MPPU (Multi-Purpose Power Unit). It is an improved design with spoon-shaped blades of metal instead of wooden, straight paddles, closed penstock pipe instead of open wooden chute, and with a power take-off device for other machines. Its main function is for grinding grains, rice hulling, oil expelling, and mini-electricity production, either with DC car generators or AC generators. It is produced in the range of 2.5 to 10 HP. The advantages of these units over other mini-scale hydro-power applications are that these are easily transportable and installed in a short period of time. The villagers will have no problem in

using MPPUs as they are based on traditional devices.

Given the scattered settlements in the mountains, even an improved water mill like MPPU (for grinding, hulling, and oil expelling) may not be feasible due to low load for processing. Hydro-power, therefore, has to be used with integrated application. It should be used for many purposes like irrigation, water supply, electricity production, grinding, hulling, expelling, grading of flours, small scale industries, improved production of everyday products (ropes, mats, etc.), handicraft making and woodwork, etc. The extension of immediate use of water power could be for grading of ground flour, which is a time-consuming manual process (ground maize is separated into four different products), for winnowing, and for food packing. Such machines are available in the market, as well as can be locally manufactured with little effort and cost.

The use of water power is severely limited now as the needs of an individual community are so small that even the smallest improved power unit remains under-utilized. Approximate minimum settlement size required to sustain a 7 HP water power unit for the purpose of grinding, hulling, and oil expelling, given the present standard of mountain people, is about 5,000 people. This implies that if water power is to have greater future in the mountains, we should try to create bigger settlements instead of present pattern of scattered settlements. If not, we will have to choose integrated uses of the power unit and diversify its use to small industries, food processing a packing, rural industries, and electrification. The settlement size may decrease accordingly.

The installation of water power units has to be carried out by technicians. The total cost of such power units are within the reach of local people and cost of recovery is possible. The cost of power units will decrease considerably if power units can be standardized using modular concepts and considering the demand pattern of the hills. It is also valid for the micro-hydro turbine units. Preferably, the power unit should be owned by a private party, but at places where there is strong community action, it may be owned by a community organization, a panchayat body, or even by a group of small farmers.

The establishment of a turbine institute is very important and could enhance the utilization of water power and will help national testing and R&D activities for energy development.

Bio-gas:

Where wood is a scarce commodity, the people, especially low income groups, use animal waste directly for cooking and heating. This rich, valuable manure is being misused as source of heat instead of using it as a fertilizer which could contribute enormously to hill agriculture. At present, there are already 1,200 bio-gas plants installed and 25 per cent of these are in the lower hills. Bio-gas has mainly been used as an alternative for cooking and lighting. Recently, it is being used in diesel dual-fuel engines. About 10 dual-fuel engines with about 25 to 30 per cent bio-gas and 70 to 75 per cent diesel consumption are in use for grinding, rice hulling, oil expelling, and as a source of light. However, investment in bio-gas digesters for such engines is not yet economically feasible. In one of the operating 7 HP dual-fuel diesel engines for grain processing and light, there is a saving of only 3 litres of diesel per day. A bio-gas system costs about 45,000 rupees and the gas lasts for about 4 hours daily.

Bio-gas as AER can be used for cooking and lighting. It provides a powerful source of light attractive to the hill people. The energy required for light is almost one-third of that required for cooking. Bio-gas plants have a better future as a source of light compared to cooking. Bio-gas potential is high for the lower

hills but present technology is not appropriate for higher altitudes due to cold climate. More effort is needed to cut down the cost of the plants, to use other organic materials besides animal dung for digestion, and to improve fermentation at lower temperatures. At places where there is no alternative energy source and the people depend upon animal wastes, these plants should be encouraged by all means.

Wind Energy:

The application of wind energy has been tried at several places but there has been little success so far. Sophisticated systems, manufacturing problems, maintenance problems, and lack of wind data are the major constraints hindering the use of wind energy. However, there is a good prospect for this energy use in some places. The recording of wind data should be carried out as soon as possible and some windmills should be installed on an experimental basis.

Human and Animal Power:

Muscle power is widely used all over the hills but pedal power has been neglected. Animal power is used for farming and transportation. Some local manufacturers are already producing hand corn shellers, pedal corn shellers, pedal paddy threshers, pedal pumps, and many other agri-tools. Many new items, like rice huskers, rice polishers, winnowers, crushers, chaff cutters, and silage cutters can be easily manufactured and used in smaller communities where water power technologies are not feasible. Increased use of muscle power requires more food. Serious thought should be given for intensive use of these energy sources in isolated, dispersed settlements.

Implementing Strategy :

For successful implementation of energy development and use programmes, based on energy potentials and appropriate energy technologies in the hills discussed earlier, the following measures should be taken:

Implement AET at Selected Focal Points:

As mentioned at the outset, it is essential to select certain potential centres where energy development programmes can be intensively launched. These centres should also act as receiving stations for the technology transfer process. R&D activities are vital in adapting and adopting innovations. These centres will also be a potential place for markets. Integrated development plans for these centres, in view of the service area, becomes necessary. It is easier to organize community action and participation at such centres.

Categorize Main Purposes for which AET is needed in the Hills:

The energy potentials available and the energy needs are the two factors that should decide energy development programmes. For integrated mountain development, agriculture, transport, communication, and industry (including tourism) ought to be developed to ensure viable and sustained development. Assessments of the potentials, conservation and development, and the ultimate use of energy form a complete cycle. An inventory of energy sources for integrated mountain development assumes crucial dimensions. Population location as well as activity location should be given due consideration.

Develop and Adopt Modular AET:

This is essential for mass production of designs. It has several advantages: technology becomes cheaper and costs are reduced;

the production process becomes mechanized and simplified; technicians will be more efficient in implementation; technology transfer to local people becomes easier; and publicity and communication become wider. However, standardization is the final stage in the adaptation of new appropriate technologies. Only with the careful study of the local needs and after the experimental stage should one proceed towards standardization. It should be seen as the end of R&D activities.

R&D Activities:

R&D activities help enormously in the implementation of energy development and use programmes. It should, in fact, be seen as an integral part of implementation programme. Feedback between implementation and design phase becomes possible only when there is an on-going research work relating to needs, potentials, and use/application of energy sources. As the energy sector is a relatively new field, it is essential to adopt a policy of "learning-by-doing" process. The essential component of such research activities should be to relate community needs, resources, and enterprise with potentials of energy development.

Maintain the Quality of AET and Give Training to the Local People:

For successful application of appropriate technology, it is essential to launch technical and communication support programmes. The new technology must be well demonstrated to ensure and maintain quality. Local people should be selected as dissemination agents and given training. Information dissemination at the household level becomes more effective when local people are used. Community participation in energy development programmes will improve maintenance and ensure sustained use of energy sources. Socio-cultural resistances can be minimized by involving local people. The local needs can be more easily ascertained. When an AET becomes acceptable

economically, socially, and culturally we should go for mass application of the technology and the local people could play a key role here, as well.

For the successful implementation of the above strategies, international co-ordination among government and non-government organizations, manufacturers, research centres, and users' group should be established.

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The Task and Significance of Integrated Approach—A brief Account of Chinese Expedition to the Himalaya and Tibet

Sung Hong-Lie

Commission for Integrated Survey of Natural Resources, The Chinese Academy of Sciences

Mr. Chairman, dear friends,

I would like to thank you for the honour of being invited to address this distinguished gathering. The Chinese Academy of Sciences intends to summarize all available data concerning the formation and evolution of the Himalayas and the Tibet Plateau, and to formulate a proposal for the management of natural resources and conservation against natural catastrophes. In accordance with these objectives, a number of expeditions have been organized to the Himalayas and Tibet since the 1950s. These multi-disciplinary expeditions have facilitated a much broader understanding of this region.

The expedition which began in 1973 lasted longer and involved many more disciplines than the others when, for ten years, scientists from over 50 disciplines were engaged more than 400 scientists and technicians participated in field work and over a thousand in laboratory work. Based on the results of this expedition, a series of monographs has been published or is in the process of being published. Some of them will be presented to ICIMOD. At present, this expedition is concentrating on field work in the Hengduan Mountains, the eastern part of the Tibetan Plateau.

I have had the great pleasure and honour to serve as the head of this expedition since 1973. I would like to give you a brief introduction to this research and to emphasize the following points according to my own experiences.

First, the integrated multidisciplinary research is really important. I think it is the principal approach to safeguard the ecological balance and to ensure the rational development of the mountain area. In my opinion, problems such as excessive deforestation, overgrazing, soil erosion and so on, and due to the lack of integrated development.

In order to organize integrated research based on a number of disciplines, it was necessary, first of all, to develop a well-coordinated plan, and especially to define the theme of the project. This theme provided a focus for all the disciplines involved. Otherwise, effective integration of each of the disciplines would not have been possible. For example, the theme of my expedition was the formation and evolution of the Himalayas and Tibet and their influences on the environment and human activities.

There are really four problems to this theme: (1) the evolution and upheaval of the Himalayas and Tibet; (2) the influence of the Plateau's upheaval on the characteristics, evolution, and differentiation of the environment; (3) the flora and fauna, and their adaptation to the Plateau environment; and (4) the evaluation and utilization of natural resources and environmental conservation.

According to my experiences, an integrated approach must involve the collaboration among natural and social scientists, as well as technicians. As mentioned before, more than fifty

disciplines participated in our integrated research including geologists, geographers, biologists, agronomists, economists; and so on.

An integrated approach must involve also collaboration between the scientist and the decision-maker. For example, in the very beginning of our expedition, we sent a task force to the area to identify gaps in knowledge and to determine the urgent practical needs of this region. After the formulation of the programme, we discussed it not only with the authorities of related institutions, but also with the local decision-makers. We usually encouraged the local scientists and practitioners to participate in our expedition team with assistance from the local inhabitants. Sometimes, the local decision-maker himself served as one of the leaders of the expedition. In this manner, the opinion of the scientist and the local decision-maker could be duly considered. Another example is that the Commission for Integrated Survey of Natural Resources, of which I am now the director, is under the dual leadership of The Chinese Academy of Sciences and The State Planning Commission.

The integrated approach must involve the cooperation between the scientist and the local population. I think this cooperation should not be neglected because the local residents are the practitioners. They have a great deal of experience. We scientists must learn from them, and on the other hand, the scientific results must be implemented by them.

Development of the resources of mountain areas may result in widespread harmful environmental effects. In the meantime, a number of successful examples of rational protection and utilization of natural resources have been achieved. So I think the most important task for us is to organize related disciplines to sum up these successful experiences and to determine the scientific approaches to rational mountain development.

In my opinion, one of the more effective means is to hold seminars and symposiums in those places where successful examples can be displayed. Of course, we have adopted the experiences of other countries outside this region.

Finally, it is necessary for us to establish research stations in some key areas. Such stations may be used for studying the relationship among the various elements of mountain ecosystems and the interactions between highland and lowland for comparison of the original conditions with the developed conditions and for recording the economic benefits and ecological effects of mountain development. We have already established several stations in the Hengduan Mountains and other mountain areas. The results of research will be published in due course.

Distinguished colleagues, dear friends, we would like to see that more and more attention is paid to research in the Himalayas and Tibet by scientists from all over the world. We know that numerous important results have been achieved by many scientists in this region. We would like to learn about the

successful experiences from our foreign colleagues. We do hope that this symposium and ICIMOD will pave the way for constant exchanges of views between scientists of this region, as well as

scientists of the whole world. Let us, therefore, increase our efforts to discover a more effective approach to integrated mountain development.

Highland-Lowland Interactive System on a Local, National, and International Level

Bruno Messerli
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The programme, "Highland-Lowland Interactive System", of the United Nations University (UNU) has a special significance and importance for ICIMOD's "Mountain Development: Challenges and Opportunities".

Mountains, regardless of absolute altitude, are areas of sufficient relief to reflect significant ecological differences, as can be seen in the Hindu Kush-Himalayas on a local and regional, but also on a national and international level. Ecological differences also mean socio-economic differences, and these different impacts of human activities will ensure continuous interaction between two or more ecological belts (Messerli 1983-84). Therefore, an integrated approach is needed in a double sense: First, to understand the interaction between ecology and human activities, which may or may not be adapted, and second, to become the interaction between higher and lower ecosystems and land use communities.

Integration and Interaction on a Local and Regional Level:

In a concept for a case study (fig. 1)*, the main steps from the objectives to the decisions and measures are shown in a very general and very simplified way. Only in a detailed case study can the functioning, the capability, and the dynamism of a regional ecological-economic cultural system in a really integrated approach be analysed and understood. Before any decisions are taken, some scenarios should be developed. The increasing influence of external factors; e.g., policy and administration, economy and communication, demography and socio-cultural changes, and the internal differentiation at a passive and an active attitude should be taken into consideration. Scenarios help to evaluate the consequences of decisions and measures to a certain degree. Scenarios are hypothetical sequences of a development, constructed with the idea of focussing attention on causal processes and important points of decisions. Fig. 2 could give an impression of how mountain ecosystems are determined by man's activity and by highland-lowland interactive process. With regard to the Himalayas, it must be stated that human energy has converted the original forested, steep slope into an intensively used agricultural system. Owing to deforestation, the slope had become potentially unstable, but terracing has once more transformed it into a stable system. Nevertheless, erosion forms and processes can be observed (Kienholz et al., 1983: 195-220). Is this obvious damage a deliberately calculated risk, well-known and maintained within acceptable limits over generations, or is it an intensifying process that is beyond control, an indication of accelerating instability, a sign of a fundamentally changing environment? The question is very difficult to answer. It is, nevertheless, an important, even critical, question for the Himalayan region. The answer requires basic ecological research and also a much fuller understanding of the natural and human structures and processes.

Integration and Interaction on a National and International Level:

Fig. 3 shows an attempt to generalize the natural and man-made hazards in mountain areas, concerning not only the local and regional, but also the national and international level. In order that the process may be understood, an integrated approach is needed for every altitudinal belt with its special natural and human conditions. In order that the consequences of the processes may be understood, a study of the interaction between different altitudinal belts is required.

The most important element with long-term effects is the soil erosion and fluvial erosion and accumulation, beginning in the highest belts of the Hindu Kush-Himalayas, and ending in the densely populated plains of the surrounding countries. For years the same assumption of population growth, deforestation, erosion, and floods has repeatedly been made with the result that everybody believes in this vicious circle without proof for any particular region or river system. After the detailed field work in the Kakani area near Kathmandu, we begin to realize that we have not enough data to be able to say how much of the sediment load of the river is natural and how much is man-made. It is the fundamental problem of the Himalayas, and it needs international collaboration between the Himalayan countries on basic research to understand the ongoing processes. Is it not surprising that we do not have enough data available on soil loss under different types of land use practices? Is it not astonishing that we do not know the origin of the flood waters and silt, whether it is the Siwaliks, the Mahabarat Lekh, the Middle Mountains, or the great Himalayas?

Results of a research project on mountain hazards in the Khumbu area do not allow us to estimate exactly the direct influence of geomorphic processes-weathering, erosion, flooding-on lower regions (midland and Terai) that occur in the high mountains, but two examples from the field work of Zimmermann (publication in preparation) may illustrate a tendency:

1. The load of the rivers with detritus and suspended matter is not very big, because of a low weathering rate and only little glacial and fluvial deposits. The erosion in the Khumbu area is not as important as in the deep weathering layers in the Middle Hills.
2. A catastrophic flood, the outburst of a glacial lake with 5×10^6 m³ of water, that came down from the Nare Glacier (5000 m asl) did a lot of damage in the high valleys below; e.g., landslides caused by undercutting, flooding of terraces, destruction of several bridges. At Rabuwa Bazar (460 m asl, 80 km below the glacier) the peak of the glacial flood was not as intensive as the run-off of a normal monsoonal precipitation in the lower part of the Dudh Kosi watershed.

*Figs. 1-4, pages 49-52

The hydrograph (See fig. 4) shows that the maximum water discharge of precipitation during the monsoonal period (26th to 28th August, 1977) went up to 1600 m³/s above the basic run-off, the discharge of the glacial flood (3rd September, 1977) was only 800 m³/s.

The latter instructive example shows that a catastrophic event in the high mountains has had no effect on the plains below.

The following data (table 1) were published from an international congress on river sedimentation in Beijing in 1980. An interesting fact is that the high rate of average sedimentation concentration in kg/m³ of the Yellow River (China) and the Colorado River (USA) is comparable to all the other big river systems of the world, except the equatorial ones. If the annual sediment load is taken into consideration, the Ganges has an extremely high quality. However, as a whole, the Himalayan rivers are in comparable order of magnitude. Are the data too old? Is the recurrence interval of the floods during the last few centuries known and can an acceleration really be observed? Finally, how much is the man-made rate of sediment load and which zone or belt is responsible for it?

All these questions are still open. Answers are needed for eco-development of the different regions and to find them it is necessary for scientific collaboration between the higher and the lower countries of the Hindu Kush-Himalayas.

The Contribution of the Scientific Community to ICIMOD's Activities:

The main objectives of development in the Himalayas are to guarantee long-term sustainable and stable production in the mountainous areas, especially on the marginal land, where high subsistence agriculture has to be developed. Therefore, basic application-oriented research is required. Better knowledge is necessary to reduce the constraints and to increase the potential of the mountain eco-system and the surrounding lowlands and plains.

In this sense, ICIMOD has to stimulate research activity in the Hindu Kush-Himalayas, but it also has to see that the results are available (documentation), applicable (training), and, finally, that they are applied (information). The main responsibility for all the research is borne, wherever possible, by the scientists themselves of the countries of the Hindu Kush-Himalayas. One problem must be solved, however: research for the rural population can never be done in a capital, in an institute of an university, in an office, or in a laboratory. It must be done in the field where people are working and living.

It should be further borne in mind that a lot of farmers know much more about ecology—their knowledge having been accumulated over generations and centuries—than any scientist. It is not true that the scientist must come and tell the farmer what he has to do. Quite the opposite: firstly, the farmer has to tell the scientist what and why he is doing something in a certain way. Then, the "foreigner", even if he is a native of the country, will understand the key problems and the limiting factors. He will also see that behind a certain problem there is, perhaps, not a scientific but a social or a political constraint. For instance, if a farmer has to pay more than 50% of his yield in taxes to a landowner, how can he afford to improve his farming methods? If the population increase leads to such an intensification of agriculture that the soils are progressively impoverished, how can the downward spiral be reversed when the farmer is forced to utilize increasingly marginal land in order to survive (Ives and Messerli 1984)?

If the scientist begins to see and understand these problems, his thinking and working become integrated and interactive. The truth is not to be found in the book of the office, and the truth was not the same yesterday as it is today and will be tomorrow. Natural and human conditions are in a dynamic equilibrium-or disequilibrium—and ecological stability is the continued existence of an ecological system and its capability to restore its original state after a change (Gigon 1983:96; see also Winiger 1983:106).

Though the scientists of the countries concerned have an absolute priority for research, foreign specialists or generalists could be helpful; e.g., methodological aspects (system analysis and scenario techniques as tools for integrated approaches); technical problems (instrumentation, data collection and evaluation, etc.); special scientific questions (analysis of a nutrient cycle); and, finally, as a means of comparing Hindu Kush-Himalaya research problems and projects with other mountains of the world. The deterioration of mountain ecosystems is a world-wide phenomenon and ICIMOD should be ready to facilitate the import and export of knowledge and know-how.

ICIMOD from the Scientist's Point of View:

The understanding of structures and processes in mountain ecosystems, the integrated approach of natural and socio-economic sciences, case studies with a long-term monitoring concept, and programmes with a special reference to highland-lowland interaction are not only questions of research but also of international collaboration, documentation, information, and training.

The experience of several years of scientific work on the Swiss Mountain-MAB Programme has shown that considerable efforts were necessary regarding the education of participating scientists. Most of them were not trained in interdisciplinary work, and it was difficult to adapt the approaches, methods, and results of discipline-oriented work to the problems of an integrated man-environment system. The scientist had not the time nor the training to think about the needs of local inhabitants and decision-makers. However, the different levels of decisions have to be taken into consideration and our work and findings have to be adapted to the reality of the local population and administration (March 1983: 117).

Finally, long-term oriented research is needed because the deterioration of the mountain environment is frequently the result of slow acting processes that are often not clearly identifiable within a decade or within a single generation (Ives and Messerli 1981). The very high costs of these slowly accelerating and uncontrolled processes must be paid by all the subsequent generations. The mountain ecosystems of the Third World are now changing in somewhat the same way.

With regard to the Hindu Kush-Himalayas, the same processes can be observed and differentiated from high to low, from humid to dry, from cold to warm, from steep to flat, from intensive to extensive use, and from adapted to non-adapted techniques. Therefore, a regionalization within the ecological differentiated regions is necessary to place a series of case studies with a long-term monitoring system. These test areas have to be integrated in a highland-lowland interactive system based on friendly international collaboration. If all the Hindu Kush-Himalayan countries are willing to support ICIMOD as a main agent in solving these fundamental problems, then they will have important feedback on the future development of their own fragile mountain ecosystems.

Fig. 1

Concept for a Case Study

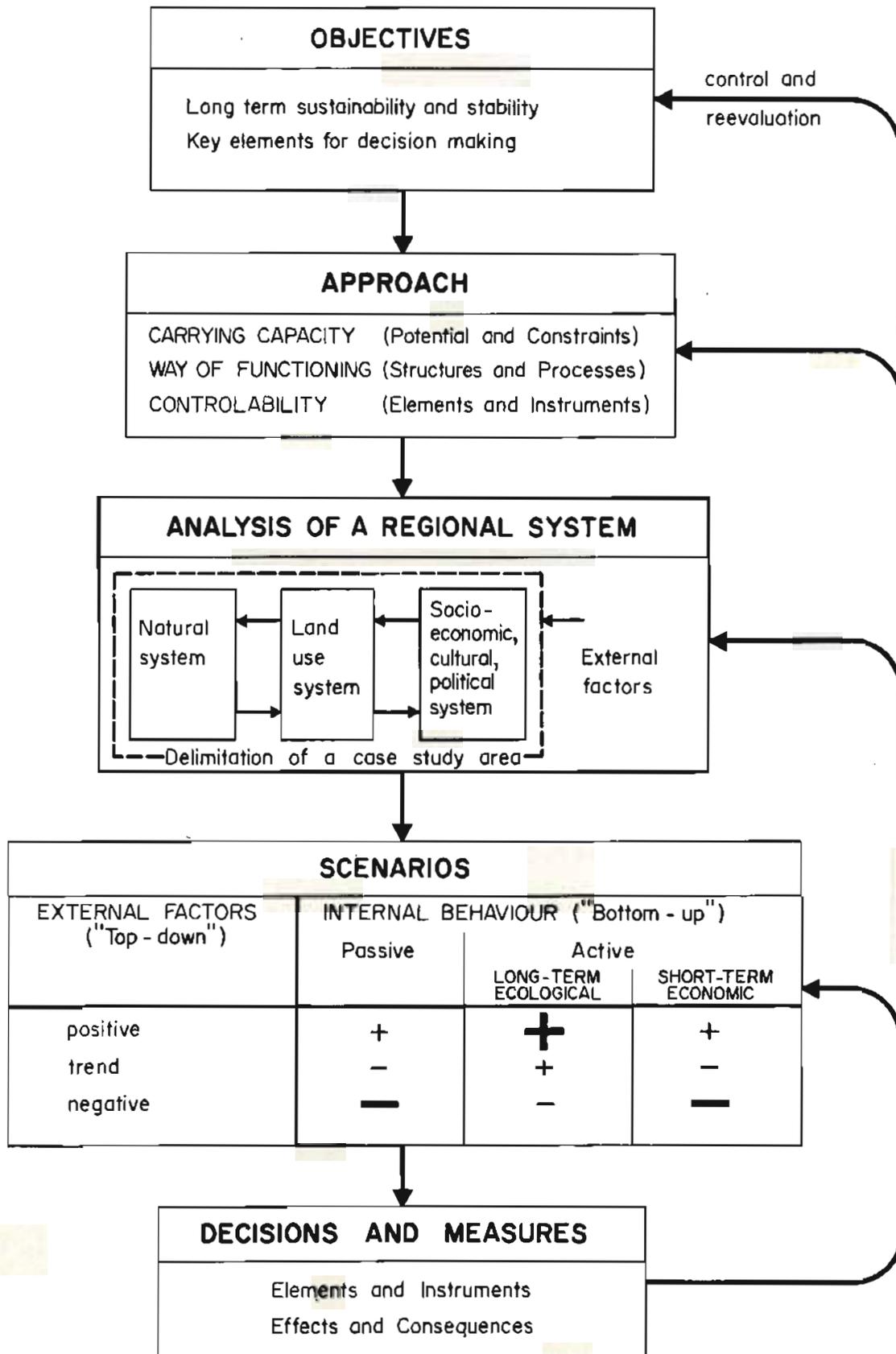
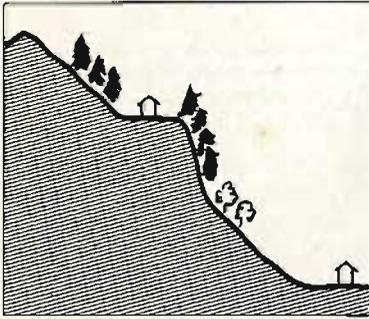


Fig. 2

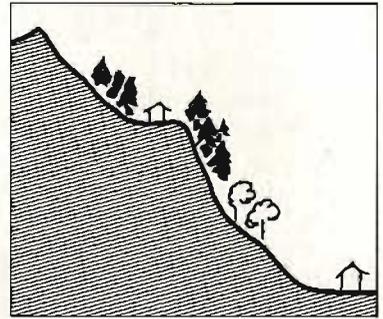
Stability, Vulnerability, Fragility, Instability

Some generations ago

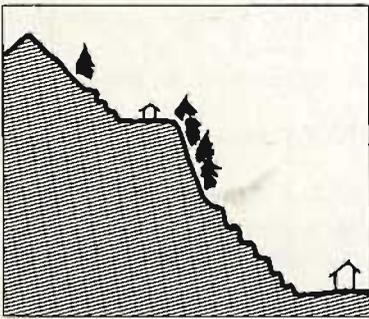


Stability
Unchanged for generations
Long-term sustainable yield

Today

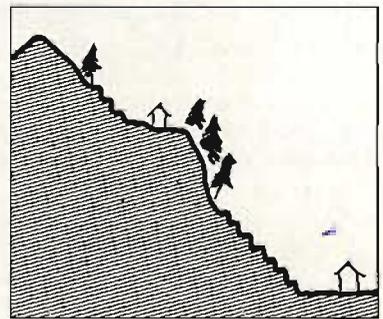


Some generations ago

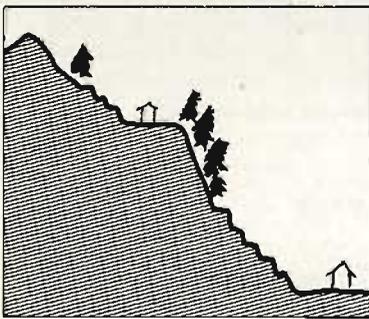


Vulnerability
(Stability)
Unchanged for generations (terraces)
Damages reparable with careful management

Today

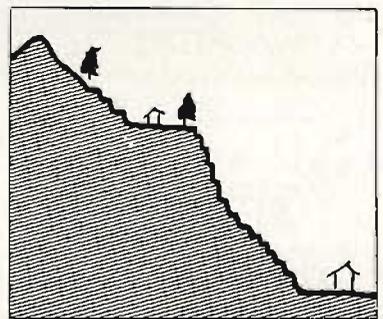


One generation ago

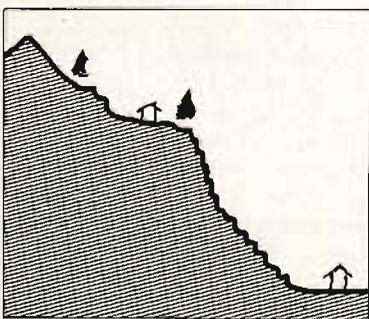


Fragility (Lability)
Changes compensated by human energy input (terracing)
Irreparable damages can easily be inflicted

Today



One generation ago



Instability
Changes by less human energy input (terracing)
Irreparable or irreversible processes

Today

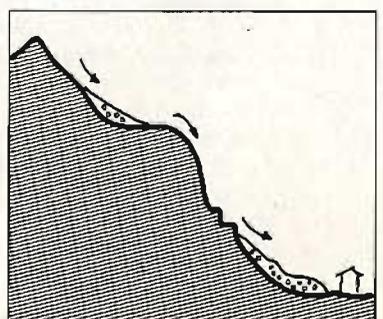


Fig. 3

ATTEMPT AT A GENERALISED CLASSIFICATION OF MOUNTAIN HAZARDS

(Natural and man-made hazards depending of altitudinal belts)

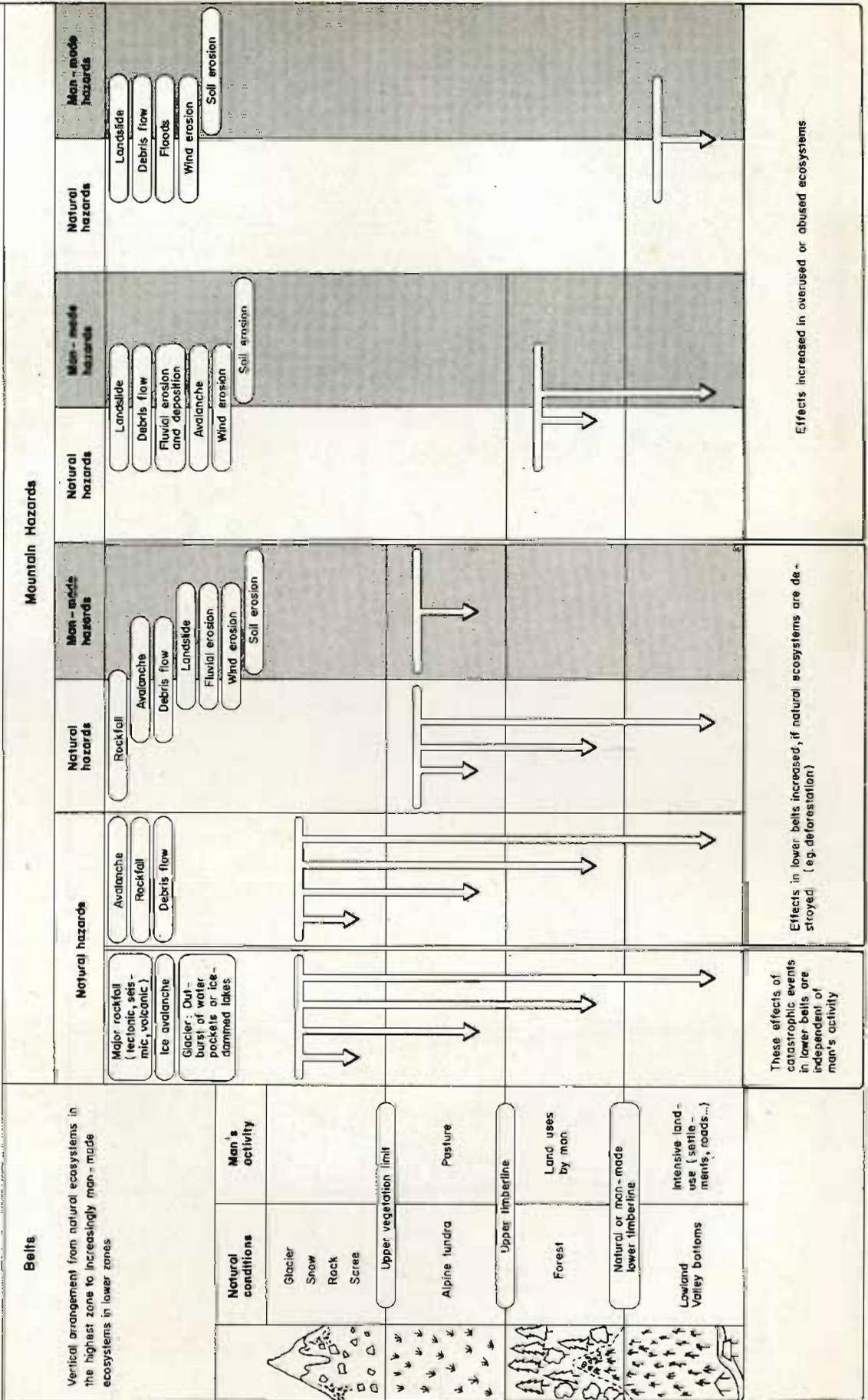
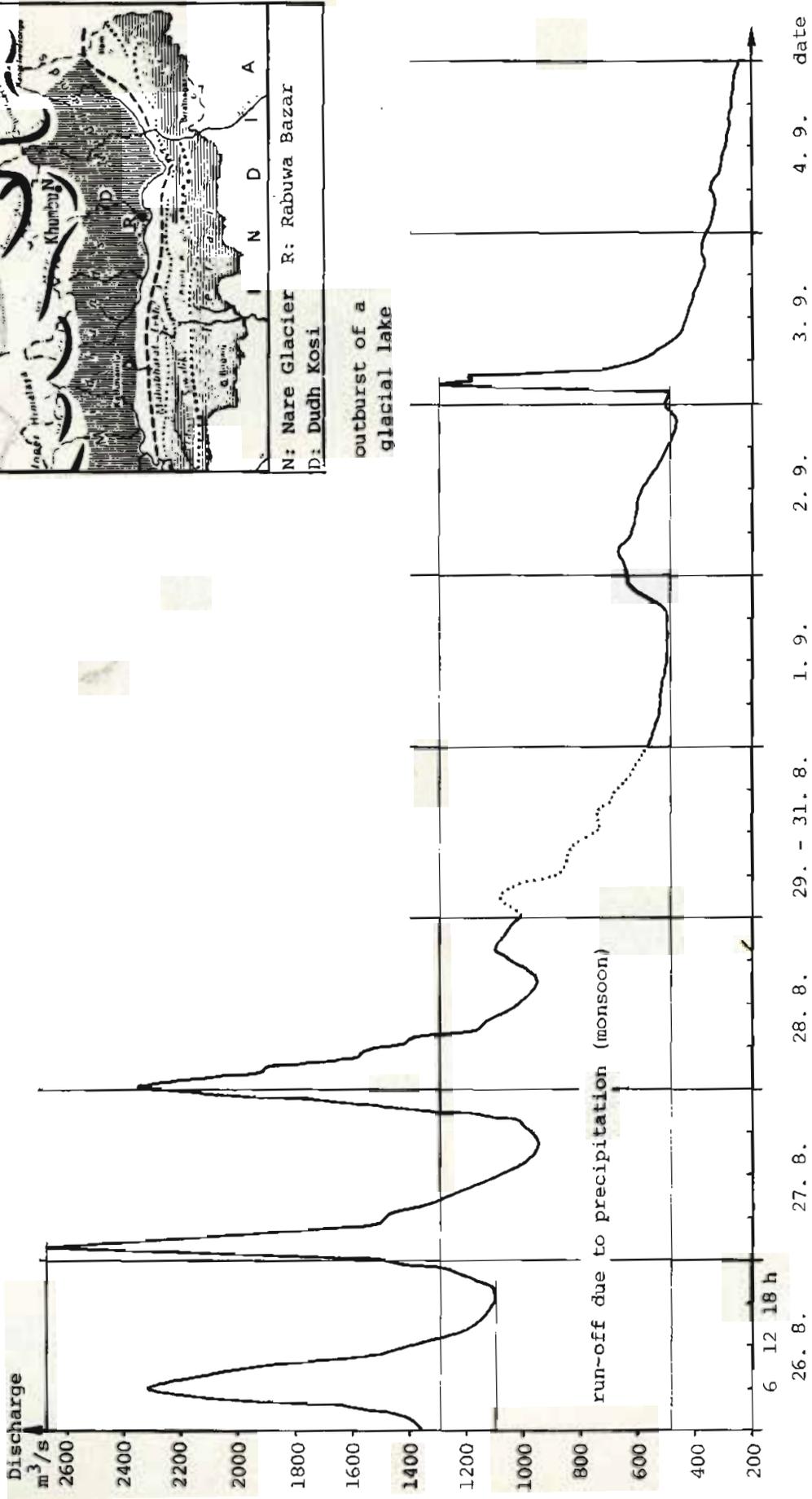
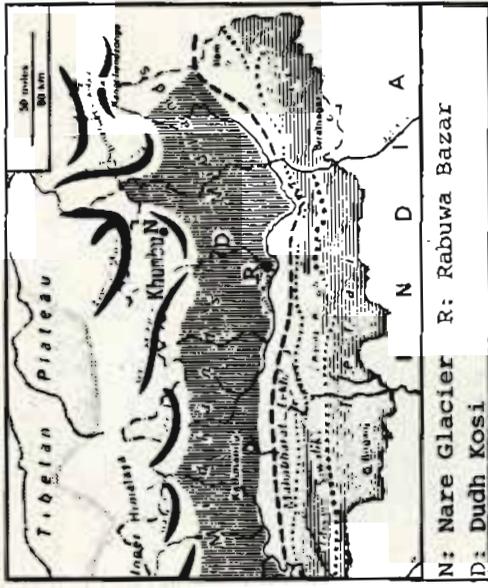


Fig. 4: Dudh Kosi: Daily run-off (August/September 1977)
at Rabuwa Bazar (460 m a.s.l.)



Khumbu Area (NE - Nepal)



Source: Dept. of Irrigation, Hydrology and Meteorology,
HMG, Kathmandu, Nepal

M. Zimmermann, February 1984
University of Berne

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Current Approaches to Research and Development In the Hindu Kush-Himalayan Region

J.D. Ives

Mr. Chairman and Mountain Colleagues, I would like to introduce myself as a representative of both the United Nations University and of the International Mountain Society. However, I want to speak mainly as an individual committed to the cause of rational development of mountain resources and the well-being of mountain people, because the two are inseparable.

First, in my estimation the ICIMOD Procedural Paper is most comprehensive and the Board of Governors, Regent Gueller, and the analysts deserve fullest congratulations. It is a splendid beginning and it is, therefore, with some trepidation that I, as an outsider and generalist, volunteer any commentary.

I would like to concentrate on three themes:

1. to follow the initiative of our distinguished colleague, Sri John Lall, and to emphasize the importance of what I believe to be ICIMOD's need to engender the correct kind of scientific research, scholarship, and development analysis as a basis for understanding mountain environments and their optimum sustainable use;
2. to call for a courageous evaluation of many of the current, so-called, development schemes, and hence, of development agencies;
3. and, now, to risk an apparent contradiction, to take a leaf, literally, out of the new book of our absent distinguished colleague, Professor Frank Davidson, and recommend that ICIMOD take on the evaluation of a selection of possible, or "futurist" macro-engineering projects within the Himalayan region.

In terms of the first theme, I would like to extend to you my conviction that much of what we may call the theory of Himalayan-Indo-Gangetic Plains degradation is based, at least in part, upon a degree of myth—a quarter-century of emotion and repetition of first impressions—and I am at fault myself as much as anyone else. Is it really correct to assume that deforestation in the mountains causes soil erosion and landslides, with direct impacts all the way downstream to the Bay of Bengal, and to base development plans directly upon such a facile assumption?

We must first ask what are the causes of deforestation. This obviously has a simple answer, but it is the more complex set of answers that must be sought. Fuelwood demands of subsistence farmers, and pressure to farm more marginal and steeper land to produce food for local consumption to feed a rapidly increasing population are two oft-cited causes. But why is the population growing so rapidly? What are the patterns of local and regional migration? What can be done to ameliorate these massive socio-economic and political pressures? Next, we must examine the linkage between deforestation and soil erosion. What are the rates of soil erosion under different cover types and land-use strategies, at different altitudes, and on different substrates? What are the point sources of sediment transfer and how far downstream from point sources can the effects of siltation be detected? It seems to me that we really do not know whether Indo-Gangetic Plain disruptions are caused by sedimentation derived from the high mountains, the middle hills, the outer

ranges, the Terai, or the main floodplain itself. At least, we cannot rank these five major potential source areas with any degree of confidence. It is a much larger problem to differentiate between so-called "natural" and "man-made" causes, but this also must be recognized if effective—and costly—countermeasures are to be contemplated.

These questions can be answered, but I think the continued perpetration of large-scale development schemes without answers must be regarded as folly, if not irresponsibility. To tackle such an issue will require a constructive and integrated approach: integrated in the sense of "interdisciplinary", but also in the sense of inter-agency, inter-national, and inter-personal co-operation. An obvious starting point would be the construction of a research design—a model in today's favoured parlance—to test the assumptions that we tend to accept as facts. This, in turn, should lead to identification of additional data needs collection analysis, and refinement of the model. Five years of carefully construed effort should be enough to provide a much more rigorous input into assessment of development projects. Perhaps, more importantly, it should be enough to confirm, modify, elaborate, or replace the theory of Himalayan-Indo-Gangetic Plains degradation.

I am very much aware that it may be considered preposterous for any individual to present such a statement. In an attempt to justify my position, therefore, let me refer to the detailed field study made in the Kakani area on the edge of the Kathmandu Valley. This study has been performed under the sponsorship of the Nepal National Committee for Man and the Biosphere, the United Nations University, and UNESCO between 1979 and the present day. Since the research team, albeit with limited resources, set out to link socio-economic, natural science, hazards mapping, and village level environmental perceptual studies, and, since we had the chance of revisiting field sites over a five-year period, certain advantages accrued to us. Our initial response to the large amount of landsliding and soil erosion was comparable to that of earlier workers and one-time visits of experts. It appeared that the Kakani area was on the brink of catastrophe. What becomes apparent in the longer term is that there exist traditional strategies at the village level for response to the landslide hazards. Areas that I photographed in 1978 and 1979 as unstable landslide scars are today well-tended and highly productive wet and dry agricultural terraces. When the village level reclamation efforts are deducted from the land loss estimates that are often derived from one-time visits, the rate of environmental degradation is seen to be much less than that initially assumed. This does not imply that we can afford the luxury of complacency, but it does mean that there is a little more time and room for more hope, and hope is an invaluable commodity.

Our experience in the Kakani area also led to the realization that the existing destabilizing pressures on the local people must be taken into account. These include aspects of land tenure, rent, and tax structure which, collectively, may be a major cause

of the on-going deforestation. As a small scale example, it appears that a subsistence farmer may be tempted to continue to cultivate increasingly unstable terraces, rather than leave them fallow, because he fears that fallow land will be repossessed by the government for reforestation. Thus, local actions are influenced by "outside" forces, or perceptions of them, and taken in contradiction to the traditional strategies built up over many generations.

Another related issue: accelerating rates of deforestation are often related to the growing need for fuelwood. Yet, as an example of how unreliable our "data base" is, a recent IASA study revealed that existing "facts" on per capita fuel consumption vary by a factor of 27. Would an economist draw up his company's next year's budget if estimates of a prime area of expenditure, or income, varied by a factor of 27?

Hence, there is a need for a research design to identify minimum data requirements, and a plan for fieldwork and analysis, at least in a few representative river basins, coupled with a better attempt to understand the landscape dynamics.

At a recent conference in Switzerland (1981) organized by my colleague, Professor Bruno Messerli, an experienced contributor spoke in opposition to more research with what, to me, was an entirely understandable remark: When the scientist doesn't know what to do he collects more data. An equally reasonable response could be that the scientist is sometimes led to think that the developer or decision-maker prefers no research because it is easier to make decisions if there are no facts. I do not wish to be divisive, because these are obviously extreme positions and there is much more room down the centre of the road than is sometimes appreciated (the results of the 1981 Swiss conference, *Stability and Instability of Mountain Ecosystems*, have been published in *Mountain Research and Development*, Volume 3, Nos. 1 and 2, Volume 4, No. 1; they will be issued in book form under a single cover; Editors, Bruno Messerli and Jack D. Ives, 1984).

For my second theme, I will raise an equally delicate topic. It has always astounded me that many development agencies sponsor, for instance, large dams and other vast projects, apparently without taking note of watershed conditions, indigenous deforestation, rates of siltation, and social acceptability. Cases can be cited, not only in the Hindu Kush-Himalayan region, but also in East Africa, Ethiopia, and the Andes. Two examples are described from the Ecuadorian Andes because they are far removed from the Himalayas.

First, there are two important hydroelectric projects being developed in the upper watersheds of the Rio Paute and the Rio Pastaza, headstreams of the Amazon. I was only able to visit the latter briefly. These two projects, vital to the national economy, have begun without collecting data on sediment transfer in the upper stream basins. Current pressure on land from a rapidly expanding highland population, however, is significantly affecting high mountain vegetation cover in the direction of increasing rates of soil erosion and sediment transfer. This affects the Paute project in terms of the useable lifetime of the storage reservoir, and to the Pastaza project, which has no reservoir, in terms of cavitation damage to the turbines.

The second example is a little more esoteric but no less interesting. The growth of Quito, at 2,800 m above sea level, has led to a shortage of water and to a serious lowering of the water table. Population continues to grow, and, as a response to the increasingly pressing problem, a large water diversion scheme is being funded. This project will tap the headstreams of rivers to the north of the city and divert them southward, at considerable expense and not a little environmental disruption.

The main aquifer supplying Quito is believed to be recharged largely from rain and snow melt in the neighbouring highlands which support paramos and sub-paramos vegetation. One of the most important areas is the Cotopaxi highland.

Extensive areas of the Cotopaxi highland (Cotopaxi National Park) are being converted to pine plantations (*P. radiata*) at the expense of the natural sub-paramos vegetation. It has been hypothesized that the pine plantations, because of greatly increased evapo-transpiration, may be causing serious lowering of the water table.

It could be argued that the two development projects—pine Plantation and water diversion—are in conflict because the decision-makers never asked the fundamental questions nor acquired the appropriate data upon which to base rational decisions. It is conceivable that elimination of pine plantations from Cotopaxi would not only reduce, or even overturn, the need for an expensive water-diversion project, but would result in a much more aesthetically attractive and ecologically appropriate national park. And the much-needed timber could be obtained from further destruction of the tropical rain forest, or from pine plantations established in more appropriate locations.

The preceding discussion is hypothetical and deliberately argumentative. Clearly, a full cost-benefit analysis is required. Minimum data needed to undertake such an analysis include precipitation data, evapo-transpiration data for pine plantations and sub-paramos vegetation, and determination of rates of ground water recharge and sub-surface flow. Should the more conservation-oriented approach prove practical, then an unnecessary environmental disturbance and the wastage of funds would be averted. Should the current development schemes prove the only feasible alternative, then, at least, the growing numbers of skeptics who are complaining about irresponsible squandering of public money may recognize the need for rational decision-making and international development aid.

My intention is not to be divisive and to provoke development agency response. The broad problem of development wisdom is a complex one that affects us all. The examples are introduced because, together, we can reflect on them and devise a more effective approach. One component of such an approach might be the ensuring of independent and politically neutral assessments of development proposals.

My third and final theme is borrowed from my colleague, Professor Frank Davidson. Despite the more obvious sensitivities within the Hindu Kush-Himalayan region concerning very largescale projects that would transgress national frontiers, a series of feasibility studies could conceivably lead toward collective development for the benefit of the entire region. Here are three examples:

- 1 the damming of the Brahmaputra near Namche Bawa and the directing of the ponded water from the Yarlung Tsampo basin through a trans-Himalayan tunnel. The results would be hydroelectricity, irrigation, flood control, and multi-national collaboration;
- 2 the development of a grand canal from the Nepalese Terai to Calcutta or Dacca. The results would be reduced transportation costs for imports and exports, flood control, irrigation, and multi-national collaboration;
- 3 the construction of a large island in the Bay of Bengal, with the advice of Dutch engineers, and the use of supposed sediment transferred from the Himalayas. The results would be new land for refugees and other migrants, a new granary, and multi-national collaboration.

The foregoing remarks may appear as overly critical of current approaches to research and development in the Hindu Kush-Himalayan region. They can equally be criticized for lacking a sound data base, or that information derived from studies in one area may not be representative of adjacent areas. Nevertheless, the intent has been to indicate that certain obvious weaknesses can be overcome, given an integrated and carefully orchestrated approach. In this same context, it is perhaps appropriate to emphasize that the United Nations University and the International Mountain Society may have much to offer ICIMOD. ICIMOD, in turn, has much to offer them, considering that the combined objectives involve sustainable development and the

well-being of the mountain people of the region in the widest sense. The UNU, on limited resources, has nurtured the concept of highland-lowland interactive systems and is a uniquely a political member of the United Nations family. IMS, as an NGO, produces a quarterly journal, has a membership of over 700 in 42 countries, and maintains many close contacts with mountain scientists, both within and beyond the region.

Both ICIMOD and IMS were really conceived, in one form or another, at the seminal 1974 Munich meeting, and, I suspect, both owe as much to Dr. Klaus Lampe as to any other single person. Speaking from the one to the other, I am hopeful that a natural and rewarding relationship can be developed.

Conservation of the Himalayan Environment in Relationship to Development

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The International Centre for Integrated Mountain Development was established in 1981 in Kathmandu. It was initiated by a resolution at the end of the Regional Meeting of MAB on "Integrated Ecological Research and Training Needs in Southern Asian Mountain Systems, particularly the Hindu Kush-Himalayas". This meeting was related to MAB Project No. 6, "Impact of Human Activities on Mountain and Tundra Ecosystems", and was held in Kathmandu from September 26 to October 2, 1975. Continuous effort since then by Unesco/MAB and the MAB National Committee of Nepal has produced fruit as an international centre. Its productive activities are hereafter anticipated.

There is a three-man committee on the Himalayas in Japan. It consists of Prof. Kawakita, Prof. Higuchi, and myself. We have been discussing ecological research and development, training activities, etc. at the same meeting up to now. This committee will develop further in relationship to the activities of ICIMOD. I, myself, have been in Nepal several times. Field studies by the members of Chiba University were focussed in eastern Nepal because there are great similarities in the climatic conditions, the biota and vegetation between eastern Nepal and Japan, particularly in the temperate zone.

Japan is a mountainous country, too, and forests cover about 70% of the land. Thus, only about 30% of the land is inhabitable. The population density is 300/km² as an average over the whole country; however, the population density is 2,011/km² in Toyko and 1,058/km² in Osaka. In these two large cities, 38% of the total population live on 7.5% of the land. The degree of naturalness (1-10) proposed by the Environment Agency implemented a national census of vegetation in 1972. The vegetation naturalness ratings are: 9, 10: natural vegetation; 7, 8: secondary forests; 6: tree plantations; 4, 5: semi-natural and artificial grasslands; 2, 3: croplands; and 1: urbanized areas. This kind of national census will be very useful for the conservation of the Himalayan environment in relationship to development.

I pointed out important matters on the conservation of mountainous areas, particularly referring to Japan, at the MAB No. 6 meeting in Kathmandu in 1975. That is, priority should be given to the comparison of man's activities in mountain ecosystems in Japan and in other Asian countries, such as Burma, Bhutan, Nepal, India, Pakistan, and Afghanistan. In the humid high mountains on monsoon Asia, similarities of biota, vegetation, and people can be seen as an extension of similar features in the Sino-Japanese region of flora.

In Japan, major problems of man's interactions with mountain ecosystems include: (1) Effects of tourism and recreation. Mountain areas, such as Mt. Fuji, the Japan Alps, Mt. Daisetsu, and so on, should be studied from the conservation standpoint, particularly from consideration of environmental assessment in relationship to tourism and recreation; (2) Impact of large-scale

technology. In Japan, many hydro-electric dams have and are being constructed, as well as are transportation facilities (such as motorways, ropeways, cable cars, etc.) for mountain recreation. The effects of such large-scale technology on the biota and vegetation will likely be studied, applying technology assessment methods. We are trying to develop a system of environmental impact assessment with a matrix of technological actions and responses of man, biota and vegetation, and environment. For this purpose, mountain areas must be studied before, during, and after the application of large-scale technology; (3) The value of nature for man. To give priority to technological development or nature conservation in a given area, not only commercial profit must be considered, as well as the value of nature for human life, human welfare, and the maintenance of the stability of the ecosystems. It should be considered not only from the standpoint of natural sciences, but also from that of the humanities and social sciences. Guiding principles should be elaborated for decision making in integrated natural resource management in a broad sense, particularly related to the value of nature for human welfare.

In addition to research into these problem areas in Japan, we are eager to explore the possibilities of participating in bilateral and multilateral projects with other countries, for example, in projects in the Himalayas on problems of human settlement and land-use alternatives at high altitudes.

In the fourth scientific expedition of Chiba University to eastern Nepal in 1981, I went up to the north from Biratnagar along the River Arun. I was quite surprised not to find a large area of natural forests, observing only small fragments of them and many secondary forests, such as *Alnus nepalensis*, particularly in the area of human settlements. On the other hand, there were varieties of crops, fruit trees, and so on, and the people's living standard has been improved.

My observation revealed the fact that there were many naturalized exotic plants, such as *Eupatorium adenophorum* and *E. odoratum*. We could not see large invasions of exotic noxious weeds twenty years ago. However, there is an experiment of biological control against the spreading of *E. adenophorum* using a gall fly. On the other hand, there is another opinion (for example, that of Dr. T.B. Shrestha) that herbaceous vegetation may be useful for the prevention of the soil erosion on denuded lands caused by landslides. When I saw a picture of the Himalayan area taken by Landsat, I found a lot of landslides in this country. Natural hazard mapping by the United Nations University Project Team is closely related to this matter.

According to MAB Green Book No. 34, the specific objectives of MAB regional meeting held in Kathmandu in 1975 were as follows:

1. major impediments to an ecologically sound development of the area;

2. priorities for integrated ecological research;
3. training needs and opportunities in the region; and
4. documentation and information flow.

These objectives will be pursued by the new International Centre for Integrated Mountain Development.

The meeting recommended that a high priority for research should be given to the following problem areas:

1. massive erosion and landslides in mountainous areas;
2. population pressure and migration in mountain areas;
3. changing floral and faunal populations;
4. tourism;
5. planned resettlement schemes associated with over-population and labour demands in various areas.

In regard to the conservation of the Himalayan environment, the felling of natural forests, soil erosion, flooding, and so on, are usually pointed out. However, in my opinion, those phenomena have principally originated due to the rapid growth of the population which requires a large amount of croplands and pastures, fuelwood, and space for houses, etc. In densely populated areas, so-called urbanization and pollution proceeds as it does even in rural areas. As a result, the destruction of nature and natural resources becomes remarkable. To recognize the actual state of the natural environment around us and to establish wise and reasonable counter-measures against the destruction of nature today and in the future, environmental education must be introduced into schools and out of schools.

Conservation strategies, such as the protection and conservation of nature and natural resources, the control of human population growth, the protection of natural vegetation, flora and fauna, the sustainable use of secondary vegetation (forests and pastures), soil conservation, and so on, should be established (Numata 1983).

Among them, I would stress the sustained yield vegetation management for forests and grasslands (particularly pastures), as well as tree planting and grassland establishment. Regarding sustained yield forestry, a standard for cutting trees must be established, and we must determine the size of herds of cattle, the duration of grazing, control of brush and weeds, etc., to achieve sustained yield pasture management. The curriculum for environmental education, including these items, should be recommended.

In Japan, I devised a measure to estimate grassland conditions using an index IGC (index of grassland condition). IGC was derived from the degree of succession (DS). Thus, the grassland condition for cattle raising or mowing based on the degree of succession can be estimated. This method was applied to pastures in Nepal (Numata 1965, 1981). There are many pastures in the Nepal Himalayas, and animal husbandry is an important bio-industry for Nepalese farmers. We must recognize exactly the present state of those pastures using the indices DS and IGC and consider counter-measures for the improvement of pastures, for example, for the proper use of pastures within the limit of their carrying capacity. I spoke on this matter at the Tropical Ecology Symposium (1975).

Next, I'd like to speak about the establishment of biosphere reserves. I wrote about the conservation of nature in eastern Nepal after our scientific expedition in 1963. I sent our report to the Nepalese Government and explained the conservational situation of the area at the 11th Pacific Science Congress in 1966 (Numata 1966). Now there are several national parks, wildlife, and hunting reserves. The biosphere reserve of UNESCO/MAB has core area and buffer zone, etc. zoning. Therefore, the

biosphere reserves will be established on the basis of national parks or wildlife reserve as nuclei. The biosphere reserve will be useful for conservation and scientific research.

In conclusion, here are some of my ideas on the conservation of the Himalayan environment in relationship to mountain development. Priorities should be laid on the study of urbanization and its effect on the natural environment, the control of population growth, recognizing actual state of forest destruction and considering the most suitable plantation, the sustainable use of forests and grasslands within their carrying capacity, a national census of land-use and natural hazards, the control of tourism in relationship to the environmental capacity for recreation, and environmental education for students and the public (Numata 1980).

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The Role of ICIMOD: A Presentation of the Centre

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The statements, the papers, and the play presented over the last two days, as well as the discussions based on them, have focussed on the problems of development and ecology in the Hindu Kush-Himalayan region. Again and again, it has been shown that very close inter-relationships exist between these two major problem areas. In fact, development of any mountain region poses a dilemma from the ecological point of view. Development, almost by definition, implies the exploitation of available resources, but the particular vulnerability of mountain ecosystems makes it necessary to manage slopes and their resources with particular care. It is more difficult here than anywhere else to find an ecologically sound method of land use which will preserve the productivity of the system for the future.

This is especially true of humid, tropical and sub-tropical high mountains, such as the central and eastern Himalayas, where it is the vegetation cover alone which must prevent the deeply weathered soils on slopes from being washed away by the long and heavy monsoon rains. However, the drier western and northern parts of the Hindu Kush-Himalayas are by no means in a better situation. The constraint of low and variable rainfall, which severely limits natural biological productivity, and that of the high risk of erosion on slopes, combine to make these dry mountain regions equally sensitive to even quite small disturbances. Of course, we need to distinguish between natural processes occurring without man's interventions and man-induced deterioration of the land.

It is also clear that strict conservation of these mountain regions is to be excluded as a solution. On the contrary, these areas must continue to be developed in order to improve the standard of living of the local people and to promote further growth of national economies, two objectives which normally should go hand-in-hand. This, then, is the mammoth task ahead of us: to conciliate the development of these mountains and valley areas with sustained use of the ecosystems and their resources, not for the sake of the environment alone, at least not primarily, but rather for the sake of the people of the region and for their descendants. This is, indeed, a huge task for the local people themselves, for their governments, and for the international community.

In order to come as close as possible to meeting these objectives, it will be necessary to continue to deal with a number of key constraints to development of a more general nature, such as the scarcity of capital and new skills, insufficient education, as well as the lack of physical infrastructures, such as roads, and of those of social services, such as hospitals. In addition, a series of more specific problems will have to be tackled. The list of problems includes: how to halt deforestation caused by the over-exploitation of firewood; how best to help farmers increase the yields of rice, maize, potatoes, and other crops in the valleys and on less steep slopes; how to achieve a smooth transformation from subsistence agriculture to ecologically sound and economically viable market-oriented land-use systems; how to make sure

that the construction of roads and power lines is done in such a manner that they do not provoke landslides.

Practical problems such as these reflect the broader question of the inter-relationships among population, resources, and environment. Participants seemed to agree that reducing population pressure on the land and natural resources will be decisive in solving the problems of the region. The only way to achieve this seems to be through intensification and diversification in the land use sector, while at the same time creating alternative sources of income not directly dependent on land exploitation. In this respect, special attention will have to be given to industries using local resources, including cottage industries, as well as those based more on craftsmanship rather than on the availability of raw materials, such as precision mechanics. And, not the least of concerns, is the development of tourism. Such a change in the socio-economic structure and system in the Hindu Kush-Himalayan region would involve considerable further changes in population dynamics, in particular those linked to rural-urban and highland-lowland migration. However, the mountain regions would not be abandoned, as one might fear from observing some of the present trends.

The need for an integrated approach

Another conclusion of the symposium was to recognize that such a target scenario of development will never be reached without following an integrated approach to development at all levels which takes into account the myriad inter-linked factors (ecological, economic, social, cultural, technological) involved in the functioning of the many man-environment systems of the Hindu Kush-Himalayas.

This integrated approach, which particularly takes into account environmental conservation, should be adopted for the development of small, circumscribed rural areas, as well as for regional and national planning. Rural development should be linked with that of urban areas. Planning in the energy, transport, construction, industrial, and commercial sectors must not be carried out in isolation. In addition, social issues, in particular education, public health, and population policy, must also be taken into account in integrated plans, programmes, and projects. But, again and again, symposium participants have raised the question of how to translate this concept into reality.

Before dealing with the obstacles to the application of an integrated approach, the international dimension of the problems dealt with here and of their possible solutions needs to be emphasized. A number of participants have spoken in detail of how the ecological and development problems in the Hindu Kush-Himalayas transcend national boundaries and how the ecological problems experienced in the highlands have serious repercussions on the lower valleys and lowland areas. Development planning should take into account the wider inter-country interactions, as well as the lessons learned in the various countries and the know-how available in the region and elsewhere. Exchange

of information and co-operation is needed to deal effectively with the problems of development and ecology in the Hindu Kush-Himalayas and in their adjacent lowlands.

Obstacles to integrated development

It would be naive to assume that it is easy to introduce an integrated approach at any one of the three levels where it needs to be adopted, at the level of the local administrator/technician/farmer, at the agency level in governments, and at the international and bilateral agency level. In fact, the application of an integrated approach is seriously hampered by a number of very basic obstacles. The first one to mention is the lack of awareness on the part of planners, decision-makers, local administrators, and managers of the need for an integrated approach. It should be noted, however, that considerable progress has been made over the last decade as regards the heightening of such awareness, in particular among top-level decision-makers and executives of national and international agencies. Unfortunately, it appears that their goodwill is very often not translated into action due to "economic constraints"—as most of them would explain.

In reality, I believe these people face other obstacles to an integrated approach which are at least important as the reason they give. These obstacles involve:

- the sectoral structure of governments, and of international and bilateral technical co-operation agencies, as well as of their subordinate management units;
- insufficient knowledge about inter-relationships between sectors, and about methodologies and practical tools of integrated planning and development action;
- lack of information on and evaluation of failures and successes of development programmes and projects;
- lack of trained personnel capable of implementing integrated approaches in planning, applied research, and development action;
- insufficient exchange of information and co-operation among decision-makers in the various economic, education, and social welfare sectors, and also between these officials and scientists;
- insufficient regional co-operation to take advantage of the information and experiences of other countries and to avoid duplication of efforts in documentation, training, evaluation, research, and technical advisory services;
- disappearance of the knowledge and experience of local farmers, pastoralists, and technicians, as well as that of many development projects due to the lack of systematic collection of unpublished information and data;
- dispersion of scientific and developmental knowledge concerning the region in many countries outside the region, often recorded in a language not widely known in the region.

Regarding the problem of insufficient information and gaps in knowledge, the problem is not so much with different sectors, but rather with understanding the inter-relationships in mountain systems between sectors, such as forestry and agriculture, forestry and hydrological management, hydroelectric development and watershed conservation, livestock development and horticulture, horticulture and industrial development, and so on.

Intricately interwoven with the concept of integrated mountain development are four other concepts concerning systematic inter-relationships. These concepts are:

- the watershed management concept concerned with the hydrological connection between upstream and downstream, between upland use and lowland consequences;

- the ecosystem concept concerned with ecological stability and the conservation of life support systems;
- the population carrying capacity concept concerned with the balance in the inter-relationships between population, resources, and environment;

- the concept of socio-economic integration where development is not merely an economic process, but also a social and cultural one, and where development or underdevelopment in one sector is considered to influence all other sectors.

In my view, there is a lack of knowledge of how to bring these concepts together into more comprehensive and holistic models which better reflect on real life situations, particularly at the micro-world level, and which provide improved methodological tools for successful development planning and integrated development projects. Furthermore, there is a lack of scientific validation of generalised statements and assumptions on man-made erosion and the increased occurrence of landslides, the amount of firewood consumed, the efficiency of alternative energy devices, and so on. There is also insufficient testing of many new technologies in the specific environments of the Hindu Kush-Himalayan region.

In analysing this list of obstacles hampering the application of an integrated approach, it becomes apparent that almost all those mentioned have to do with one of the following groups of activities:

- documentation collection and information dissemination;
- specific types of training, seminar activities, and applied research;
- programme and project evaluation, and technical advice.

This analysis, naturally, leads to the conclusion that what is needed in order to reduce and, in the long run, to remove major obstacles to the application of integrated approaches to mountain development, is an institution which serves as a focal point and clearinghouse for integrated mountain development based on ecologically sound environmental management. This institution would have to make information available, provide expertise, train personnel and evaluate lessons learnt, and generate knowledge where it is still missing. One would also conclude that such an institution, while focussing its services exclusively on the Hindu Kush-Himalayan region, would greatly benefit from having an international character so that knowledge, expertise, and resources could be made available from a wide range of countries.

How ICIMOD came into being

These were the ideas launched by two international meetings. In December 1974, in Munich, an international workshop on the development of the mountain environment was organized by the German Foundation for International Development. A second meeting was organized by UNESCO in the framework of its Programme on Man and the Biosphere (MAB). The regional meeting on integrated ecological research and training needs in the Southern Asian mountain systems, particularly the Hindu Kush-Himalayas, as it was entitled, was held in 1975 in Kathmandu, in collaboration with the MAB National Committee of Nepal. As most of you certainly know, it was this meeting, attended by delegations from most of the countries of the Hindu Kush-Himalayan region, which strongly recommended the establishment of an institution servicing the countries of this region and focussing on documentation, promotion of research and training on integrated mountain development, and technical advisory services in this field. The meeting also welcomed the offer of the Kingdom of Nepal to host the proposed institution.

Following the endorsement of this recommendation by the 1976 session of UNESCO's General Conference, UNESCO as it was sored the development of the Centre-UNESCO as it was soon called—in the framework of its MAB Programme.

Eight years have passed since the regional MAB meeting in Kathmandu. The need for such a centre is felt even more strongly today than in 1975. In 1981, when the first issue of the journal *Mountain Research and Development* appeared, it included a letter to the editor commenting on, "the need for a centre for the study of mountain environments", submitted by Joseph Allen Stein, a noted scholar on mountain housing and human settlements. Stein eloquently described the situation as follows:

"At present, even concerned administrators and technical officers are frequently at a loss, confused by conflicting ideas, instructions, and advice. In their haste to do something, they often do more harm than good. While notable work is being done by conservation and scholarly organizations, and both cultural and environmental conservation measures are helping to save some outstanding specimens of natural and cultural importance, the main problems, the level of understanding and technique of the local administrator/engineer/farmer remain nearly untouched. And the decision-making apparatus is still based upon short-term considerations, often oblivious of long-term consequences. This is further compounded by obsolete planning and engineering practices, probably well-intentioned, but nevertheless damaging.

The situation requires a new approach, with access to information, advice, and knowledge that is seldom at hand. Although huge sums are currently funding research, research institutions, and education for technicians and professionals, there are no institutions or centres for the study of the mountain environment in which competent, practical training and advice for those whose work affects the ecology of their environment is offered on a regionally pertinent basis. Numerous experts have long ago pointed out the need for research and training on a systemic regional basis, linked with accessibility to the international pool of knowledge and experience. Although good examples can be found of mountain housing, communications, road building, erosion prevention, forestry, dam siting, siting of tourist and other industries, and solar heating from which useful lessons may be learned, these are not widely known and are not always pertinent to specific regional conditions and needs."

Structure and main activities of ICIMOD

Now, almost three years after the writing of this letter, the Centre actually exists and work can start tomorrow. We now must rise to the opportunity and challenge that this Centre provides. What then will ICIMOD actually do and how will it function?

Firstly, it needs to be pointed out that the Centre is an autonomous international institution under the authority of a Board of Governors. In other words, it is neither a Nepalese, nor a Unesco, nor a Swiss, nor a German centre, to mention the four founding sponsors. The composition and constitution of the Board of Governors are laid down in the Statutes, and the major objectives and functions of the Centre are defined there. These objectives and functions represent the character of ICIMOD, its terms of reference, the framework of its competence, and its activities.

The objectives of ICIMOD are set out in Article I of the Statutes as follows:

"The primary objectives of the Centre shall be to help promote the development of an economically and environmentally sound mountain ecosystem and to improve the living standards of mountain populations of the Hindu Kush-Himalayan area which, for the purpose of these Statutes includes Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan. To this end the Centre will serve as:

- (a) a multi-disciplinary documentation centre;
- (b) a focal point for training and applied research activities; and
- (c) a consultative centre in scientific and technical matters for all the countries of the region upon their request.

In Article II of the Statutes, the main functions and activities are outlined:

1. In fulfillment of its foregoing objectives, the Centre shall have the following activities:
 - (a) collect, evaluate, and make available information and results of
 - (i) research programme and projects;
 - (ii) development projects; and
 - (iii) other published and unpublished material related to the ecologically sound development of hill and mountain areas;
 - (b) assist in the identification, preparation, execution, and evaluation of relevant programmes and projects;
 - (c) give advice to governments and non-governmental institutions of the said area of new programmes and on all issues related to the development of mountain areas;
 - (d) serve as a clearinghouse for information for all parties engaged in such development and help to make use of existing know-how;
 - (e) produce and distribute relevant information for the different client and target groups;
 - (f) support and undertake post-graduate training in all subjects relevant to mountain development;
 - (g) host national, regional, and international seminars and conferences in order to strengthen the idea of economically and ecologically sound development of hill and mountain areas on a worldwide basis;
 - (h) promote, conduct, and co-ordinate applied and problem-solving research activities;
 - (i) perform such other related activities as may be appropriate in the furtherance of its objectives.
2. The Centre will provide assistance, advice, and support to countries and non-governmental institutions at their request.

A closer look reveals that each one of these activities has been carefully chosen to address the list of obstacles to the application of an integrated approach which was presented earlier.

Regarding documentation, the Centre will focus on the collection, collation, classification, and storage for retrieval of published and unpublished data and information on integrated mountain development and on the Hindu Kush-Himalayan region in particular. The Centre will also function as an abstracting, translating, and indexing institution establishing liaison with relevant information programmes and agencies internationally, in particular in the participating countries of the region.

The second major function of ICIMOD will be to develop and maintain a multipurpose publishing and information dissemination programme for a wide range of clients and potential users of the Centre. This information dissemination programme might,

therefore, include in its activities, among others:

- publication of a regular ICIMOD Newsletter distributed free to collaborators, actual and potential, comprising news and comments on matters related to integrated mountain development in the Hindu Kush-Himalayas and more specifically on Centre affairs; a first issue has already been distributed here;

- provision of printed and illustrated educational material for use in schools, extension centres, community discussion and project groups, women's and adult education programmes. Such material should make use of the local language and the visual idiom;

- an information service to meet requests from development agencies and others for data, information, and references;

- publication of major monographs, proceedings of seminars, workshops, symposia, project appraisals, and evaluations.

Regarding training, it should be understood that ICIMOD will not engage in organizing formal training programmes. If requested, however, it may provide advice on how to make formal training programmes within the region more relevant to integrated mountain development. ICIMOD's training and seminar activities will treat various aspects relevant to mountain development with special emphasis on promoting an integrated approach. Courses and seminars would normally be of short duration and, when possible, would include field demonstrations and case studies. Priority target groups will be planners and decision-makers, agency executives and administrators, project personnel, teaching staff, extension workers, and local administrators. Seminars which provide a forum for dialogue between experts in fields related to integrated mountain development and decision-makers will receive particular attention.

The Centre's research functions come under the following objectives:

- translating the concept of integrated mountain development into practical development planning and action programmes, including applying it to project planning and appraisal;

- synthesizing, evaluation, and transcribing research data in order to facilitate their application to integrated development;

- identifying problem areas as well as opportunities for development and relevant gaps in knowledge;

- evaluating proposed, ongoing or completed development programmes and projects to identify strengths and weaknesses, successes and failures, expected or possible unexpected side effects, and direct consequences. Such evaluation can, of course, be done only in close co-operation with agencies responsible for planning and implementing the programmes and projects concerned;

- stimulating, co-ordinating, and, in selected cases, executing and possibly partially financing research needed to fill the gaps in knowledge.

Finally, ICIMOD will function as a technical advisory service on all matters related to the promotion of integrated mountain development based on ecologically sound environmental management. In particular, the Centre offers its participation in feasibility and appraisal studies of development projects in the Hindu Kush-Himalayas.

Collaboration and sponsorship

It needs to be emphasized that it is not intended that ICIMOD play a competitive or parallel role to any existing institution, but a complementary one in furthering the effectiveness of the national, bilateral, and international bodies already operating in the region. The states in the Hindu Kush-Himalayan area and

the bodies referred to are warmly invited to participate in the activities of the Centre and to use its services.

It is to be expected that the level of participation in the activities of ICIMOD will vary from country to country, at least in the beginning. In particular, regarding appraisal, evaluation, and the provision of advice, the Centre can become active only upon the request of the authorities concerned. In fact, it will be a guiding principle for ICIMOD to seek an agreement with the appropriate authorities prior to becoming involved in any national or international activity whatsoever in any country.

As a member of the Board of Governors of ICIMOD, I am confident that the combined wisdom of the participants at this symposium will help shape the 1984/85 work programme for the Centre to reflect its objectives and functions, to be sound from a technical point of view, and to respond to the needs and interests of the countries of the Hindu Kush-Himalayan area regarding this first operational phase of ICIMOD. This shall, indeed, prepare the way for the adoption by the Board of the next two years' programme. On the other hand, I think we will also have to be patient. As much as we would all like to see ICIMOD launching fully-fledged operations as soon as possible, we will have to take into account the constraints of the budget and the time it will take to recruit personnel and to set up the physical infrastructure of the Centre. Priorities will have to be set.

ICIMOD was most fortunate to have had for its preparatory phase a very dynamic Regent. I would like to take this opportunity to express my sincere appreciation to Mr. Gueller for his work—including the organization of this symposium. As from spring 1984, ICIMOD will have as its Director the notable scholar and development expert, Dr. Colin Rosser. The Director shall administer the Centre, including recruitment of staff, and shall be responsible to the Board for its operation and management, and for ensuring that its programmes and objectives are properly developed and carried out. The Board of Governors has not yet considered the internal structure of ICIMOD, and it might not be fair to my colleagues on the Board to present my ideas to this assembly. Hence, I would like to restrict myself to the comment that it would seem quite obvious that operational task forces and/or units will have to be set up to deal with the major functions of the Centre as outlined earlier, that is to say, documentation, information, dissemination, investigation, evaluation and research, training, as well as consultation services. Flexibility—not the establishment of a rigid superstructure—will be the key to success.

Finally, Ladies and Gentlemen, I would like to make a plea to all governments represented here, to all institutions participating in this symposium, to all practitioners and research scientists present: ICIMOD cannot survive without your co-operation and participation. In order to fulfill its objectives, ICIMOD seeks the close collaboration of experts in fields relevant to the Centre and even more so with national, bilateral, and international agencies engaged in the Hindu Kush-Himalayas.

I feel strongly that both agencies operating in the region and ICIMOD would benefit from co-operative activities, as well as from exchange of information and ideas. ICIMOD offers its services to all those agencies and institutions which are concerned with development and science in the region and which share the ultimate objective of improving the well-being of the local people through sustained use of resources. In return, ICIMOD hopes to receive support from within the region and from other parts of the world.

Formal sponsorship of the Centre is open to all Member States

and Associate Members of UNESCO, international, governmental and non-governmental organizations, and private and public institutions of a scientific and non-profit nature.

Formal sponsorship implies a contribution in cash or kind to meeting the costs of operating the Centre and of carrying out its activities. The specific rights of formal sponsors of the Centre are laid down in the Statutes. Four seats on the Board of Governors are reserved for the financial sponsors. Let me take this opportunity to express UNESCO's hope that other governments and institutions will follow the example of His Majesty's Government of Nepal and the governments of the Federal Republic of Germany and Switzerland to sponsor ICIMOD. I would like to suggest that other countries in the Hindu Kush-Himalayan area also consider this possibly seriously. If ICIMOD is to develop into the highly useful and successful operation, which UNESCO and I take it all of you would like it to become, the acquisition of new sponsors will be decisive.

Before closing, a last word on the future role of UNESCO in

ICIMOD. On Monday, the Director-General of UNESCO, Mr. Amadou Mathar M'Bow, will take the floor during the inauguration ceremony, and will no doubt address himself to this question. If is, therefore, not opportune and not necessary for me to elaborate on this point now. However, I am pleased to underline once again that UNESCO takes great interest in the Centre, as demonstrated by the presence of the Director-General during its inauguration ceremony. UNESCO's support for the Centre shall continue through the Programme on Man and Biosphere as ICIMOD begins in the near future. I sincerely hope, to fulfill our collective expectations of what it can contribute to this region.

The author gratefully acknowledges that a few paragraphs of this paper are based on the unpublished mission report entitled "A Prospectus for Living with Mountains" prepared for UNESCO by Professor Kevin O'Connor, New Zealand (June 1981). Also referred to is the ICIMOD brochure (1982) which had been prepared jointly by Messrs. P. Gueller, J. Seelhofer, Ms. J. Damlamian, and the author.

Some Lessons and Problems in Eco-Development

A.D. Moddie

I have been asked to speak by old friends as one of the four original movers of the international mountain environment movement, which we started in the years 1973-5. I have not prepared a statement, but I will speak directly and sincerely, and not in the usual conference language. I am grateful to ICIMOD for the opportunity to be here and to meet old friends of this endeavour, as well as those of us who were present at the first international conference on this subject in Munich, 1974. Once there were only four, then forty, now I do not know how many.

Ten years ago when I came to Kathmandu, I was asked by a person from an international organization who I represented, I said then, "I represent no one. I represent a concern for mountain environment". I can say the same today, and I hope that all of us, whatever governments and institutions we represent, share that concern sincerely and deeply. And, in doing so, I hope we will be able to surmount the boundaries of countries, institutions, and disciplines and become a society of friends, as we did at Munich. That way, half our problems can be overcome.

May I just offer you a few of the major underlying lessons I have learnt in eco-development in the last decade, and some practical problems from our experience for ICIMOD.

Major Lessons of the Last Decade

This is an age of multiplying institutions. With it has gone the realization of the limitations and incapacities of institutions. Expectations and promises have been high; realization of those expectations and promises has been low. There has not been enough understanding of the social dynamics of institutions. It is well to remember this at the start of a new institution like ICIMOD, before rigidity, bureaucratization, and a loss of innovative, experimental zeal set in. Institutional vitality is essential for new eco-development tasks.

The next lesson is that reality, real people, and real work are in the micro-world of the Himalayan people. We need to redress the past preponderant imbalance of the macro-institutional world, by putting the micro-world in the centre of the picture. The real decision-making with soil, water, plants, and livestock is there. The real role of the institutional world is to be facilitators, resource-mobilizers, and science providers; the final decisions are made by the hill family in the hill village. How can we facilitate their decision-making, instead of living in the delusion that we in the macro-world are the real decision makers?

The third lesson is the question: How far has the macro-institutional world itself been a part of the problem with old, unchanging, and rigid ways, with old performance norms which do not induce new and better performance from its performers? How can we expect the hill man out there to change his traditional ways, if we first do not change? To the extent we are part of the problem of eco-development in the Himalayas, to that extent we are impediments to the solution or amelioration of problems. And there is, after many plans and much expenditure, a marked gap between the last development office and the village. The processes of development themselves; e.g.,

forestry practices, dam and road building, and tourism appear to be increasing threats to our eco-systems, of the Himalayan life-support systems. For example, mistakes over twenty years ago in the days of the Bhakra dam were understandable; but we have repeated the same basic mistake of ignoring the upper catchment eco-system twenty years and twenty dams later in all Himalayan countries.

Some Practical Problems for ICIMOD:

Some scientists in India, and also abroad, are questioning: How far is the international land classification relevant to the realities of land use in the mountain regions of developing countries? ICIMOD might re-examine this question, especially to see land classification in the perceptions of local hill farmers. With rising populations, and hardly any class I and II lands for developed agriculture, and with no practical prospects of any government being able to materially alter this basic situation, should we not begin with this hard reality, and modify both classification and its consequential steps for land-use planning?

So far, foresters have acted and believed as if the prime function of forest is to produce wood and other commercial forest produce to maximize revenues. Belatedly, a few foresters are beginning to realize that the prime function of a forest is water conservation. In this context, hill springs, too, are seriously threatened by deforestation, as the perennial source of water for most people in the hills. ICIMOD should promote the prime importance of water in Himalayan eco-development, and the preservation and recharge of hill springs as a primary subject.

Too long have the three communities of the villagers, scientists, and administrators lived in separate worlds. How to devise working organizational systems to fuse these for sub-catchment eco-development? This, too, is a task for ICIMOD on the basis of mutual learning processes. The hill villagers' "science" of inherited experience and wisdom should be a starting point for applied research.

In particular, how are we to make people's participation and cooperation in the management of local natural resources meaningful? How are we to revitalise traditional forms of local village social action processes? It is crucial for all eco-development to have the involved responsibility of the local people.

Some of our scientists are also questioning the application of high technology agriculture and animal husbandry, as in the USA and the Punjab. In hill areas ICIMOD should examine the optimum mixes of appropriate technologies-high or low-for subsistence hill farmers with hardly any class I and II lands, at least until enough water can be harvested and harnessed for higher starting productivity. Until then, how to raise the sustainable productivity of dry-land mixed farming, with soil and water conservation?

The crux of the eco-development problems is attributed to human and livestock pressures of rising numbers on Himalayan eco-systems. Yet the ecological principle of "carrying capacities" is only a phrase in development plans. How is it possible to

transform it into operational use, to see what can be done to reduce constraints and enhance the potentials of eco-systems, and so minimize excessive human and livestock pressures on eco-systems? This may first require a modelling approach, a crucial scientific task for ICIMOD in sub-catchment eco-planning.

Society has been described as "a vast, complex learning machine". I hope, for these and many other problems, ICIMOD will prove to be a useful learning machine in the future.

Finally, may we leave this symposium with the spirit of the Munich Conference of 1974, as a society of friends representing Himalayan eco-development concerns, as friendships are more important than representativeness or specialisation. Such a spirit will help solve our problems. It will also bring us closer to the realities of the situation, and make us better equipped for mutual learning processes, which all development problems demand.

Activating Research toward Development

Corneille Jest and A.E. Manzardo

Several matters have bothered us when we have tried to consider the question of what is to be done to conserve our mountain eco-systems. One major hurdle has been the lack of communication between research scholars and developers. Often, the two speak different languages and work undertaken by one group seldom seems to affect the other. This creates a situation where there is duplication of effort or worse, where one group operates in unnecessary ignorance in spite of the presence of research which is already available. We would like to address several issues concerning this lack of communication in this paper and expand upon two topics which are crucial to this discussion: the role of social science in development and the importance of documentation.

The Role of Social Science in Development

Decision-makers and planners have shown some impatience, if not irritation, with the results and attitudes of academic scholars. It seems that this attitude is indicative of a wide lack of communication between scholars and developers. This paper explores some of the reasons for this lack of communication and proposes some ways in which the situation could be remedied.

A major cause of this communication gap is the difference between the occupational demands of both groups. For example, in the time frame available to the developer, decisions often must be made quickly. The constraints created by deadlines, the demands of budget preparation, and the fiscal year are always with him. The time frame available to researchers is much longer, almost luxuriously long from the point of view of the developer. Although long-term research provides more accurate data and insight into the yearly cycles basic to an agricultural society, the developer often cannot hold up his decision, even if the information is felt to be vital for his plan.

Academic researchers are trained to research their fields exhaustively. Their occupation demands that they try to collect as much information as possible to support their analyses. The presentations of a scholar often show his justifiable pride in the size of his collection, so reports tend to be long and highly detailed. Developers, on the other hand, tend to demand only enough data to make their decisions. Any additional information only slows down the decision-making process. Thus, what might be a source of pride to the scholar is a burden to the developer.

One of the problems the developer encounters in trying to use scholarly work in his decision-making process is the unavailability of these works. Scholars face difficulties in making their research available to a large audience. They publish in a great number of journals throughout the world, but only a few of which are regionally based or devoted specifically to the problems of development. Thus, a developer would have to wade through a great deal of information before he found something directly relevant to his work. For this reason, developers are often unaware of research which could affect their decisions. This is one of the reasons why decision-makers tend to rely heavily on quick surveys rather than depending on research which might be already available.

The limited circulation of information is another problem.

Although scholars publish throughout the world, only a few libraries carry their work, and these, for the most part, are far from where actual decisions are made. Likewise, researchers often find it difficult to gain access to reports written for developers and, therefore, the problems encountered by the developers are unknown to them. The lack of space in government offices makes the saving of reports a difficult practice. For the developer, it is again a question of paring the information down to that which is essential. This attitude, of course, is appalling to the researcher who needs to accumulate as much data as possible to reach his own conclusions.

There are other differences as well. Researchers often start with less defined problems and less defined geographic areas for their research. Scholars need to wander and find the thread of useful research. Their research categories are often based on units such as watersheds, ethnic or cultural areas, and villages, all of which have no real meaning within the political context of the developer. The decision-maker is concerned instead with wards, panchayats, districts, and zones. There is often, therefore, no direct correspondance between the areas of concern of the two.

Development work has traditionally followed what could be termed an "engineering" model. Developers order research and implementation through purchase order contracts and look for specific and directly definable skills. They like to hire "specialists" to do specific tasks under "terms of reference" and "scopes of work".

The use of an engineering metaphor might better be explained as follows: If one were to build a bridge, one would hire a civil engineer who would measure the river, look at the surrounding area, do calculations, and make a plan. The bridge would then be built according to the specifications of that engineer's plan. For the engineer and his work it doesn't matter whether the bridge is being built in Peru, Chicago, or Kathmandu. There may be changes in material, but for the most part the techniques would be the same. The engineer is a specialist with certain skills to be applied to a specific task regardless of where it is to be done. Engineers, therefore, travel throughout the world and do their work on demand.

Public works, such as bridge-building, is part of development, but there are other development tasks, as well. Currently, development includes health, education, and agriculture, as well as engineering. Although each of these fields require expertise of a very real sort, we are discovering that the need to work with people makes these other forms of development very sensitive to where they are being undertaken. Most development work, therefore, requires attention to culture and communications, as well to the specialist's techniques.

Traditionally, the solution to the problem of communications was handled by bringing in yet another specialist. Once the technicians developed their plans, the "extension expert" was brought in on a "purchase order" to sell the expert's plan to the people. This system is clearly flawed. Gradually, we are learning that projects cannot be planned by experts without the direct participation of the people themselves.

Developers often complain that anthropologists tell them why projects *cannot* be done. Anthropologists realize that projects planned without reference to local conditions or without concern for local problems must fail. Once plans are better tailored to the local context, the negativism of the anthropologists ought to disappear. Research into history, culture, local ecology, geo-logy, and so on are an insurance policy against disaster. History reminds us of the danger of policies being rashly instituted by administrators without proper understanding of the social or political consequences of their acts. It is through a detailed understanding of the context of our decisions that we can best protect ourselves and our environment.

On the one hand, there is the need to act slowly and understand the context of our decisions fully to avoid disaster. On the other hand, the developer needs to make decisions within a limited amount of time so that actions can be taken to solve pressing problems. How can the two be reconciled?

Clearly, the need for a change in the conception of how to go about development has opened the door for the kind of information which has been collected for years by researchers. Clearly, there is a need for localized knowledge gathered in the earth, life, and social sciences to modify plans based on the knowledge of the experts. Clearly there is room to learn the communication techniques of scientists who have been living in Nepalese villages for thirty years.

Researchers, on the other hand, must learn about some of the needs of developers and to understand the constraints under which they operate. The credibility of the researcher will increase as he learns to formulate both analyses and conclusions more rigorously and more economically—to get to the point. This comes of understanding how much information is needed to reach a specific decision and presenting enough data—and no more. Surely research will lose some elegance, but at least it will be used and the confidence of developers and their concomitant support will likewise grow.

Similarly, scholars ought to shake themselves loose of the notion that culture change is something which is somehow tacked onto the end of an ethnography. Cultures have always changed and always will change. The notion of a steady-state culture is a holdover from the days when colonial governments rationalized secondary rule. What we now call "development" is a continuation of this process of culture change. The refusal of individual researchers to recognize this can only blind them to the facts.

Like tourists photographing the main squares of Kathmandu without showing taxicabs or telephone wires, the researcher who ignores change is painting a false picture for himself and for his readers. In Nepal, for better or worse, the social landscape now contains community forestry, community health, integrated rural development, agriculture development banks, corporations and input organizations, cooperatives, and small farmer programs. If these are not understood and placed into perspective, then the local culture is somehow being distorted. The developer, therefore, becomes part of the field of the researcher as the researcher becomes part of the field of the developer. The two have grown together and the need for symbiosis is clear. What is missing is the means. As there is need for mutual support, somehow the two must find their way together.

Suggested Solutions and the Role of Documentation

Several changes in current practices could improve the

situation. One must look for individuals to work on local projects who are willing to examine local situations and work within the context of the field. This does not limit hiring to local nationals. Often, urban nationals have less experience in understanding the rural problems of their own countries than experienced foreign researchers. This is especially the case as donor agencies begin to hire former members of voluntary agencies to be part of their regular staff.

Initially, at least, it is those who have had the proper experience in the field who ought to be hired to direct research or work on development planning. Nationals need to be given experience, however, if they are willing, through counterpart training and educational programs to make sure that talented and trained manpower in rural social and economic analysis are available to the nation. This is slowly becoming the case in Nepal.

In order to facilitate this, there needs to be an improvement in local educational facilities, especially library facilities. A research library needs to be opened in Nepal, which contains not only local project reports, research papers, and theses on Nepal and the Himalayas, but larger theoretical works and journals as well, so that local work can better be placed into the international context and so that local researchers and planners could better benefit from the experience of others. This could be partly accomplished if donor agencies would stop discarding reports and journals after a fixed period of time and make them available to the scholarly community, either by donating them to the university library (with a contribution to enable these items to be processed and stored), or on an "open table, take what you need" basis. An improved library would make it easier for developers, especially short-term consultants, to carry out their work more efficiently.

Localizing training would be an improvement in the long run, although initially unpopular to those standing in line for training abroad. Money now spent on transportation and support abroad could be better spent in the host country improving educational facilities, increasing teachers salaries, and providing improved education for many more than those who could now be accommodated for training abroad.

Other ideas come to mind as well. Seminars involving joint participation of researchers and scholars ought to be more common. This could be supported by the publication of a bi-annual development journal. The university ought to publish a periodic list of both foreign and local scholars currently working in the country, along with their topics, so that developers can find out about work being done of interest to those planning projects. Likewise, it would be useful to have a wider distribution of the list of projects currently underway, so that scholars can see how they might be affecting their work. These are largely small improvements in communication in which small investments might have large effects.

A great deal has already been said about the collection of field data and its use in analysis and development planning. Debates continue between scholars in Nepal, but the basis data continues to be collected as it has been done for the last thirty years. The collection of data has come after a considerable investment of time and money by scholars and their research institutions. Unfortunately, little of this data has found its way to the desks of developers and decision-makers. It is important to collect this data and to see that surveys are properly done, but it is equally important to see that materials are made available for use.

Comments on the 1984/85 Draft Programme

Mr. J.R. Dunsmore

Land Resources Development Centre, Overseas Development Administration
London, U.K.

Mr. Chairman, Distinguished Delegates, Ladies and Gentlemen,

May I start by speaking as the delegate from the Overseas Development Administration (ODA) of the United Kingdom (UK) and offer the warmest good wishes of the Administration for the success of this symposium and the launch of this important new International Centre.

Moving on now to make a few comments on the proposed Work Programme my views are purely personal. Seven years ago His Majesty's Government of Nepal (HMGN) requested the cooperation of the UK in the implementation of one of its Integrated Rural Development Programmes: the area covered by the programme lies in eastern Nepal and covers the four hill districts of the Kosi Zone—hence the name, The Koshi Hill Area Rural Development Programme and the acronym KHARDEP. Five years ago my unit of ODA, the Land Resources Development Centre, was asked to take responsibility for the professional aspects of the ODA input to KHARDEP and, until six weeks ago, I was responsible for the London end of the work; this involved visiting the area once or twice a year.

Six weeks ago I began a 12-month resident assignment as Senior Technical Adviser to KHARDEP and during the next 6–9 months consideration will have to be given by HMGN and ODA to whether ODA can usefully continue to assist with KHARDEP during the 7th Development Plan 1985–90. It is against this background that I would like to make a few points.

The general picture in Nepal was clearly and comprehensively described to us on Thursday by Professor Malla and some specific reference to the Kosi area was made this morning by Professor Numata I need not therefore speak further on that aspect.

"Integrated Rural Development Programme" (IRDP) is, I feel, something of a Humpty Dumpty term. You will remember in Alice Through The Looking Glass, when challenged about his use of a word, Humpty Dumpty replied "When I use a word it means just what I choose it to mean—neither more nor less" Let me say first therefore that when speaking of KHARDEP as an IRDP we do so, I believe, because it has the following characteristics—

1. It covers a specified and limited area for which a planning and implementation agency has been established.
2. The Programme started with an assessment of the resources of the area—socio-economic (1) and agro-ecological surveys (2) plus sectoral studies on health, communications, cottage industries and so on. On the basis of this assessment, priorities for development were defined and an Outline Plan (3) for 5 years prepared. (From the start it was recognised that we would have to think in terms of a much longer-time scale than that—10–15 years at least—before a major impact would be clearly identifiable.

However, like most other agencies, ODA is understandably reluctant to commit itself for more than 5 years at a time. Also the five year concept fitted into the 5-year Development Plan of HMGN).

3. The Outline Plan is refined annually into a defined programme for the coming year.
4. The programme is multi-sectoral all the sectors, we felt being linked or interdependent.
5. The aim was to assist a range of socio-economic groups with initial emphasis on two—the poorest and on those in areas with relatively high potential.
6. Lastly, it was hoped to involve, to an increasing degree, the people themselves in the planning as well, of course, as the implementation process.

As we now look towards the next five days my query which follows a point raised by Dr. Glaser, is to what extent do we need to aim for integration of the implementation programme except in the natural resource field. Coordination/integration between work on crops, livestock and forestry and the related needs for inputs, credit and marketing is, I am sure we all agree, essential. But having once assessed the whole range of resources of an area and decided on a programme for their development, is there an over-riding advantage to having an integrated mode of implementation as opposed to a multi-sectoral approach? Thus, in our case, having decided to build a road from Dhankuta to Basantapur, the Department of Roads could get on with it, while the Health Department concentrated on training the paramedical staff needed to man the Health Posts, the Education Department aimed to raise standards in the schools and others made efforts to increase off-farm employment through the further development of cottage industries. I appreciate that during the implementation there is a need for an authority to oversee the monitoring and evaluation of individual projects and to undertake the longitudinal studies required to assess the overall impact of the Programme. One must also regularly review progress and re-assess priorities. This presents no difficulties as most countries have 5-year plans into which quinquennial and mid-term reviews would fit easily. On the other hand, if we decide that integrated implementation is necessary, how, in the context of well-established vertical and sector-specific agencies, do we introduce a matrix? Put another way, how do we define the coordination role that will be needed for integrated implementation?

I would now like to make a few specific comments on the Draft Work Programme 1984–85. I fully support the emphasis placed on the role ICIMOD can play in information dissemination. In the last two days we have had spelled out to us very clearly the complexity of the situation which faces us. Frank exchange of information I am sure will make each of us more effective in our work and encourage us as we tackle the intractable but not impossible tasks we have.

Mention is made of the identification of areas where no published information seems to exist. There must be many people who have must much practical experience who have never realised the value of their knowledge and have never written a paper in their lives. I hope ICIMOD can encourage them to do so or to have accounts of their experiences tape-recorded.

I am pleased to see the reference to grey literature—we can often learn more from this and get the knowledge more expeditiously than with formal publications. Again none of us likes publicising our failures and indeed some can be politically sensitive. We are more likely to warn our colleagues of lessons learned from them in discussion at seminars and workshops, the organisation of which will be an important role for the Centre. Of the seminars proposed, the one on off-farm employment would be of particular relevance to the Kosi Hills, where a quarter of the families have less than 0.25 ha of cultivable land yet craftsmanship of the highest order is applied to make everyday household goods—skills which could be used for increasing incomes: for example, some of the finest handweavers in the world are found in the area as is evidenced by the exhibition of their work which will open in the British Museum in London this month. (December 1983).

I believe also that a useful contribution could be made to a seminar on Mountain Environment and Human Health on the basis of work in the Kosi hills and doubtless KHARDEP could itself benefit from such a seminar.

On the question of the training role of ICIMOD the working paper defines an enormous task—I wonder if it is practically possible or whether we should not define more narrowly how ICIMOD could best assist in this essential field—perhaps by concentrating on aspects of integration in the planning and implementation process.

There are other points of detail in the Working Paper on which one could make comments but overall it seems to me to describe a potentially very valuable programme of work in which I wish the Centre every success and with which I hope I may, in some small degree, be associated.

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Views on the Role and Concern of The International Centre for Integrated Mountain Development

Peter Gueller
Regent of ICIMOD (1982–1984)

1. ICIMOD IN THE MAKING International Signs of Alarm

For several decades, politicians, the international scientific community, and practitioners in development activities have shown growing concern for the degradation of the environment in the Hindu Kush-Himalayas. Certainly, the annual cycle of floods and drought in the downstream areas of the large river systems is nothing new, and the processes of erosion in the highlands and midlands of the hills have been known for a long time. Especially striking, however, is the alarming rate in which deforestation takes place in these fragile mountains. Population has been doubling within the last few decades. This leads to an ever-increasing need for new agricultural and pastoral land, to overgrazing, excessive lopping of leaves and twigs for fodder, to intensified collection of firewood, and timber extraction. Clearance of forests results in increasing amounts and speed of water run-off, erosion, landslides, soil impoverishment, and loss of cultivable land. Once the water retaining capacity of the natural vegetation is reduced, the danger of both floods and drought becomes more severe, leading to loss of lives and reduced return of investment in costly infrastructures, such as roads, water storage basins, and irrigation systems.

Two Significant Meetings

The Himalayas are not unique in this situation of environmental stress. Similar processes can be observed in the Andes and in Northern Africa. Even the European Alps, despite a wide range of measures taken during the last century to cope with the destructive forces of water, face new indications of environmental degradation. To discuss these unfavourable developments of mountain eco-systems and to look for more interdisciplinary and international co-operation in coping with these problems, an international workshop was organized in Munich in 1974 by the German Foundation for International Development. The aim was to reach "a feasible compromise between a more intensive development of the mountain regions, with their great variety of resources, and maintenance of their protective function."¹ The workshop raised the idea of creating an autonomous international institution which would be concerned with collecting, preparing, checking, and using scientific information and practical data concerning the whole complex field of mountain development. Such an institution would function as a clearinghouse which would, apart from making information available, also provide expertise and train personnel. One of the main promoters proposed that the new institution should have branches on at least three continents.

Another milestone in the making of ICIMOD was set at the "Regional Meeting for Integrated Ecological Research and

Training Needs in the Southern Asian Mountain Systems, Particularly the Hindu Kush-Himalayas," which was organized by Unesco in 1975, in Kathmandu, Nepal.² This meeting took place within the framework of UNESCO'S Programme on Man and the Biosphere (MAB), with the co-operation of His Majesty's Government of Nepal, and was attended by delegates from many countries and representatives of international organizations. This meeting discussed problems for study, a strategy for ecological research, the establishment of biosphere reserves, and proposals for increasing problem awareness, training activities, and documentation. It also recommended the establishment of a regional institute for integrated mountain development. This institute would focus on pertinent documentation, promotion of research and training, and technical advisory services. The meeting also welcomed the offer of the Kingdom of Nepal to host the proposed institution in Nepal.

The Establishment of the Centre

Following several years of preparatory work on ICIMOD, four parties—His Majesty's Government of Nepal, UNESCO, and the governments of the Federal Republic of Germany and Switzerland—agreed, in 1979, to act as founding sponsors of the Centre. An agreement providing the legal basis for this autonomous international centre was signed in 1981 by the Government of Nepal and UNESCO. The governments of the countries of the Hindu Kush-Himalayan region endorsed the efforts of the four sponsors at several sessions of the UNESCO General Conference. The region, as defined in the Statutes of ICIMOD, includes, partially or totally, Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan.

1982 and 1983 were dedicated to the development of the logistics, the organizational structure, professional contacts within the region and outside, a draft work programme for the Centre, as well as to the selection of its first Director, Prof. Colin Rosser from the UK, and the preparation of the first International Symposium and the Inauguration of the Centre, in December 1983. These events were attended by representatives of all the eight countries of the region.

Until the summer of 1983, the Centre operated under the authority of an Interim Committee, with executive responsibility held by a Regent. Subsequently, the authority was assumed by a Board of Governors representing the host country, other states of the region, UNESCO, and the final sponsors.

ICIMOD has engaged all countries of the region in the discussion of the work programme. Realistic outlooks for co-operative linkages were developed with some countries. ICIMOD has also attracted the broad interest of the worldwide scientific community. In this initial phase of ICIMOD'S profes-

Presented at a conference at the Chinese Academy of Science, Beijing, February 1984, and included here to present the views of the Regent, Mr. Gueller, on ICIMOD.

sional development, the Centre must now demonstrate how it intends to work and what will be the profits of international co-operation in the Himalayas.

2. CONCERNS AND ISSUES

The primary objective of ICIMOD is to promote economically and environmentally sound development in the Hindu Kush-Himalayas and to improve the well-being of local populations. Let me outline some observations and thoughts which came to my mind while working in Nepal as Regent of ICIMOD.

A Multi-Sector Approach

ICIMOD's concerns cover a vast range of topics. Geology, climate, natural resources, energy production, agriculture, forestry, population dynamics, health, education, national economics, and local habits all interact in an almost inextricable network of relations. Put simply, ICIMOD's interest centres on the human conditions as related to natural processes and the use of natural resources in the hills and the adjacent highlands and lowlands. Natural processes mean the interactions of climate, geology, topography, hydrology, soil conditions, flora and fauna (see figure 1, circle 1). Man is linked with these natural processes in manifold ways through the use of natural resources: agriculture, forestry, the use of water resources, the extraction of minerals and gravel, and nature-oriented forms of tourism (figure 1, circle 2). Reciprocal effects between natural processes and the use of natural resources largely make up the environmental concern. Further, individual and social habits and the spiritual orientation of man have a strong connection with the natural environment, especially in the mountains, and they are especially relevant to his attitude in utilizing natural resources (figure 1, circle 3).

This set of interactions between man and his environment can be completed by two additional spheres of interest of ICIMOD. One is the range of technologies and infrastructures (circle 4) which relates to the use of natural resources (across ways, irrigation technology, hydro-power works) and also to natural processes, either by affecting them negatively through inappropriate construction techniques or by keeping their destructive forces under control. Infrastructural functions of education, communication, and the health system will also have special relevance for social and individual attitudes of the hill population. An additional sphere of ICIMOD's interests are the non-agricultural sectors of the economy and off-farm employment (circle 5). Development of cottage industry, industry proper, trade, and other tertiary activities can reduce pressure on land. These developments can complement the rural labour market and local income generation, a necessary condition for self-reliant growth of social capital. Some industry and trade can be based directly on agriculture and forestry, forming an important extension of the role of these primary sectors in the total economy and the chain of production.

Highland-Lowland Interaction

One of the major concerns for the Centre, which was very much in the minds of its founders, was that mountain development is not simply a matter of dealing with the problems faced in hill communities or watersheds, but also the strong highland-lowland relationships. It has been mentioned that environmental degradation experienced in the highlands have serious repercussions in the lower valleys and adjacent plains, such as silting, flooding, devastation of crops, drought, and human suffering. On the other hand, the same river systems are also the sources of

profits carried down from the heights—valuable soil components, irrigation water, and hydro-power. It is, however, not only this water-bound highland-lowland linkage which counts in mountain development. There is a whole series of other interactions which gain momentum in development policy.

Figure 2 presents this in a systematic way as follows:

1. Downstream transport of hazards and fertile soils. They are negative in nature for the hills and have both negative and positive impacts on the lowland.
2. Gains in irrigation capacities for the lower valleys and the plains.
3. Profit in hydro-power for the more densely populated areas downstream. Storage basins are, at the same time, an essential means for flood control.
4. Trade between highlands and lowlands, based on comparative production advantages and depending on the quality of transport facilities.
5. Tourism, which brings both recreational profit to lowlanders and economic benefit to highlanders—unless the latter are faced with too many negative impacts through consumption of their natural and socio-cultural heritage.
6. Seasonal migration, allowing occasional surplus segments of the hillside labour force to find employment and additional income in the industrial and service sectors of urban centres.
7. Permanent out-migration from the highlands, which can be interpreted as "brain drain" or "leaving behind those with less initiative", but, depending on the situation, also serves to reduce over-population in the hills where there is limited carrying capacity of the traditionally used land.
8. Communication links, opening mountain communities up to that which materially better equipped and more sophisticated lowland societies might communicate—good or bad.
9. Technology transfer, mainly from lowland societies and economies, leaving open the question of highland capacities to absorb it.
10. Production chains, extending from hill agriculture and forestry to related processing industries in the plains. Efforts should be made to concentrate more of the processing well within the upstream areas, thus bringing more profit to the highlands and providing employment to the labour force in the hills.
11. Trading with manufactured goods between highlands and lowlands.
12. Capital transfers, in the sense of private capital flowing mostly downstream, whereas social capital investments in engineering works in the hills might lead to a certain balance.

Facing such a widely diversified typology of highland-lowland interactions, we might question why ICIMOD should deal with that whole spectrum. Not all elements have a direct bearing upon the mountain environment. It should, however, be understood—and this has already been demonstrated with the five basic spheres of ICIMOD's interest (figure 1)—that:

- a. the concern for the mountain environment is not only related to the scenery of nature, but also to the human condition in a broad sense, covering economic, physical, social, and cultural aspects; and that
- b. mountain development is not only a matter of plans and regulations, but, far more, of action and related economic, social, and cultural backgrounds.

ICIMOD is conceived as a centre for integrated mountain development. It is also quite obvious that such interaction

extends from the mountain regions to the large urban centres of the subcontinent and to the outside world, including wider parts of Asia and the West. A well-known issue in that regard is the one of overcoming constraints imposed by the landlocked condition of some of the Himalayan states. ICIMOD will have to work out how such questions of international relationships will be tackled.

Communication, Education, and Building-up Operational Capacities

Hill populations in the Hindu-Kush Himalaya, as in Nepal, are scattered all over the valleys and ranges. This contrasts with the European Alps, where we find far more compact settlements, well-developed pathways, and a widespread network of motorable roads. Furthermore, the zone of cultivation in the Alps does not extend over the same broad range of altitudes as allowed by the climatic and soil conditions in the Himalayas.

This decentralized pattern of human presence is a great challenge for communication, extension work in all kinds of activities, and building up of operation capacities. ICIMOD can, thus, not lean back and merely concentrate on becoming a think tank. Reaching the farmer, revitalizing and developing the organizational skills of the mountain communities, and decentralizing planning and administrative bodies away from the centres is a provoking task of any government and other agencies concerned with development and conservation strategies. ICIMOD will have to find appropriate ways to assist in this noble endeavour. We may not help by inundating central administrations with yet more knowledge and ideas, if these administrations and the local communities still find difficulty in joining their creative forces across scarcely passable hills and, possibly, mental barriers.

Similar concern is to be given to the operational and administrative capacities of governments. Integrated development policy is a high goal. Even administrations with a long tradition face problems when their departments try to interact and co-operate along common lines of a development strategy. And let us be aware of the difficulties to which any administration or political body is exposed when it tries to embody concern for both economic development and protection of the physical environment. The Hindu Kush Himalaya is confronted with both issues to an almost unprecedented degree.

A Challenge for Science

To mobilize all scientific capacities in the region relating to the issues of mountain environment and development is a must ICIMOD has been approached by—and has already been in contact with—a considerable number of pertinent institutions. The worldwide scientific community is concerned with the environmental and socio-economic situation in the Hindu Kush-Himalayas, as well. Erik P. Eckholm's famous book "Losing Ground"³, and a series of other publications, dramatically show how the destiny of entire civilizations and cultures has been and is still related to the processes of environmental degradation. No continent has been spared from such experience. Our time has the privilege of being aware of such processes and their consequences, and we use science so as to share the responsibility which arises out of such awareness.

A multitude of branches of science are addressed. Coming back to figure 1, it emerges that natural sciences, social sciences, and technical sciences have important roles: The former one relates to the sphere of natural processes and the use of natural resources (circles 1 and 2). Social sciences (including economics)

overlap with the natural sciences in what relates, again, to the use of natural resources, and they extend mainly on the spheres of social behaviour (3), the software part of social infrastructure (4), and the industrial and tertiary sectors of the economy (5). Technical sciences, as well, are concerned with the use of natural resources and they mainly focus on technologies and infrastructures requiring engineering skills (circle 4). It is, however, not only the traditional and specific disciplines of science which are of interest to ICIMOD.

A major concern of the Centre are those fields of study which rely on joint contributions from various disciplines. For example, the genetic improvement of plants is an important subject matter of research. But ICIMOD is looking for clarification regarding the entire set of conditions under which plants grow and are used. This includes the conservation of land and the improvement of soils; land use planning and regulations; accessibility of fields; use of crop residues; the feeding and pasturing habits of livestock; food habits and social habits related to the growing, harvesting, and use of plants; the contribution of plants to ecological stability; etc. The range of interest is vast, indeed, and, correspondingly, the efforts should be vast to take a holistic approach in research.

This list of scientific concerns is not exhaustive. The tasks of communication and extension work between urban centres and rural periphery, and of developing planning and project management at national, district, and local levels of public administrations or non-governmental institutions need a scientific backstopping, as well.

ICIMOD might intend to gain a view of the scientific capacity in the region. It might be eager to know about the number and qualifications for research staff, as well as the fields, type, quantity, and quality of research work which relates to the Centre's concerns.

We are aware how ambitious it is to get such an overview. National requirements as well as individual ones have to be taken into account when we want to evaluate a country's scientific achievements. International research standards play a role, as well. Furthermore, each country will have its specific set of conditions under which science can develop and develop its profile: the political and cultural backing, organizational skills, and the available funds.

Of interest, also, is how the results of research are presented to a wider public; i.e., how they can be communicated to politicians, administrators, actors in the field, and the broader segments of population. We shall discuss later how ICIMOD could take part in related efforts.

Unknowns

ICIMOD is eager to know about the unknowns in mountain development, as perceived by the various countries of its service area. A first draft of such unknowns, leading over to expectations in ICIMOD's activities, has been presented by the host country of the Centre.⁴

Let me cite a few of these unknowns, mainly relating to the use of natural resources in the hills:

- a. The origins and consequences of reduced viability of community institutions for resource management, and of the alienation of the individuals from common resources;
- b. Potentials of fodder components (trees, pastures, crop residues, and farm fodder), especially in terms of seasonality, nutrient contents, ease of development, cost, etc.;
- c. Food-fodder-manure linkages in terms of altitude, accessibility, inputs availability, and seasonal factors;

- d. Impact of disruption of the habitat of wild animals and birds, due to drying up springs, on the forest ecology;
- e. Effects of forest fires—washing out of nutrients, reduction of the moisture retention rate of soil, mortality of naturally growing saplings and seedlings of forest trees and plants;
- f. Potential of irrigation in the hills—viability of various irrigation technologies, namely gravity, sprinkler, lift, and drip irrigation;
- g. Determinants of household-specific energy demand, such as ethnicity, altitude, family size, culture;
- h. Degrees to which deforestation can be stopped through various innovations—bio-gas, improved chulo-stoves, private tree plantation, hydroelectricity, charcoal.

Such unknowns may be included in a larger framework of questions related to the environmental and economic development in the Hindu Kush-Himalayas. For example:

- To what degree is environmental degradation, in the sense of erosion, soil loss, and landslides, part of natural processes characteristic of the Himalayan climatic and geophysical reality, and to what degree it is related to human intervention?
- Are the natural processes of environmental degradation still too dynamic to be brought under effective human control?
- What is the balance between destabilizing and stabilizing activities of the hill farmer?
- Can we imagine “wet deserts”: What is the regeneration potential of land which is no more under cultivation?
- What changes in lifestyles and community behaviour would be necessary to adopt specific types of innovation in energy and fodder production?
- What are the overall effects of improved access ways to the economy, socio-cultural structures, and the environment in the hills?

Certainly, answers to these questions cannot be given in a general way. They will differ from country to country, from ecozone to ecozone, and maybe even from valley to valley. It will be one of the most challenging tasks of ICIMOD to take account of the existing variety of natural, economic, social, and cultural conditions within the region when it develops its documentary, training, research, and consultancy functions.

Speculations on the Future

Such unknowns give ample ground for speculation. Let me draw a series of scenarios which can be imagined when we reflect on the future of the environment in this mountain range.

A first could be styled as *Today's Ideal*. It is based on the assumption that all measures which we envisage today will finally prove successful: we will be able to reach a satisfactory reforestation rate in critical areas; we will have a clear distinction between land for pasturing and forests; alternative energies will be developed and applied in time; the health standard of people and animals will be improved, accompanied by reduction of both the human and livestock population; and watershed management and flood control can be successfully realized from the uppermost streamlets down to the mighty rivers, thus allowing an optimal use of hydro-power and irrigation systems. Man and the mountain environment have found a mode of coexistence.

Exodus might be the eye-catching title of a second scenario. Hardship to hill populations due to unbalanced relations between demand and supply of food, fodder, and fuel is increasing and accentuated with the downward spiral characterizing environmental degradation in the hills. Schools, health posts, and other welfare institutions cannot be provided to the

widely dispersed settlements in due time. Especially rainy and disastrous summers lead to a massive exodus from the hills down to the more promising plains and cities. Weaker and less ambitious members of the population are left behind. Cleared and terraced land on the steeper slopes is given up and cultivated no more. Erosion and landslides increase drastically as the farmers no longer devote themselves to stabilizing work. Natural re-vegetation is not rapid enough to prevent the topsoil from washing away in the denuded areas. Thus, the drama of shipping environmental degradation downstream along river systems reaches an unprecedented degree.

A third scenario could be entitled *Less Money, More Nature*. Worldwide recession does not come to an end but gains in momentum. The creation of social capital in the countries of the Hindu Kush-Himalayas is faced by a severe setback and the influx of foreign assistance is drastically reduced. *Today's Ideal*, as sketched above, cannot be realized at the planned pace, but, on the other hand, man's technical intervention in the hills goes along less aggressive lines. Tourism is gradually drying up and related pressure on the mountain environment diminishes. Those parts of the hills which are privileged by a rather robust ecology show gains in stability, but others, under fragile conditions, experience more and more hazards; they are finally declared irrecoverable territories and cultivation efforts concentrate on the more promising sites.

Another contrasting scenario, however, can certainly also be imagined: *Superstructures*. Worldwide recession does not paralyze the international community but leads to a very active search for large works which could give new hope and orientation to mankind. Visionary engineering in the Himalayas is among the projects. Rivers are diverted through sophisticated tunnelling to provide irrigation. Large barrages are erected. Finger-like storage lakes penetrate deeply into the valleys and, besides being used for hydro-power, they serve as most welcome routes of transport to and from the hills. The labour potential of the region is absorbed in an unprecedented way, and people see new horizons for applying and developing their skills. Return on investment is large and provides populations with development opportunities and means for the protection of environment. Much later, people will put these efforts in line with the erection of the pyramids or the cathedrals.

We feel that each of these scenarios reflects some reality, but we also feel the uncertainties and put question marks behind some of the assumptions made. Probably no one of these scenarios alone will dominate the future appearance of the Hindu Kush-Himalayas: we might well find that some parts of this large region go rather along the lines of *Today's Ideal*, others will fact *Exodus*, and still others resemble *Superstructures*.

Approaches and destinies in this large area will, no doubt, exhibit variety, and ICIMOD will have to live with this variety. It will, we hope, be able to contribute to development concepts of these mountains which are correspondingly differentiated.

3. ROLE AND FUNCTIONS OF THE CENTRE IN AN INTERNATIONAL DIMENSION

The Hindu Kush-Himalaya ranges transcend national boundaries. The countries in this region have a series of problems in common. The threats, challenges, and opportunities inherent in mountain environments link them together. Mountains are not only barriers and the home of self-willed people, but they have long been zones of intensive cultural exchange and trade, as well as strongholds of spiritual orientation for their inhabitants and, also, for those of the plains. Still, the countries of the region vary

greatly in size, in the ways mountain problems become part of their national policies, in their religious beliefs and cultural backgrounds, in their economies and social structures, in their political and administrative systems, and in their scientific and technical capacities.

However, such variety should be emphasized less for its differences and more as the base for complementary endeavours and as a source of improvement and practical experience. It is in this context that ICIMOD should be able to play a vital role. Its functions have often been described as the ones of a clearing-house where demands for, and supplies of, know-how and experience in mountain development meet. Variety in cultural, economic, and political setting means variety in concerns, views, and approaches. A forum for related multilateral exchange and sharing has for years been felt as the need of the hour.

Still, it must not be overlooked that this region is, in many ways, still only in the making. Political differences dividing the countries must be admitted. Facing this, the Centre should, as Maurice Strong has put it in his keynote address at the Inauguration, "develop a network of co-operative relationships on the technical, professional, and operational level, which take the necessary account of, but do not directly involve, areas of political sensitivity."

Divisive forces within the region should not be overemphasized, as there is a very common interest linking the countries of the Hindu Kush-Himalaya. This region has a cause to defend: the cause of one of the world's largest mountain ecosystems in peril. ICIMOD will have to take part in defending this cause. The Centre is not just one more international organization, but it is, within the framework of international concern and co-operation, a trustee for mountain development, for safeguarding a viable environment in the hills and the adjacent plains.

ICIMOD relies very much on the interaction with, and the support of, the countries of the region. Such collaboration can develop in steps. The least ambitious form of co-operation—not to say that it would be ineffective and not in response to a need—is the organization of international workshops, possibly linked with study tours which demonstrate country-specific approaches in coping with mountain problems.

A next step will consist of international library co-operation, the participation of ICIMOD in existing documentation and information networks and the establishment of an efficient correspondents system related to the Centre's activities.

A third issue is the technical support of, or participation in, international and national training courses for planners and decision-makers, agency executives and administrators, project personnel, teaching staff, and extension workers.

Fourth comes scientific co-operation. ICIMOD is planning to have an international professional staff which will synthesize, evaluate, and translate research data to facilitate its application to integrated development. The Centre will, together with the countries of the region, identify gaps in knowledge of the Hindu Kush-Himalayas and stimulate, co-ordinate, and possibly finance research needed to fill the gaps in knowledge.

Expertise and technical advisory services are a fifth and, probably, the most ambitious form of interaction between the Centre and the countries of the region. Once it has built up its own capacities and establishes the necessary contacts with qualified research teams and private consultants, ICIMOD might participate in feasibility and appraisal studies of development projects.

With all these activities, it is not intended that ICIMOD play a competitive or parallel role to any existing institution, but a

supplementary one in furthering the effectiveness of national, bilateral, and international bodies operating in the region. At the first international symposium of the Centre, Dr. Gisbert Glaser sketched the paths along which such co-operation can develop as follows: "It is to be expected that the level of participation in the activities of ICIMOD will vary from country to country, at least in the beginning. In particular, regarding appraisal, evaluation, and the provision of advice, the Centre can and will become active only upon the request of the authorities concerned. In fact, it will be a guiding principle for ICIMOD to seek an agreement with the appropriate authorities prior to becoming involved in any national or international activity whatsoever in any country."

The one-and-a-half years during which I had the opportunity to serve this challenging idea of a mountain centre in the Hindu Kush-Himalaya have been very encouraging in view of an international approach to mountain development in this region. There is no doubt that all the eight countries involved share a concern for the fragility of the environment in this area. Each of the countries might also have its specific and legitimate political interest in the activities of ICIMOD and the way the Centre operates. Personally, I would perceive such political liveness not as a difficult challenge to the Centre's effective functioning, but as fruitful ground for developing multiple initiatives.

International co-operation in the region should develop along lines which make it easy for each partner to provide the Centre with a maximum of professional support, and to profit from it. I hope that such giving and taking among the partners be developed in a spirit of competition with ideas and interest.

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Summary of Symposium Working Group Reports

During the Symposium the participants divided into Working Groups comprising representatives of governmental and non-governmental organizations and of the scientific community to discuss the Draft Work Programme and make recommendations to ICIMOD. The Working Group discussions were important exercises aimed at bringing the talents of the professional participants to bear on the substantive work that the Central must begin addressing.

The Working Groups examined four areas of the Draft Work Programme: Information and Documentation, Research, Training, and Expertise services. The following is a summary of the major recommendations and comments of the Working Groups.

ICIMOD offers its special thanks and appreciation to Dr. Harka Gurung, Dr. D.R. Pandey, Dr. T.N. Pant, and Mr. K.P. Upadhyaya for their dedicated work in leading the discussions of the Groups and in summarizing and presenting their recommendations to the Symposium.

Information and Documentation

The need for a Documentation Centre was endorsed, but a strong recommendation was made that the boundaries of documentation must be established, e.g., documentation of integrated mountain development, or mountain development from a multi-sectoral basis.

ICIMOD should establish working links with existing documentation centres in the region—or world—from which to draw and/or share material when needed, rather than duplicate existing work.

ICIMOD should not burden itself too much in its formative stages by taking on too heavy a programme in Information and Documentation. It should forge good linkages with other institutions and built its own capabilities carefully and deliberately.

A top priority for ICIMOD should be to identify its appropriate audiences and clientele and develop a communications strategy to reach each one effectively; not just storing information, but making it available in readily usable form.

The following brief points were comments or items that concerned the content and services of Information and Documentation.

- Maps and remote sensing data should be collected.
- Efficient services to collect, process, translate, abstract, and reproduce full texts of appropriate material should be instituted.
- Primary attention is needed in delivering needed material rapidly to users.
- An important Info./Docu. activity that would support Research and other programme activities of ICIMOD would be to compile and regularly update an inventory of who is doing what and where relating to integrated mountain development.
- As a part of Info./Docu. activities, a Communications or public information unit should be established to produce a newsletter or bulletins, educational materials, press releases, and radio and video programmes. This latter could be contracted out to specialized organizations, perhaps, rather than have ICIMOD form its own media production unit.

- Mapping, as an aid to studying population distribution, hydrology, agriculture, etc. would be a good early activity for ICIMOD.

Research

Research is a priority and, therefore, ICIMOD should become involved in adaptive research; move from experimentation and study to direct application in the field.

Member countries should be directly involved or consulted in developing the research agenda.

ICIMOD should strengthen existing institutions, facilities, and local perceptions in research.

Staff with experience and proven abilities in research *management* should be engaged.

Procedures for contracting or forming agreements for research with organizations and institutions in member countries need to be resolved.

Dialogue between persons engaging in research, both inside and outside the region, should be encouraged and expedited by ICIMOD.

ICIMOD should promote research that can be applied and that will directly benefit the neediest. Such practical results of research will help to build confidence in ICIMOD among the beneficiaries, as well as encourage sponsors to support the Centre.

Development donor agencies should be encouraged to finance research (through ICIMOD) to provide a larger scientific data base.

Training

It would be too ambitious for ICIMOD to begin major training programmes during the first two years. During this time ICIMOD should be a catalyst in promoting training by other agencies and organizations in appropriate subject areas.

ICIMOD should conduct an inventory of existing training programmes available in the region, disseminate this information to member countries, and assist members in placing trainees in programmes by coordinating placement between members and training sponsors.

An inventory of training needs among the member countries related to integrated mountain development should be carried out, following a priority needs assessment in each country.

ICIMOD's role in long term training must be integrated with the other work programme components as the Centre grows.

Emphasis should be placed on training of trainers to strengthen existing institutions. Trainers must be leaders in their field.

Expertise

A roster of expertise is of paramount importance in establishing ICIMOD's credibility. The roster should have three levels of detail or activity: a general roster of available expertise; a method of selection of appropriate expertise from the roster when ICIMOD is requested by an outside organization to assist in securing expertise services; and a means for using the roster effectively to support internal staff and programme needs of ICIMOD.

ICIMOD should take note of—and establish links with—existing rosters, e.g., FAO and IUCN.

Regional, national, and local expertise should be identified and made use of.

High merit must be a criterion in selecting names for the roster and in making referrals.

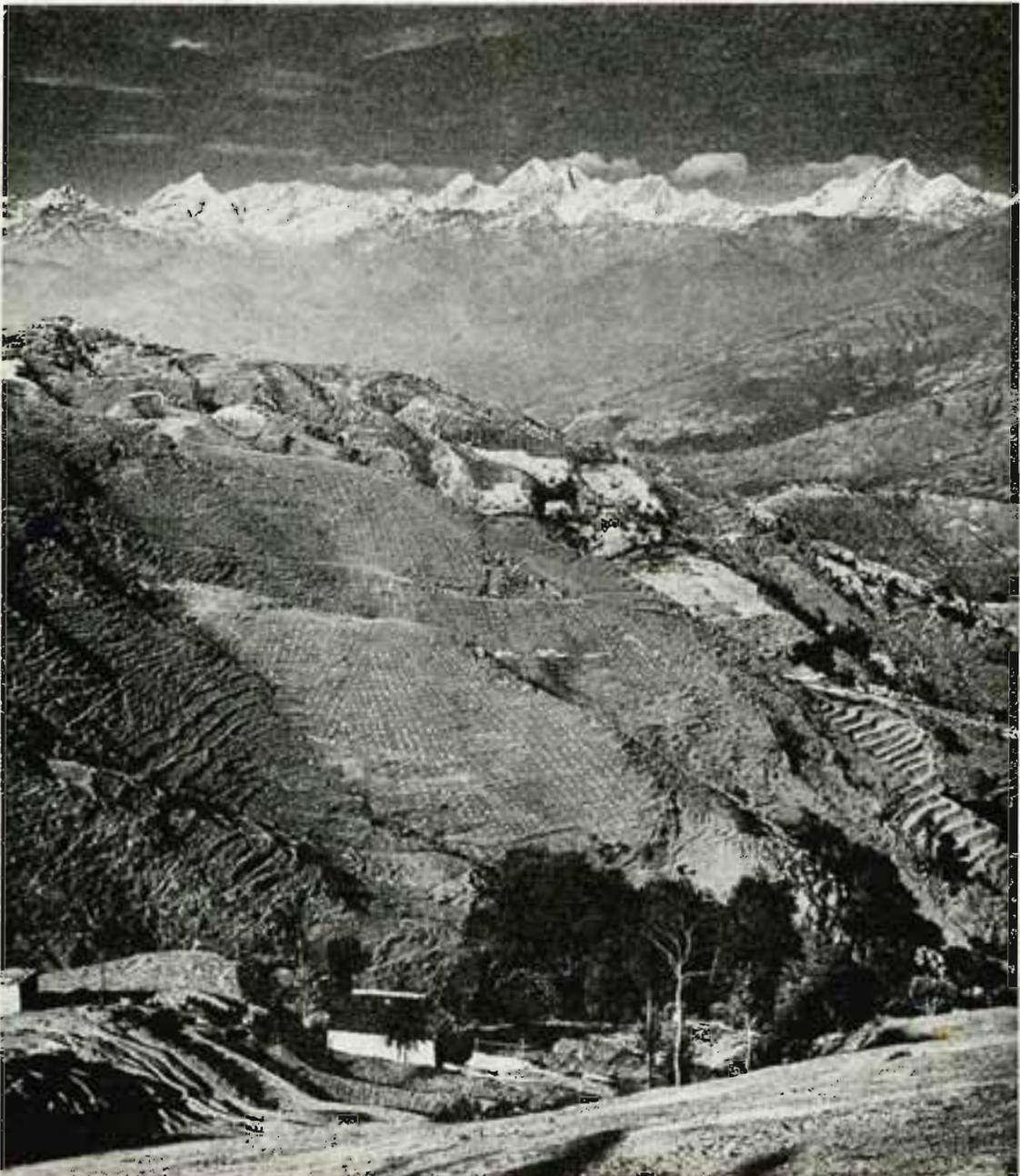
Other

Work Programme Objectives: The Draft Programme seems ambitious. For credibility, ICIMOD should prioritize and separate objectives into realizable immediate ones that would build a base of successful work, and longer term ones allowing more effective setting of priorities.

Administrative: ICIMOD's institutional links with governments is not clear. It is recommended that the member governments be requested to designate focal points through which all ICIMOD activities would be coordinated or channeled in each country.

Non-Governmental Organizations: ICIMOD should develop closer relationships with the many NGOs operating in the region to benefit from their expertise and involvement at the micro-level. ICIMOD should assist NGOs by facilitating communications and contacts between them and the Centre to take advantage of their local experience, as NGOs are often innovative and are willing to take risks with new ideas. ICIMOD involvement with NGOs should take place through the member governments.

Seminars and Workshops: A variety of professional or subject-oriented seminars and workshops conducted at a high professional level would be valuable in generating quality dialogue and publications on integrated mountain development. Seminars for training purposes should be aimed at the organizational and regional/national level, and at the local level.



Key Priorities for the ICIMOD Work Programme: A Summary Statement

Colin Rosser
(Director-Designate)

The last four days have been highly instructive for all of us, but particularly for me charged as I now am with the spectacular task of building an International Centre here in this ideal mountain location capable of an effective *professional* response to the developmental and environmental challenges expressed so vividly by participants to this Symposium.

As Director-Designate, let me express at once the thanks of ICIMOD, embryonic as it now is, for the serious collective contribution to its fundamental institutional conception that has been made here. We have appreciated both the informative and detailed country assessments of need and priority by distinguished national delegations and the personal contributions of individual professionals who represent nobody but themselves—but rather, in that memorable phrase, 'represent a concern'. As always at such gatherings, we have all learnt a great deal also from informal exchanges outside this conference room. The specific comments and recommendations from each Working Group, so efficiently presented, will be studied in full and at length by the professional staff of ICIMOD, as this staff is now assembled, and will doubtless exert a significant influence on the practical organisation of the first-phase work programme of this new International Centre: this working contribution from this Symposium is particularly appreciated.

And so, finally, we come to the beginning. With the close of this Symposium and the formal Inauguration tomorrow, the stage is set for the vigorous effort of professional institution-building that must now take place. If this effort is to be effectively organised it must be guided from the outset by a sharp and clear understanding of what exactly ICIMOD is seeking to achieve—both in the short-range future and over the longer term. In institution-building here as elsewhere the three great virtues are Faith, Hope and Clarity: and the greatest of these is Clarity. I would like to use the opportunity of this brief 'summing up' not so much for some kind of encyclopaedic review of the discussions of this Symposium, but rather just to concentrate on summarizing the views that have emerged (and indeed my own thoughts) on two key issues only: the basic operational conception of ICIMOD (and therefore the priorities of its work programme), and the vital international dimension of ICIMOD's activities.

1. The concept of ICIMOD, and its operational priorities

The ecological and developmental concerns, throughly inter-related as they are, which led to the creation of ICIMOD have been well-evidenced in paper after paper at this gathering. These concerns need no detailed elaboration on this occasion beyond what has been amply emphasised in Symposium contributions. Since however, they are fundamental to an understanding of ICIMOD's intended role, we need to keep before us the central issues. Allow me to summarise them with the following extract from an ICIMOD 'foundation document':

"In many parts of the Hindu Kush-Himalayan region, population growth has now exceeded the carrying capacity of the available habitable land. It has led to over-stocking of grazing land and an ever-increasing need for new agricultural and pastoral land. Consequently, forested upper slopes which hitherto protected the lower slopes from excessive erosion are being cleared for cultivation, grazing, fodder, firewood and timber.

Excessive deforestation and overuse of mountain slopes trigger acute problems: massive erosion, landslides with resulting soil impoverishment and soil losses. Thus decreasing agricultural yields and increasing poverty are linked to a deteriorating physical and biological environment. Further, ecological problems experienced in the high mountains have serious repercussions (physical, social and economic) in the lower valleys and lowland areas.

At the present time, there is a danger that the ecological balance in the Hindu Kush-Himalayan region will be irreversibly ruptured.

Development of this mountain region thus poses a dilemma: development efforts must necessarily involve the exploitation of the available resources, yet the fragility of the mountain ecosystems makes it necessary to exploit these resources in an ecologically sound manner which will preserve the productivity of these systems for future generations.

This development dilemma—reconciling economic needs with those of maintaining biological productivity—will never be solved by sectoral and isolated measures at the local level. What is needed is an integrated approach to development which takes into account the myriad factors (ecological, economic, social, cultural, governmental) involved in the functioning of the man-environment systems of the Hindu Kush-Himalaya."

These few sentences, elaborated and illustrated and expanded as they have been in contribution after contribution (most notably in the Country Statements) made at this Symposium, set out the essence of the growing national and international awareness of an ecological crisis in these mountains of alarming proportions, directly affecting populations, rapidly increasing, of some 50 million people in the mountains themselves and a further 300 million or so in the great plains below. As we have seen in our discussions, there is equally an awareness of the direct relationship between relentlessly increasing population pressure in the mountains and the process of environmental degradation: as Sir Edmund Hillary recently put it in a memorable phrase—"environmental problems are essentially social problems: they begin with man as the cause and end with man as the victim."

This alarm has underlined the urgency of the search for constructive, progressive, practical solutions to the basic 'development dilemma' summarised in the above quotation. It is clear from the Country Statements made at this Symposium that

this need for a more effective developmental response to this critical ecological situation in the mountains is acutely felt by each of the countries involved. This is true also for the international aid community as is evidenced by the increasing concentration of aid projects in the mountains on better techniques of environmental impact assessment, soil conservation, forestry development, watershed management—as well as on 'integrated hill development' projects. Clearly a great deal is being done in these mountains, albeit in a fragmented fashion, both in national development programmes and in international aid assistance and re-inforcement. Equally clearly there is still much to be done—and much to be learnt—before we can say with confidence that, in terms of the basic development dilemma as posed above, the great challenges of mountain development are being met with effective responses on the spectacular scale required.

If it is possible to summarise the basic conclusion of this Symposium so briefly, it can be asserted that two main needs have been consistently emphasised:

- i) the need for a more systematic and practical understanding of the linkages and inter-relationship between the 'myriad factors' involved in progressive mountain development i.e. development with built-in environmental management;
- ii) the need to mobilise professional and scientific expertise on an international scale for the development of this understanding, to organise a purposeful exchange of relevant knowledge among the countries of the Hindu Kush-Himalayas, to promote regional cooperation in this field on a specific and structural professional basis.

However the professional contribution of ICIMOD may be elaborated over the coming years, it is essential to recognise that the establishment of ICIMOD, in its basic conception, is an attempt to provide an effective institutional response to the above two needs.* Perhaps it could be added that this recognition seems to underlie the marked euphoria which has characterised this inaugural Symposium.

Essentially, ICIMOD has two objectives: the furtherance of practical knowledge and the promotion of effective regional cooperation and exchange—with, of course, direct relevance to mountain development and environmental management. Having stated this, however, it is important to state, with equal clarity, what ICIMOD is not.

It is *not* an institute of mountain research, or of agricultural research in the mountains, or of mountain ecology, or of the geography (or geomorphology) of mountain regions, or of the anthropology or demography or economics of mountain communities. Above all, it is *not* an academy of mountain studies, or mountain sciences: everything you ever wanted to know about mountains—but were afraid to ask. It does not aim at any kind of encyclopaedic, academic view of mountain knowledge or research.

The exceptional and tenaciously sustained efforts of the founding fathers of ICIMOD—both within this region and in Europe—were clearly not undertaken to found a new kind of academic institution here in these mountains. We have heard during this Symposium of the considerable catalogue of hill universities and research institutions widely distributed through the mountains (and throughout the eight participating countries of the Hindu Kush-Himalaya). On the contrary, if our work is not to be completely misdirected and misunderstood, it is

essential to assert with due emphasis that it was clearly the intention of these founding fathers, enlightened and far-seeing as they were, to found a practical *development institute* focused on a single (if highly complex) problem which I will phrase as a question—in the active tense:

"How best can we structure the *practical relationship* between the effective social and economic development of mountain communities and the ecologically sound resource management of the national environment inhabited by these communities?"

The key operational words are "development" and "management". The key tools are practical research, systematic evaluation of programme and project experience in specific development situations, the organised assembly and exchange of knowledge, and integrated development planning and implementation through the full partnership of government and community. The work priorities of ICIMOD, adjusted as they must be to the varying developmental and ecological situations within and between the countries in this markedly heterogeneous Hindu Kush-Himalayan region, must reflect a ruthless relevance to that single and central question.

Our first and most obvious professional task is to establish the current state of knowledge throughout these mountains with regard to this question: the "interface" between socio-economic development and resource management in mountain regions. This is the unique field of ICIMOD. And we need to understand not just the current state of knowledge but, equally, the current experience with the *use* of the knowledge in practical development programmes and projects in the mountain districts of the eight "participating countries" of this region.

If ICIMOD, over the critical first phase of its institutional development (say over the two-year period from now to the end of 1985), is to get itself quickly into the position of being able to contribute with confidence and competence—in the service of the hill communities, of working professionals of all relevant disciplines in field programmes in these mountains, and of government decision-makers at all levels—we need to *command* four related categories of understanding:

- i) the current state of knowledge regarding the *socio-economic situation* of mountain communities, and of the causes and consequences of environmental damage: that is, a vigorous exploration of at least the five major themes that have been repeatedly raised during contributions to this Symposium: a) the dynamics of increasing population pressure throughout the region, and the processes and consequences of rural-to-rural and rural-to-urban migration; b) the vital importance of generating increased employment in the non-agricultural sectors; c) the urgencies of developing and applying more useful techniques of ecological assessment and environmental monitoring in mountain regions; d) the need for a better understanding of the complex social and economic inter-relationships and linkages within hill farming systems examined holistically; and e) the need to understand mountains/plains interactive systems.
- ii) the current state of the art with regional and district development concepts and methods in mountain regions: i.e. *the development response*—with particular regard to such key issues as the accessibility of communities in the high mountains, the developmental consequences of improved communications, the need to learn the lessons

* See the paper by Dr. Gisbert Glaser in these 'Proceedings' (pp. 60–61) in which he sets out lucidly and succinctly—indeed with enviable clarity—the motivation which led to the foundation of ICIMOD, and its objectives and tasks as set out in its Statutes.

of practical experience, and to identify the criteria of "success" or "failure" in programme and project formulation and implementation.

- iii) the current situation with government policy formulation and with governmental institutional structures and powers: i.e. *the organisational response*, with particular emphasis no doubt on the themes, raised so often at this Symposium, of decentralisation, community consultation and participation at all relevant levels of development policy and development implementation, and the need for much stronger emphasis on issues of effective organisation, accountability, and sustained management.
- iv) the current state of play with regard to the perceptions, policies, attitudes, priorities of international aid agencies directly concerned with programmes and projects in these mountains: i.e. *the aid response* which, as a number of contributions here have pointed out, could well do with a thorough, systematic and independent examination so far as assessing the relevance and effectiveness of "aid agency" approaches to the specific developmental and environmental conditions of hill communities is concerned.

These four categories of understanding need to be developed quickly as the "knowledge base" of ICIMOD, and as "the intellectual platform" upon which the Centre can construct its own distinctive contribution over the next few years. If the Centre is to develop this contribution to "integrated mountain development" in a constructive and significant fashion, it must start with establishing what is known (or thought to be known). The four "statutory functions" of ICIMOD on which there has been so much discussion over these last few days—applied research, training, documentation/information exchange, and expert advisory services—have a common base in *knowledge*: and cannot be developed effectively unless and until that knowledge base is adequately and firmly established. This is our first task.

From that basic conception flow the judgments that now will be necessary about ICIMOD's work programme and priorities. The excitement of the challenge that now confronts this new International Centre lies not in the performance of mechanical services (however useful, in information exchange, or training, for example) but in *the development of ideas* of direct practical relevance to the long-term welfare of the people who live in these splendid but "fragile mountains"—constructive, innovative, imaginative, doubtless even irreverent, ideas. And in the dissemination of these ideas wherever they originate. We, therefore, have to start at once—given the lead time required to assemble the Centre's first professional staff numbers and to organise these in multi-disciplinary, and multi-national, "task forces"—with a conceptual work programme that is *problem-oriented* not *function-oriented*: a work programme that is an immediate engagement with this world of ideas (how to manage watersheds effectively, how to generate increased off-farm employment, what are the most effective alternative sources of rural energy and what are the constraints on their widespread adoption, what are the environmental consequences of infrastructure engineering projects of varying scale in mountain regions). The design of the Phase I Work Plan for the Centre needs to be formulated not on a random listing of questions of this type, however obviously important, but rather on a systematic conceptual appreciation of their linkages and inter-relationships.

Whatever the final design of this initial Work Plan, it is clearly essential to translate this conceptual thinking into an *operational*

work programme that is realistically structured around the constraints of available resources in both staff expertise and budget terms, and which, therefore, is realistically implementable—with clear productive goals—over a defined period of time (say the first two years). On behalf both of myself as the Director-Designate of ICIMOD and of the professional staff yet to be appointed, I would like now to thank all who have participated in, and contributed so enthusiastically to, the Working Groups of this Symposium. The detailed discussions on the Draft Work Plan of ICIMOD, prepared so skillfully and so usefully by Nancy Axinn and Devendra Raj Pandey of Integrated Development Systems as consultants to the Centre, have been both extensive and intensive. We have had a very useful opportunity at this Symposium for a full exchange of views on this vital subject of the Centre's objectives, priorities and modus operandi.

However, no operational work programme, no matter how clearly constructed, can be effectively implemented for an international centre of this type without the whole-hearted support and involvement of the governments, and particularly of our professional colleagues, in the eight countries (Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan) of the Hindu Kush-Himalayan region. And this brings me to the second subject—that of regional cooperation—on which I would like to make some brief comments in this short summary of the key themes, as I see them, that have emerged during this Symposium.

2. The International Dimension of ICIMOD's Activities

However ICIMOD be organised and whatever the content of its work programmes, this new International Centre at the very basis of its conception is essentially a bold venture in regional cooperation. At the heart of the matter is the shared understanding among a group of "participating countries"—all with common if not identical interests in the promotion of the welfare and well-being of their peoples living in adjacent or similar mountain habitats—that there is a collective benefit to be obtained through a sharing of knowledge and experience on the developmental and environmental problems that confront these mountain communities, and through the organisation of a collective effort to identify more effective responses to these problems (with better techniques of analysis, of plan and programme and project formulation, and of development *implementation and management*) than those currently being used. This regional cooperation is indispensable to ICIMOD's effective development.

In this light, it has been immensely encouraging to see all eight countries of this Hindu Kush-Himalayan region represented at this Symposium, and at the Inauguration which follows tomorrow. And not merely represented, but actively and vigorously participating. This already augurs well for the future of regional cooperation in integrated mountain development—and indeed for the future of ICIMOD. Within our professional and scientific field of mountain development—and given our central conception of ICIMOD as a development centre rather than as an academic research institute—the *promotion* of this regional cooperation will remain one of ICIMOD's essential objectives. The *achievement* of effective and significant professional cooperation on this regional basis will constitute one of the surer tests of the Centre's success or failure.

I have particularly appreciated the many suggestions that have emerged during this Symposium on the best ways of building this collaboration and cooperation on this international basis. All

such recommendations will, of course, receive the most careful examination. I would just like to emphasise on this occasion that, in this critical field of inter-country collaboration, I see the Centre as having three immediate, and indeed permanent, priorities:

First, full and detailed consultation with those concerned in each country on the content and priorities of ICIMOD's work programme. This seems to me an inescapable requirement if the Centre is to develop an effective contribution of recognised significance within this region. Agreement, indeed consensus, on the work programme is the basis for the active professional involvement on a cooperative basis in each country that ICIMOD is seeking to promote. This can only be achieved on the scale required if each country of the region is fully consulted with regard to its own identification of the areas and subjects of urgency on which ICIMOD should concentrate its professional expertise, resources, and capacity to mobilise a region-wide effort of professional collaboration.

This process of detailed consultation with regard to ICIMOD's work programme is all the more important when we recognise, as indeed we must, the complexity of the international political situation in this mountain region—extending as it does from Afghanistan in the far west to northern Burma, north-eastern India, and to southern China at its eastern extreme. It is all too easy to assert that ICIMOD is a completely autonomous international organisation structured on a professional and scientific basis, owing allegiance to no government whatsoever. Above all, that ICIMOD is not a inter-governmental organisation either in conception, funding or in practice. Having made these perfectly correct assertions about the Centre's international but independent status, it would nevertheless be folly not to acknowledge, and to take practical account of, the facts of inter-national relationships in this region, and of every nation's obvious right to be its own judge of what constitutes its national priorities, and indeed its national interests. We will make sure that ICIMOD's style of operation, its work programme priorities, its professional relationships are developed with the skill and common sense required. ICIMOD is wholly non-political (in the accepted sense of this term) but equally the Centre will seek to develop good working relationships with the proper government departments and agencies in each of the eight countries of the region, and with relevant professional and scientific institutions in each country. As an autonomous organisation, we have the great advantage of a multi-national Board of Governors, on which four of the countries of the region have full representation and to which the other four may send observers for full participation in the Board's deliberations. In each of these eight countries of the region, ICIMOD has a "focal point" within the government. Thus, we can develop ICIMOD's style of operation with the support and advice of Board Member, observer, or focal point in each country. The first requirement, however, is

full and significant consultation throughout the region to formulate a work programme acceptable to each country and which will indeed stimulate the active professional commitment on the regional cooperative basis that is essential to ICIMOD.

The second requirement, to which I will give immediate emphasis, is the assembly at ICIMOD of a *multi-national* professional staff drawn mainly from the participating countries of this region. We hope to have senior and experienced professionals from all eight countries represented on the core staff of ICIMOD, and working together at the Centre as colleagues on the problems of integrated mountain development that are shared, in varying degree, by mountain communities throughout this region.

Thirdly, we will begin at once with the organisation of a regional Documentation and Information Exchange network in which, desirably, all eight countries will participate. This practical step in regional cooperation will, I am very glad to hear, receive immediate assistance in terms of expert advice from UNESCO and the International Development Research Corporation (IDRC) of Canada jointly. This expert help is particularly welcome at this first critical phase of ICIMOD's development since it correctly focuses on the practical organisation of ICIMOD's first efforts in the field of regional cooperation.

Perhaps in closing these remarks, I may just be allowed to add two final personal comments. First, my warm appreciation of the organisational work undertaken by Mr. Peter Gueller, as Regent of ICIMOD, through the long period of preparations that have led to this First International Symposium and to the "rite de passage" of the Inauguration tomorrow. His totally committed efforts will enable ICIMOD to get off to a running start once I take over as the first director mid-April. He has played a major part, warmly appreciated by me, in building the ship: it remains to me to put the crew aboard and chart the course. ICIMOD fully recognises its debt to Peter Gueller.

I have also greatly appreciated the many warm good wishes—and indeed the many active offers of support—that I have received personally from all sides over the last four days, and certainly from all national delegations. With the Board of Governors, under its distinguished Chairman, Dr. Ratna S.J.B. Rana, we now begin the tasks of building a completely new international institution here in this ideal location in this mountain kingdom. A very considerable challenge by any standards. This highly stimulating Symposium, where a great depth of international expertise has been assembled, has been a very encouraging beginning for the tasks of professional leadership that I now undertake. The good wishes I have received here make me indeed feel that I have joined a society of friends linked by a common concern for the peoples of these mountains and for the magnificent but fragile environment that they inhabit.



The Keynote address of the Symposium being delivered by the Chairman of the Board of Governors, Dr. Ratna S.J.B. Rana.



In Session



Mr. Qin Li-Sheng, Chairman MAB Committee, China, planting a tree at Godavari.



Delegates listening to an address during the Symposium.

**PART II
INAUGURATION**

Welcome Address

Fatteh Singh Tharu
Honourable Minister of State for Education and Culture

On behalf of His Majesty's Government of Nepal, I take great pleasure in extending our heartiest welcome to the Right Honourable Prime Minister, the Director General of UNESCO, Dr. Maurice Strong, the delegates of the participating countries, and to all the distinguished guests, ladies, and gentlemen at this auspicious Inauguration of the International Centre for Integrated Mountain Development.

This day, indeed, marks the culmination of several years of ceaseless efforts by concerned agencies and interested governments to see that a centre serving the needs of the Hindu Kush-Himalayan region be established to check any further degradation of mountain ecology of the whole South Asian mountain system. Nepal has always attached great importance to this kind of endeavour.

The Himalayas, as you all know, constitute a substantial part of our country and for centuries these have been the natural habitat of the majority of our people. We have always adored these mountains, worshipped them as manifestations of divinity, been inspired by their sheer splendour and majesty, and have also derived our succour and sustenance from them. The snowcapped mountains in their majesty have inspired some of our greatest poetry, as well as nurtured some of our toughest warriors down through the ages.

A few years ago, however, the realization began to dawn that the mountains, denuded of their protective vegetation, would hardly sustain the growing numbers of people who had been inhabiting them for so long. It suddenly seemed that these mountains could no longer support them as they had done for years.

Thoughtless deforestation, soil erosion, loss of productivity, landslides, frequent floods, and drought have made their continued existence in the hills difficult. They have been fleeing to the lower plains in search of better prospects of living, but, to their disappointment, things there are not any better. The destruction of the mountain environment has also taken its toll on the plains, almost as if nature were taking revenge on man for stripping her naked. As it is, these mountains seem to have lost their mooring for mountain people. And, needless to say, something has got to be done to restore the balance between man and his mountain environment before it is too late.

Ladies and gentlemen, ICIMOD was conceived to help restore this all-importance balance. It all started as a result of the findings of an international workshop on the development of mountain environments in which UNESCO and the German Foundation for International Development played pioneering roles. UNESCO, within the framework of its programmes on Man and the Biosphere, organized a regional meeting in

Kathmandu on integrated ecological research and on training needs in the South Asian mountain system, particularly in the Hindu Kush-Himalayas. At this meeting, among other things, we offered to host the establishment of ICIMOD in Kathmandu.

Thus, we have the privilege to become the host of ICIMOD which, we believe, is central to all we have been doing so far for mountain development. We are gratefully to UNESCO, as well as to the governments of the Federal Republic of Germany and Switzerland, for taking the lead in seeing to it that the Centre can now begin to address its objectives of integrated mountain development through research, exchange of information, and training.

We all know that the potential exists in these mountains to unleash a chain of developmental activities which would lead to the total well-being of the inhabitants of these areas. Mountains are the sources of hydro-power, timber, fuelwood, irrigation, livestock, medicinal plants, and minerals, and could also provide an outlet to the sea for land-locked countries like Nepal.

Our problems of mountain development are well known. I would like to mention here only two of them: population growth and deforestation. These two problems move in a vicious circle. We have to find a way to get out of it by adopting an integrated approach to the whole issue of mountain development.

I am confident that the countries of the Hindu Kush-Himalayan region—Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan—will pool their expertise and know-how and, by participating in the activities of ICIMOD, will see that not only is further damage avoided to our mountain ecology, but that improvements are also effected to ensure the all-round prosperity of the region. We have great promises to keep in order that we may share great prospects together.

I hope that mountain scientists and experts within as well as outside the region will put their heads together to meet the challenges, as well as unfold opportunities for a happy and prosperous future.

I would also like to mention here that the contributions of institutions, agencies, and governments all over the world will go a long way towards achieving this goal of ICIMOD.

Ladies and gentlemen, allow me to conclude with a quote from His Majesty, King Birendra Bir Bikram Shah Deva: "Given genuine friendship and mutual co-operation, I declare in the name of my government that Nepal is willing to co-operate in such a joint venture that will lead not only to planning prosperity together, but will also emphasize our independence through inter-dependence."

Once again, I welcome you all. Thank you very much.

Inaugural Address

Sri Lokendra Bahadur Chand
The Right Honourable Prime Minister of Nepal

Mr. Chairman, Director General of UNESCO, His Excellency Mr. M'Bow, Dr. Maurice Strong, Your Excellencies, Ladies, and Gentlemen,

It is, indeed, a matter of much pleasure for me to extend to you all a warm and cordial welcome, on behalf of His Majesty's Government and on my own, to this inaugural function specially convened to mark the formal opening of the International Centre for Integrated Mountain Development (ICIMOD) here in Nepal. We are particularly happy to have amongst us His Excellency, Mr. M'Bow, without whose deep and abiding interest this project would certainly not have come into being today. Similarly, the presence of Dr. Maurice Strong, whose efforts in this field resulted in the establishment of the United Nations Environment Programme, is also a matter of satisfaction to us. I would also like to extend our heartfelt welcome to all the distinguished delegates and participants who have come from all over the world to be with us on this historic occasion.

This is an important event in the annals of international co-operation for conservation of one of the greatest heritages of mankind—that of Hindu Kush-Himalaya—which has shaped the destiny and sustained the life of the millions of people of this region. The setting up of this international centre, therefore, symbolizes the hopes and aspirations of all those who have been very acutely concerned about the future of these mountains, as well as the people whose life depends upon them.

The Hindu Kush-Himalayan mountains are inhabited by about 30 million people and an additional 350 million live in adjacent large river basins and plains. These mountains, while being fragile, are unquestionably the greatest physical feature on earth. They are also the source of rivers which bind the countries of the region present here on this occasion. The river systems present a vast potential by harnessing them for the benefit of all the peoples of the region.

The Himalayas are regarded as the "abode of the Gods" No other natural or man-made structure is as lofty as the Himalayas; their beauty and grandeur stand for purity, courage, and hope.

The Hindu Kush-Himalayas have immensely contributed to the growth and development of myriads of cultures and ethnic groups, some in isolation but others blossoming into living faiths for millions.

The great basins formed by the mighty rivers originating in the Hindu Kush-Himalayas have witnessed the rhythm of cultures during the past millenia, and are now part of world history. But, of late, these mountains have been undergoing a process of change of great consequence. The deteriorating physical and biological environment of the Hindu Kush-Himalayas is the result of ecological degradation—reckless destruction of trees, soil erosion, loss of top soil, landslides, silting of rivers, and floods downstream. Large areas have undergone the process of desertification leading to the drying up of streams and springs. This man-made wilderness has led to the loss of fertility of soil and agriculture production.

The frequent occurrence of drought in the hilly and moun-

tainous regions of the Hindu Kush-Himalayas can be explained in the context of rapid loss of vegetative cover in large parts. It is estimated that the forest cover in the Himalayan region has been reduced by 40 to 50 per cent.

Human behaviour, therefore, has done much to contribute to the destruction of the life support system. It would be wrong, however, to draw the hasty conclusion that the hill people are ignorant of the untoward effects of their actions; on the contrary, they are quite aware of the adverse effects that forest destruction and cultivation of steep mountain slopes have on the maintenance of environmental balance. They are caught in the vicious cycle of abject poverty, which, in fact, is the cause and effect of environmental degradation.

The environmental problems are nowhere more acute than in the Hindu Kush-Himalayan region; it is here that nature is most mercilessly pitted against man. In his relentless quest for food, fuel, shelter, and other basic needs, man has accelerated the process of environmental degradation. An adverse land/man ratio due to high rate of population growth has further aggravated the problem. In many parts, population has far exceeded the carrying capacity of the land, forcing the people to leave their homes in search of employment and means of livelihood. This, besides uprooting the traditional social structures, has brought forth new problems which defy an easy solution. The proper management of the resources of mountain areas, therefore, cannot brook any further delay. It is hoped that this new centre now being set up will study and find feasible solutions to the problems which I have enumerated here.

The response of the international community to the setting up of an international centre exclusively devoted to promoting the idea of integrated mountain development in the Hindu Kush-Himalayas has been most encouraging. In this regard, we feel, indeed, very grateful to UNESCO for its persistent efforts which have resulted in the setting up of this Centre. We are also indebted to the Federal Republic of Germany and Switzerland for making generous grants without which ICIMOD would not have come into existence.

The development dilemma before the world in general, and the Third World in particular, appears in sharp focus in relations to the environment. The resources of the world are not inexhaustible and we must utilize these prudently. Pollution of the earth is related to the poverty from which nearly three-fourths of mankind suffer. One can recall here that at the Stockholm Conference a forceful plea was made that, in order to solve the environmental problems, the pace of development should be accelerated. Hunger, poverty, and disease are both a cause and effect of environmental degradation.

The concept that development plans should be economically viable and environmentally sound has now gained wide acceptance. Efficient environmental management mitigates the cost of development. The dilemma faced by the developing countries—choosing between growth and environmental quality—is no doubt there, but one cannot conceive growth with

total disregard of the ecosystem. I whole heartedly agree with Dr. Strong's observation that, "the need is to try to harmonize socio-economic and environmental goals by redefining patterns of resource use and uses of growth." This concept of eco-development has to be taken into serious consideration by all development planners.

Intensive use of natural resources, both by the developed and developing countries, cannot be sustained over long periods unless we give equal attention to their preservation and enhancement. There is need to use resources on a sustainable basis. The fragility of the Hindu Kush-Himalayas make it imperative to pursue sound resource management policies.

The setting up of the International Centre for Integrated Mountain Development in Nepal, the first international institute of its kind, is of great significance to us. Nepal's Himalayas have been subjected to much adverse impact by human activity which has resulted in disruption of ecological systems—often of an irreparable nature. The more serious consequence of this is reflected by cyclical drought and food shortages in large parts of the country. This forces the people to migrate to the lowlands, generating new ecological and socio-economic problems. Serious shortages of fuel, fodder, and fibre affect the entire village economy. There is, therefore, a compelling need to plan and implement an effective resource management policy in Nepal which would restore ecological balance.

In this context, alternative resources of energy—bio-gas, solar, and hydro-power—need to be encouraged. In the hilly and mountainous regions, improvement of grazing lands can improve the village economy considerably. Science and technology can play a most crucial role in finding solutions to the complex problems in environmental management. Most impor-

tant of all, we should economize on the utilization of both commercial and non-commercial forms of energy.

In the current Sixth Plan, a number of schemes have been launched in Nepal with a view toward conserving natural resources, a task with which the local panchayats (village councils) have been actively associated. Several integrated rural development schemes have a strong component of environmental protection, and the new decentralization act specifically calls upon the people to take concrete measures to safeguard the environment. During the past decade, many concrete steps have been taken for environmental protection, especially in the field of wildlife preservation, soil and water conservation, afforestation, and other related activities. We have been much helped and encouraged by bilateral and multilateral support in the implementation of these programmes.

Above all, no one in Nepal is more acutely aware of the need for environmental protection than our beloved Sovereign, His Majesty, King Birendra Bir Bikram Shah Dev, who has constantly inspired us to pursue policies which are compatible with preservation and judicious use of our natural resources. We are firm in our conviction that any conservation strategy should aim at preservation of natural and cultural as well as spiritual heritage. We believe that such a policy has much wider relevance than for just our own country.

I have no doubt in my mind that ICIMOD will play a most fruitful role in our efforts in meeting the challenges before us. The co-operation and collective wisdom of all will be available generously to the sapling that we have planted today. Nepal, for her part, is honoured and privileged to be the host country for this Centre whose impact should transcend the national boundaries and bring benefits to all those whose well-being is so much inter-linked with the Hindu Kush-Himalayas.

Address on The Occasion of the Inauguration of The International Centre for Integrated Mountain Development in The Hindu Kush-Himalayan Region (ICIMOD)

Mr Amadou-Mahtar M'Bow

Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO)

Mr Prime Minister,
Ministers,
Your Excellencies,
Mr Chairman of the ICIMOD Board of Governors,
Ladies and Gentlemen,

It gives me great pleasure to be associated with the inauguration of the International Centre for Integrated Mountain Development in the Hindu Kush-Himalayan region, in the heart of this magnificent range which forms the highest and one of the most extensive mountain areas in the world.

I wish to express my sincere gratitude to His Majesty King Birendra, the Prime Minister, Mr Lokendra Bahadur Chand, and the Minister of State of Education and Culture, Mr Fatteh Singh Tharu, for the invitation extended to me to take part in this ceremony which, to my mind, is of special significance, since this is the first time that a centre of this kind has been founded in this part of the world.

UNESCO is particularly happy that it should be established in Nepal, for we know that the country is unanimously in favour of strengthening international co-operation, by means of which we have begun on substantial joint efforts with a view to preserving the cultural and natural heritage of the valley of Kathmandu.

The presence of the Prime Minister of Nepal adds signal lustre to this meeting. I am also glad to see in our midst the ministers, ambassadors and delegations of various countries of the Hindu Kush-Himalayan region, the representatives of other countries and of many international organizations, and leading members of the scientific community; their presence here today is testimony to the importance they attach to this achievement. I extend to them my warmest greetings.

We are also happy to note that this ceremony has been preceded by the holding of ICIMOD's first symposium. I greet those who took part in it, here with us today; their work constitutes a significant starting-point for the Centre's future action.

Your Excellencies,
Ladies and Gentlemen,

The establishment of ICIMOD meets a need which has become more pronounced with each passing day. It was in 1975 that UNESCO, in collaboration with the Nepalese National Committee for the Man and the Biosphere Programme (MAB), organized for the first time, in Kathmandu, a regional meeting on integrated ecological research and training needs in the

southern Asian mountain ecosystems, in particular those of the Hindu Kush-Himalayan region.

That meeting immediately brought out the magnitude of the problems presented by mountain life and the urgent need to find new solutions to them. The desire was thus expressed that our Organization co-operate with the government of His Majesty the King of Nepal with a view to founding an institution capable of providing all the countries of the Hindu Kush-Himalayan region with the scientific knowledge and qualified personnel needed for the implementation of integrated development activities.

The UNESCO General Conference approved this project at its nineteenth session, and at its twentieth and twenty-first sessions supported the steps being taken to pave the way for its implementation. More recently, the Conference of Ministers Responsible for Science and Technology in Asia and the Pacific (CASTASIA II), convened by UNESCO in Manila (Philippines) in March 1982, gave its full support to the Centre, adopting a recommendation to that effect.

The main purpose of the Centre is to help to improve the living conditions of populations by fostering the development and rational utilization of resources of every kind, together with the lasting preservation of mountain ecosystems, as part of the overall development of the countries concerned.

An almost general tendency is to be observed in mountain areas for agricultural land to deteriorate, and erosion to be speeded up as a result of deforestation, and for landslides to become more and more frequent owing in particular to highway construction. Efforts to protect the environment and improve agricultural productivity are thus being increasingly jeopardized, at a time when there is an imperative need constantly to increase resources if the needs of populations are to be met.

Moreover, the ecological problems besetting high-altitude areas have serious repercussions on valleys situated at lower altitudes and on near by lowlands. Examples are the silting of streams, the filling up of reservoirs with sedimentations and floods, with their attendant consequences, such as loss of cattle or the destruction of crops and highways.

There is also a social and human phenomenon which is now becoming more marked, namely population migrations, both from rural to urban areas and from mountains to the valleys. All future action must, I think, take account of this trend.

In all mountainous regions the basic concern is to strike a satisfactory balance between population, resources and environment. Such a balance no doubt entails, first and foremost, a diversification of the sources of income available to each

population. The subsistence economy, which has long predominated in many high mountain areas, is now in a critical state, which is steadily worsening due in particular to population pressure, increased by improvements in health and in living conditions, on the one hand, and on the other to the emergence of new needs connected with the development of communication and trade. Under these circumstances, populations are making greater demands on the land, without any corresponding improvement in productivity. It therefore seems necessary to envisage measures that will ensure more productive and more varied land use and at the same time to seek other sources of income, such as for instance craft industries.

All the countries of the Hindu Kush-Himalayan region are currently faced by the problems to which I have just alluded, albeit in varying degrees of acuteness from one time and place to another. This in itself amply justifies regional co-operation. But such co-operation is also made necessary by the fact that many instances occur of interaction between highland and lowlands, the effects of which are passed on from one country to another, and cannot be controlled within a purely national context.

This being so, the implementation of joint research by all countries of the region, the exchange of knowledge and experience and the execution of joint activities seem particularly conducive to the mobilization of the resources, both at home and abroad, which are necessary for economic and social development. Solutions for the future are likely to be found only within the framework of integrated projects, so designed as to take into consideration all relevant human and natural factors, including in particular problems of education and health.

ICIMOD's first symposium, devoted to 'Mountain development 2000—challenges and opportunities', took a searching look at all the problems arising in this connection and at possible solutions to them.

Its conclusions bring out, in particular, the need to reconcile the goals of progress with environmental protection by means of an integrated approach to development at all levels. The symposium emphasized that the main task lying ahead would be precisely to give to the concept of integrated mountain development specific practical applications in the field. For this reason the participants strongly encouraged ICIMOD to include among its priorities for action the formulation of practical advice for planners, project managers and technicians so as to help them to carry out their integrated development programmes.

All the countries of the Hindu Kush-Himalayan region, as well as the other countries that back their efforts and the international institutions participating in the symposium, have reaffirmed their full support for ICIMOD, stressing in many cases the obvious links between the activities it intends to carry out and the action already taken under the MAB Programme, and commenting UNESCO's role in this field.

We in UNESCO, are convinced that ICIMOD will be able to play a role commensurate with the hopes placed in it by the states of the region, as an international centre for documentation, training and applied research and as a technical support agency for the preservation of ecosystems and integrated mountain development. By drawing in particular on experiences gained within the framework of UNESCO, ICIMOD will be able to develop its activities in such a way as to meet all the challenges justifying its foundation.

I should therefore like to take this opportunity to congratulate the countries which are helping to activate the Centre and to thank the governments of all the countries, particularly the Federal Republic of Germany and Switzerland, that have so kindly provided support. I very much hope that the governments of other countries, as well as other organizations and many members of the international scientific community, will be able in their turn to provide assistance to the Centre.

I also wish to thank all those who have helped to bring this undertaking to fruition, starting with the Royal Nepal Academy of Science and Technology; and extend a warm greeting to Dr. Rana, Dr. Strong and Dr. Singh for their contribution to this ceremony.

I can assure you that UNESCO fully aware of its responsibilities towards ICIMOD and that it will do everything in its power to support the Centre's activities and facilitate the implementation of its regional co-operation programmes.

In conclusion, I should like once again to convey my warmest thanks to His Majesty the King, and to the Government and people of Nepal, for the cordial hospitality shown towards us in this country of majestic beauty and age-long history, which was the birthplace of the Buddha and whose cultural treasures and lofty spirituality have always been admired.

Mr Prime Minister, Ministers, Your Excellencies, Ladies and Gentlemen, I wish ICIMOD every success in its work on behalf of the governments and people of the Hindu Kush-Himalayan region.

Keynote Address

Dr. Maurice F. Strong

I feel very privileged, indeed, to have this opportunity of participating in the ceremonies marking the opening of the International Centre for Integrated Mountain Development. This is, indeed, an auspicious occasion as it represents the realization of dreams and plans of a number of enlightened and far-seeing people, many of them here today. And it marks a new era of hope and of promise for the future of this great and beautiful region and its peoples.

I am pleased to join with you in paying tribute to the people, the institutions, and the governments who have made ICIMOD possible, and particularly to our host country, Nepal. For it is only the enlightened leadership and support of His Majesty, King Birendra Bir Bikam Shah Dev, and his Government that have enabled ICIMOD to become a reality and to make its home in this ancient and magnificent mountain kingdom. There could be no more appropriate site for ICIMOD. Nepal is the home of the greatest mountains on earth, some of the most magnificent and representative mountain environments, and, most important of all, a richness and diversity of people whose values, culture, and ways of life have made such a unique and seminal contribution to the human experience and nourishment of the human spirit. There is no country which exemplifies to a greater degree both the positive values and potential of mountain life, as well as the problems and challenges which now confront mountain peoples; and no country has shown a higher degree of awareness and concern for these problems and challenges.

I was most impressed by the prospectus outlining a "National Conservation Strategy for Nepal", prepared recently by His Majesty's Government of Nepal, in conjunction with the Conservation for Development Centre of the International Union for Conservation of Nature and Natural Resources, as a follow-up and national counterpart of the World Conservation Strategy. It provides a vivid and informed analysis of the conservation and environment-related development issues confronting Nepal, and points the way to the kind of policies and actions required to deal with these issues. It is one of the most enlightened and promising approaches to these important issues that I have seen on the part of any national government.

Mountain regions not only represent the most spectacular and beautiful of the ecosystems which make up the environment of our "Only One Earth", but are indispensable to the survival and well-being of a substantial portion of its inhabitants. As the most awesome manifestations of God's creation, mountains have always been a prime source of inspiration for man's spiritual life. When David said in the Psalms, "I will lift up mine eyes unto the hills, from whence cometh my help", he articulated a feeling which strikes a responsive chord in all of us. As the physical meeting place between the earth and the heavens, the mountains have been seen by people of all ages as dwelling places of the spirits and of the presence of God. Thus, mountains have figured prominently in the development of virtually all the world's great religions as well as the religious experience of indigenous and primal peoples throughout the world. In the mountain valley in Colorado where I have a home, the most prominent and awe-inspiring feature is a mountain that is sacred to all the

Indian tribes in that area of the southwest United States.

Mountains have been just as important in nourishing the cultural and the physical needs of people. Some of the finest, richest, and most durable human cultures have grown up amongst mountain peoples. There is a remarkable diversity in these cultures, ranging from the Zuni Indians of New Mexico to the Kogi Indians of the Sierra Nevada de Santa Marta in Colombia, from the peasant farmers of the alpine highlands in Switzerland to the Sherpas of the Himalayan region, to name but a few. But underlying this diversity are some common characteristics—strength of character, diligence, reliability, deep affinity for nature and the land, an earthy wisdom, and the ability to co-operate with others within a cohesive social unit.

These qualities have come out of centuries of experience in confronting and learning to live with the harsh, demanding, and often hazardous conditions imposed by mountain environments. And it is a tribute to these people that, in most cases, a sustainable balance was achieved between the needs of mountain peoples for food, shelter, fuel, and water, and the capacity of the natural environment to provide these. But in the past century, and particularly in the last three or four decades, these delicate balances have been subjected to accelerated pressures resulting largely from the substantial increases in population growth accompanied by the consequences of modernization. This has led to a dramatic reduction in forested areas, both through expansion of cultivation and commercial exploitation of forests, as well as the growing needs for fuelwood. It has produced a vertiable explosion of road building and air transport which has linked areas that were previously difficult of access and virtually self-reliant from the external economy. The opening up of the areas to commerce and tourism is undermining the traditional self-reliance and the values of mountain peoples, who are disadvantaged in their ability to confront the new and intensified pressures which accompany modernization and the opening up of the economy and to obtain a fair share of the benefits of these processes.

At the same time, pressures on the land—always a precious and scarce resource in mountain regions—have been mounting at unprecedented rates. As the limits of cultivatable areas are reached, the density of human and animal populations on existing lands is growing to the point which threatens to overwhelm the capacity of the land to continue to produce its crops and support its populations on a sustainable basis. I understand that this, in fact, is the situation right here in the Kathmandu-Kakani area.

When these vital ecosystems become unstable, there is an imminent threat to the very livelihood of the people who depend on them. Once the forests that control the watersheds begin to disappear and the uncontrolled waters open up clefts and gullies in the land, more and more of the precious soil will be washed away and with it the very means of life for the people of the area. Once this process begins it is difficult to arrest. The soil and the diversity of the plant and animal life it supports have taken millions of years to develop. For centuries the mountain peoples have cultivated and cared for these lands, and the land has

provided for their needs. But all of this can be destroyed within the lifetime of a generation, and, as you well know, that is exactly what is happening in mountain regions in virtually every part of the world, and particularly in the developing world. These processes are accompanied by an increase in landslides and avalanche activity which adds immensely to the hazards and, all too often, the horrors of mountain life.

The consequences are devastating for the people of the mountain regions concerned. They are just as bad for the people who live in the lowland areas where a disruption of the mountain watersheds produces accelerated cycles of flood and drought which exact a heavy toll in terms of human life and misery.

All of these phenomena are well documented in the papers prepared for the seminar that has preceded this opening ceremony. The experts who are with us today are better able than I, as a layman, to elaborate the risks to which I have been referring, as well as to point the way to remedies. I have had the privilege to seeing a good deal of this planet; one does not have to be an expert to see what is actually happening in mountain regions, including this one, and to appreciate the dire and ominous consequences of the imminent threats that are now posed to the peoples of these regions. Indeed, I see in this the grim prospect of one of the greatest human tragedies of all time.

You, more than any outsiders, know the horrendous implications for this country and the entire Himalayan region. In no region is the threat more ominous. And while conditions in various parts of the great Himalayan ecosystem vary considerably, the threat is common to all parts and is shared by all countries of the region—Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan. Similar threats confront peoples of the Andean nations of the South America, the Atlas Mountains of Morocco, and the mountain regions of Ethiopia, Tanzania, Ruanda, and Burundi, as well as the mountain areas of the Pacific Island region. The list is a long one, and one need not mention every region to make the point that there is scarcely a mountain region in the developing world which is exempt from this threat.

Thus, the creation of ICIMOD responds to what I believe is one of the most urgent and important threats confronting the peoples of our planet. We must believe that there is still time to arrest the destructive processes, already far advanced, that are undermining so many mountain ecosystems and the futures of the people they sustain. Clearly there is little time, for the processes of destruction are accelerating.

One of the principal insights which emerged from the United Nations conference on the human environment held in Stockholm in 1972 was that the processes of development and of care and protection of the natural environment are inextricably linked and interdependent. Development necessarily impinges on and alters the natural environment which, in turn, provides the principal resource base on which development depends. Development that undermines and destroys the natural resource base cannot be long sustained. The natural resource base of forests, soil, water, plant, and animal life represents the real wealth on which people must depend for their continued survival and well-being. The destruction and loss of these previous natural resources will literally deprive the people who depend on them of the means of life. A country's reserves of gold can be replenished; but when the productivity of the renewable resource base is lost, the loss is usually, for all practical purposes, irreparable.

Development itself is not the villain, however; it cannot and must not be arrested. It is through the development process that

the needs and aspirations of people, material, cultural, and spiritual, may be realized. It is destructive development that must be stopped; we must pursue modes of, and pathways to, development which maintain ecological balances and permit renewable resources to yield their bounty on a sustainable basis. Sustainable development is not an option, but an absolute imperative. There simply is not other way.

We now realize that development that is confined to individual sectors or narrow purposes and approaches cannot be successful and is usually self-defeating. Development takes place within a complex system of social, cultural, physical, and economic factors, each of which affects and is affected by the other. The success of development depends upon maintaining harmony and balance amongst the various elements of that system and requires an understanding of the cause and effect of relationships within the system as a whole before embarking on actions which will change even a single component. Changes in growth and distribution of population, in land use, in work and consumer habits and expectations, in the inter-actions with the external economy, and in the interface between traditional values and the processes of modernization introduce new dynamics and pressures into the development process, and all must be taken into account in evaluating development options and prospects.

This is why integrated development is the only approach that makes sense, the only kind of development that can be successful, particularly in mountain areas where the sensitivities and balances involved are especially delicate. This is why I am so encouraged and pleased that the concept of integrated development has been incorporated into the very theme and, indeed, the name of ICIMOD. It bodes well for the success of its mission.

The challenge of ICIMOD, as I see it, is to lighten the pathways to sustainable development for the peoples of mountain regions; to help them evolve the modes of development which are most appropriate to their own values and needs, and to the ecological realities with which they must contend. By concentrating its attention in this, the greatest of all mountain regions, ICIMOD can help produce experiences, information, insights, and examples which can be of benefit to peoples of other mountain regions throughout the world.

Having been involved in the building of a number of institutions, I would like to take this opportunity to point out a number of areas of risk which will inevitably accompany the vast range of opportunities and challenges that confront a new institution like ICIMOD. First, there is the very importance and complexity of the issues which ICIMOD will be addressing. As ICIMOD is truly unique as an international centre for integrated mountain development, and the need for it is so compelling, there will inevitably be pressures on it to do more than it will be capable of doing. Expectations of what it could or should be doing will be set very high indeed.

In the initial stages, the pressures on ICIMOD to take on more than it can do will be especially great—yet this is the time when it must concentrate its attention on mobilizing its resources, developing a sound institutional and technical infrastructure, and recruiting its people and giving them the opportunity to work as a team.

The resources available to ICIMOD are still, unfortunately, all too modest in relation to the size of the task it faces. There is a danger that these resources and the energies of its staff may, therefore, become too inwardly focused on the operation of the organization itself and too little on the basic objectives for which it was created. All international institutes also face the dangers of over-politicization of their staffs and bureaucratization of

their activities. Professional, technical, and operations competence must be the prime criteria for recruiting and rewarding personnel.

Let me also make a strong plea for an operating style which makes ICIMOD the centre of a network of institutions and peoples from both inside and outside the region whose diverse skills, insights, and resources can be brought to bear in a concerted and co-ordinated manner to assist the people of the region, their institutions, and their governments, to develop and apply the solutions to their own problems. ICIMOD must be a centre of leadership, of consultation; a means of exchanging experience and information and identifying needs and opportunities, as well as mobilizing the skills and resources required to meet them. It should be able to draw on the co-operation and support of the development assistance programmes of governments, like those of the Federal Republic of Germany and Switzerland, which have already been so helpful, and of international organizations, like the United Nations Environment Programme, UNESCO, the International Union for the Conservation of Nature and Natural Resources, the World Wildlife Fund, and others.

ICIMOD must surely resist the temptation to try and go it alone, to set itself apart from other institutions, to compete with them, or to keep them at a safe distance. In the mammoth struggle we face to maintain the vitality and the life-sustaining qualities of mountain ecosystems, what we need most of all is enlightened leadership, and surely it is the prime task of ICIMOD to provide this leadership.

The temptation to try and be a doctor prescribing solutions for its patients must also be resisted. ICIMOD must be a partner in integrated development with the people whose experience is most relevant and whose livelihood most intimately affected by the issues to which it directs its attention—the peoples of each of the mountain regions concerned. They must be involved in every stage of the process, from identification of issues and goals through the formulation of plans and programmes designed to address these issues, and through the implementation and follow-up of every practical measure and project undertaken. Without their involvement, no programme, however well-conceived in technical terms, can ultimately succeed. ICIMOD must always be seen as a source of necessary help, information, and resources, and not as a distant authority or dispenser of patronage.

One of the most important attributes of ICIMOD is its international character. At the same time, this poses one of the most difficult challenges to its effectiveness. It must be admitted that the political differences that divide the countries of this region are formidable. They will make it extremely difficult, on occasion, to enlist the co-operation that will be so necessary for ICIMOD's programmes to benefit all parts of the region, and for all to benefit from the experience of others within the region. This makes it imperative for ICIMOD to develop a network of co-operative relationships on the technical, professional, and operational levels which take necessary account of, but do not involve it directly in areas of political sensitivity. All of the countries of the region, whatever their current political differences may be, have a common interest in the sound development of the region and preservation of its threatened renewable resources and ecosystems. The kind of co-operation which ICIMOD can facilitate is of special importance to all. Its success in developing international co-operation in this key region will set an important and constructive example for other mountain regions which also transcend national boundaries.

I am encouraged by what I have seen of the proposed programme of ICIMOD, of the staff it is putting together under the distinguished leadership of Dr. Rana, and of the interest in it, as evidenced by the participation in these opening ceremonies. This will enable ICIMOD to rise to the great and compelling need which has led to its creation and avoid the risks and pitfalls I have mentioned. To do this, it will need the active and continuing support of all of us, those from within the region and those from outside. The work has just begun. The sense of excitement and accomplishment we all feel in celebrating today the opening of this new institution must be accompanied by a sense of commitment in helping it meet the colossal challenge it now confronts. As one who has been involved for many years in the struggle to create greater awareness of, and a more positive response to, the need for better care and maintenance of our "Only One Earth", I can say with all conviction that there is no greater imperative, no challenge which will affect to a greater degree the future of our planet and its peoples than that for which ICIMOD was created. Just as the mountains of the earth have lifted the spirits and nourished the aspirations of people throughout the ages, they now point up the threats and enshrine our hopes for the future of the human experience.

Address on the Occasion of the Inauguration of ICIMOD

Dr. Ratna S.J.B. Rana

The Right Honourable Prime Minister, The Honourable Ministers, Your Excellency, the Director-General of UNESCO, Your Excellencies, Dr. Strong, Distinguished Delegates, Ladies, and Gentlemen.

It is, indeed, a great honour and privilege for me to address this distinguished gathering.

The Right Honourable Prime Minister, we are particularly grateful to you for finding time, despite your busy schedule, to be with us for this inauguration. We are also grateful for the International Centre for Integrated Mountain Development (ICIMOD) and address this gathering. I am sure your address will provide us inspiration, practical wisdom, guidance, and support.

Your Excellency, Mr. M'Bow, we are particularly grateful to you for coming all this way, despite your heavy engagements, to be with us for this inauguration. We are also grateful for the inspiration and invaluable guidance which you have provided in your address.

The right Honourable Prime Minister and Your Excellency, Mr. M'Bow, your very presence on this occasion is indicative of the commitment of your institution and of your own to the nurturing and growth of ICIMOD. I am sure all of us here remain indebted to you for this and for the inspiration that we shall derive from the assurance of your interest in the establishment and future growth of this organization.

Please allow me, then, to take this opportunity to also express how grateful we are for the support we have received from His Majesty's Government of Nepal.

As you all know, HMG/N has provided us the host facilities. The fact that HMG/N set up a Preparatory Committee for this inauguration under the Chairmanship of the Honourable State Minister for Education and Culture, whom you heard just a moment ago, indicates the importance the government has attached to this institution.

It may not be out of place here also to record our sincere gratitude to UNESCO, GTZ, and SATA on this occasion. Without the dedication of the concerned officials engaged in these agencies and in HMG/Nepal, the setting up of ICIMOD thus far would never have been possible.

I would like also to place on record our sincere thanks and appreciation to all those individuals and institutions, which are too many to mention here by name, who, in many ways, supported our concern.

May I also take this opportunity to extend a very warm welcome to the visiting Honourable Ministers and the distinguished delegates and individual scientists. I wish to express my sincere thanks to the governments of the region who have honoured us by sending high level delegations to our symposium and inauguration. This action by governments, I hope, indicates their concern and exemplifies the forum of co-operation that ICIMOD can become. It is clear evidence of the future success of our co-operative efforts.

One eminent historian pointed out many years ago that every epoch has its own world view of what is good and what is desirable. If there is such a thing, and I believe there is, it has of

late been epitomized by two key words: development and environment. Development now is such a common word that I hardly need to elaborate it; as for environment, I would rather not attempt to do it. The reason for this should be obvious to you. For we have the privilege to have amongst us as the Keynote Speaker, Dr. Maurice Strong. As you might all know, Dr. Strong was the key person in piloting the UN Conference on Human Environment in Stockholm in 1972. He did the same with regard to UNEP, as well. With all due respect to others in this field, I wonder who else would be a more appropriate speaker than Dr. Strong, himself, who, in a way, has already voiced our concern for environment. It is precisely for this reason that we approached him. We are most grateful to you, Dr. Strong, for accepting our invitation. And I extend to you a warm welcome. I am sure your speech will be as inspiring as always. All of us here are probably getting eager to hear you, as I myself am. So, I shall be brief and limit myself to what I consider is essential.

As for our concern, it is by now already known and voiced. Poverty, increasing population, lack of technology, and development itself have put the supporting capacity of the mountain environment under strain. If we let this situation continue, we are putting ourselves and our children in great peril in the years ahead. Thus, even to preserve what we already have, we will have to work harder now. Moreover, we will have to keep on working and, perhaps, make sacrifices for this cause as long as we live. If we do not, we will be depriving future generations of the very opportunity to do anything about it at all.

Towards this end, the first step is the recognition of the need; a need not only for common concern, but also for working together to tackle the problem which may now look only like an iceberg, floating in the sea obscured by the waves and the morning mist. Let me ask you whether we'll also have the will to steer clear of the danger looming before us before, rather than after the event? Let us not, therefore, forget the need for co-operation, a philosophy that caused ICIMOD to be created in the first place.

The creation of ICIMOD is not something that occurred suddenly. The seed for this Centre actually germinated in Kathmandu eight years ago in a UNESCO MAB meeting held here, but the concept itself had been seeded in the fertile meeting grounds of a group of individuals who were concerned about the future of mountain environment. From then on, the spark has been carried over here by HMG/Nepal, UNESCO, GTZ, and SATA. Today, this park will change into a lamp, giving an official birth to ICIMOD. As we shall witness in a short while the Right Honourable Prime Minister will light a lamp to signal that event. This light, I hope, will ever burn brighter. And many of you present here will join hands and come forward to keep this lamp ever burning.

Today, the seed which was then planted has germinated and taken root. We hope that in due course more roots and branches will be added to it. Given your support and co-operation, and with patience, I am confident that this seedling will blossom and bear fruits in due course.

I hope we can all be gratified that today we are contributing to the official beginning of a process of fundamental importance, a process that creates opportunity for co-operation and participation.

Your Excellencies, distinguished delegates, ladies, and gentlemen, this is an occasion of great importance. It is so, not only because we are witnessing the official birth of an institution, which is important as it is, but we are also engaged in creating a learning machine, to use the expression of one of the speakers in our symposium the other day, to forge a new form of co-operation. A new co-operation, I hope, which will be guided by understanding, respect, and humility to work together to meet the challenge of development and environmental management in our mountain areas.

I think co-operation such as I have proposed should not be difficult if we perceive common interests and similar challenges

to our future prospects arising from the neglect of the past.

There is yet another reason for me to think so. During the past four days of our deliberations and discussions on various issues, one thing that has clearly emerged is optimism for the future; optimism, I would say, not only for what ICIMOD stands for, but also for ICIMOD itself. I would say so because what became manifest during our symposium is a spirit that I reckon as co-operative and participatory. This spirit and understanding, and desire to work together, I am confident, will endure in future.

In closing, I would like to add that your presense on this historic occasion is a source of great encouragement. For us at ICIMOD it is also reassurance that we are engaged in a worthy cause.

Thank you once again for the privilege you have given me.

Vote of Thanks

Dr. N.N. Singh
Secretary, Ministry of Education and Culture, HMG/N

The Inaugural function is a gratifying and rewarding day for all of us. It is, indeed, a day of fulfillment of the cherished wish to host a centre that really cares for the integrated mountain development in the Hindu Kush-Himalaya.

On behalf of the Preparatory Committee for ICIMOD, I have the honour to propose our grateful thanks to the Right Honourable Prime Minister for kindly inaugurating this function and also addressing us.

We are also grateful to the Director-General of UNESCO, Dr. M'Bow, for his kind initiative and consistent support but for which we could not have been able to see this day. His inspiring address has really provided very important guidelines for the functioning of the Centre and his very kind appeal to the international community to come to the aid of this newly established Centre, will, indeed, go a long way in ensuring the successful functioning of this Centre. It is, indeed, because of Dr. M'Bow's major interest in the cause of the Centre that soon after the exhausting and very excruciating proceedings of the General Conference of UNESCO, he has found time to come to Nepal and be in our midst and bless this establishment of the Centre. We are, indeed, very grateful to Your Excellency, Dr. M'Bow, for your consistent support and inspiration to all of us in our preparations for the establishment of this Centre. We are, indeed, very grateful and we will continue to look forward to your consistent guidance and support to this Centre.

We are grateful also for the general support provided by the governments of the Federal Republic of Germany and Switzerland. We are thankful for their interest and their tireless works in the establishment of this Centre. I would like to mention here the great works done by Dr. Ratna S.J.B. Rana, Dr. Lampe, Dr. Hoegger, Dr. Glaser, and Mr. Gueller for their meticulous spadework without which the establishment of this Centre would not have been possible.

I would also like to thank all the governments of the Hindu Kush-Himalayan region who have sent very high delegates to this Inaugural function and we express our deep gratitude for their interest and for their participation in the activities of ICIMOD.

Last, but not least, we would like to put on record our grateful thanks to the delegations of the friendly countries of the region and also to the experts and scientists who have been taking part in the symposium and who have kindly come to attend this Inaugural function.

Ladies and gentlemen, we would also like to thank all those who have directly or indirectly contributed to the making of this day possible. We thank you all, Excellencies, ladies and gentlemen, for responding to our invitations and participating in this Inaugural function and making it a success.

Thank you.

Message on the Occasion of the Inauguration of ICIMOD

Mr. S.A.M.S. Kibria
Executive Secretary, ESCAP

It gives me great pleasure to extend my best wishes and heartfelt congratulations to the International Centre for Integrated Mountain Development on the auspicious occasion of its inaugural ceremony. As much as I would have liked to, I very much regret that I cannot be present with you today owing to unavoidable prior commitments.*

It is only very fitting and timely that an international centre like ICIMOD has been established, with the primary objective of promoting economically and environmentally sound development in the Hindu Kush-Himalayas, thereby improving the welfare of the people of the sub-region. I have noted with great interest that the major functions of the Centre are documentation and information dissemination, training, and applied research in the context of integrated mountain development. These tasks are especially urgent considering that the sub-region is still in its early stages of development.

It is gratifying to note that in pursuing its major objective of promoting integrated mountain development, the Centre will be adopting an interdisciplinary approach and that, at the same time, the importance of a balanced approach in integrating environmental measures and resource development activities is to be stressed and practiced.

We, in ESCAP, have, for the better part of some four decades of our existence, been devoting our best efforts to assist the developing countries of our region in the rational development and environmentally sound management of natural resources. We, therefore, greatly welcome the establishment of ICIMOD to supplement further the effectiveness of the national, bilateral, and international efforts in developing this vast and underdeveloped sub-region.

I should very much like to compliment the host nation, the Kingdom of Nepal, the supporting countries, the Federal Republic of Germany and Switzerland, and the United Nations Educational, Scientific, and Cultural Organization for having acted as the founding sponsors of ICIMOD. I am confident that all the developing countries contained in the sub-region will earnestly participate in the activities of ICIMOD; endeavouring towards the common goal of development of the sub-region.

I should like to wish the Centre success in its undertakings and to assure you that we at ESCAP stand ready to co-operate with and assist the Centre in its development activities.

* Mr. Kibria's message was delivered at the Inauguration in absentia

Country Statement—Afghanistan

Hadi Abawi

We in Afghanistan very much appreciate the position of the Government of Nepal regarding the problems of mountainous, landlocked developing countries. Only this year, the Democratic Republic of Afghanistan was among the first countries to support a motion moved by Nepal during the 39th session of ESCAP on difficulties of rural economies and management of water resources in mountain areas, and the utilization of the natural potential for development in the long term sustainability of resources as the main target. The same understanding exists within UNGA and other international organizations and agencies.

As you are aware, Afghanistan's mountains, especially the Hindu Kush, control the economy of the country. It is the source of hydro-power, irrigation water, timber, minerals, and range land. About 60 per cent of the country's population lives in the mountainous areas. Traditional use of trees and shrubs meets over 50 per cent of domestic requirements of energy, which leads to deforestation.

Thus, the importance of the integrated development of the mountains in Afghanistan is obvious.

Stability of the Hindu Kush is of vital importance to us for conservation of soil and control of sedimentation in water storage facilities. It is equally important from the point of view of generation of hydro-power, irrigation supplies, and timber and fruit resources.

Therefore, the concept of integrated mountain development is fully supported, and we feel that development of mountain resources, including forest management, is of vital importance. We have identified a number of projects which are technically sound and economically viable, some of which have since been appraised and accepted by some international organizations. Unfortunately, there seem to be other factors which have, perhaps, made these organizations change their neutral and purely technical approach. We believe that in this task, combined efforts of the regional countries and international assistance can be more fruitful.

My delegation, as a delegation from a mountainous, landlocked developing country, therefore, expresses its satisfaction over

the establishment of the International Centre for Integrated Mountain Development. The establishment of this Centre will serve as a motive for further co-operation and common actions. The Centre should promote economically and environmentally sound development in this region and should improve the well-being of the local population. The Centre should be a focal point for multi-disciplinary documentation, training, and applied research, as well as a consultative service for resource management and development activities.

In general, we would like to support this idea to internationalize the activities of the Centre, but, at the same time, would like to draw your attention to the existing conditions and realities in our region of the Hindu Kush-Himalayas, which belongs to the land-locked and least developed countries. Therefore, we strongly ask for concentration of activities of the Centre on the problems of the Hindu Kush-Himalayan region. Priority should be given to integrated mountain development in this region. We also call for bilateral co-operation between the countries of the region to bring about all-round development and promotion of conditions of life for our people.

Allow me to take this convenient opportunity to draw the attention of this meeting to the crucial economic situation of the least developed, land-locked countries, among them the mountainous countries of this region, which are facing the most serious socio-economic difficulties and profound structural problems.

We do emphasize and reaffirm the imperative need for urgent and effective implementation of all resolutions and decisions taken by various international organizations. We appeal to all countries and international organizations to take immediate, concrete, and adequate measures and ensure sufficient resources for combating this problem.

In concluding, I cannot but express my gratitude to the sponsors of the Centre, namely His Majesty's Government of Nepal, the Federal Republic of Germany, Switzerland, and UNESCO. My gratitude goes equally to Dr. S.J.B. Rana, Vice Chancellor, Royal Nepal Academy of Science and Technology, and Mr. Gueller, the Regent, for their successful efforts.

Country Statement—Bangladesh

Faridul Islam

It is an immense pleasure for me to be able to speak on this inaugural session of ICIMOD, which is taking place in the excellent hill country of Nepal, known for its natural beauty and scenery.

At long last, crossing many hurdles, ICIMOD has come into being. Location-wise, the site has been ideally suited to the needs and orientation, and I am personally very happy to see that it is appropriately located in Nepal. I hope that ICIMOD shall be able to function in line with the stated objectives. As a necessary condition for this, I think there should be a clear

understanding and a sense of co-operation and gesture of good will among the member countries for common welfare.

I am impressed by the excellent hospitality His Majesty's Government of Nepal and the people of Nepal have shown to us during our stay here. I am also thankful to the sponsors, the Royal Nepal Academy, the volunteers, and the distinguished audience for the co-operation they have extended to us in making the symposium a success.

Thanking you very much.

Country Statement—Bhutan

D.C. Dorji

It is with a sense of great happiness that we attend this meeting of ICIMOD for the first time. We attach great importance to the emergence of ICIMOD as the first ever co-operative endeavour of the Himalayan countries of South Asia. We fully support all programmes and activities of ICIMOD.

It is now generally recognised that the preservation of our environment is an integral part of development. Any development project or programme that we may formulate must include effective measures for the conservation and rational management of the environment in order to improve the quality of life and safeguard the interests of future generations.

Many national programmes for the care and management of the environment have been undertaken. The population explosion, deforestation, depletion of natural resources, soil erosion, and air, water, and other pollution have adversely affected our physical environment, and, thereby, threatened the lives of 50 million people living in our region. To combat these challenges, our national efforts in the past alone have not proved adequate.

The problems of environment faced by the countries in our region are not confined to national boundaries. In fact, in no other sphere is the interdependence of the countries of this region more evident than in that of environment. There are many potential areas in which fruitful, co-operative environmental programmes can be undertaken to supplement our national efforts. Our collective efforts will be an important factor for enhancing regional capability to face environmental challenges. In this, ICIMOD can play an important role.

For us in Bhutan, fortunately, the problems of environment do not pose any serious threat at present. Abundance of natural resources, small population, and other favourable factors have helped to preserve our environment. We are fully aware, however, that negligence and defective planning in the process

of modernizing our country may create serious environmental problems in the future. We seek to achieve harmonization of environment with development through careful planning and judicious use of nature's bounty. In this endeavour we seek the co-operation of other countries of our region.

It is gratifying to note that the workshop organized to discuss activities and future plans for implementation has concluded with meaningful results. I congratulate the Chairman, the Regent of ICIMOD, and the delegates of the workshop for the commendable job they have done.

The Kingdom of Bhutan shall make special efforts and extend all possible co-operation to the countries of our region in the process of realizing the objectives and aspirations set forth by ICIMOD for the welfare of our hill people.

In conclusion, I would like to state that the success of our programme shall mainly depend on the proper design of a strategy.

I strongly feel that such strategy should involve maximum participation of the people, as these programmes are intended for the people and should be implemented by the people, under technical guidance from the executing agencies and governments.

Perhaps this newly born Centre will take some time to establish itself. With the zeal and dedication with which the Centre has initiated its activities, however, we should expect the following in the near future.

- collection and dissemination of useful data to the member countries on a regular basis;
- transfer of technology, especially on alternative energy sources—solar, wind, and mini and micro-hydels; and
- strengthening of the government departments concerned, through training support.

Country Statement—Burma

Kyaw Htain

Mr. Chairman, Excellencies, Ladies and Gentlemen,

On behalf of the Burmese delegation, I would like to first tender our thanks for inviting us to attend the Symposium and Inauguration Ceremony of ICIMOD. The Burmese delegation also wishes to convey their deep appreciation for the excellent arrangement proffered and warm hospitality being extended by the Government and people of Nepal.

The current Symposium and Inauguration Conference is the first of its kind in this region. During the past few days the Symposium has dealt with the integrated approach to mountain development towards AD 2000. It has also included discussion on the formulation of the Southern mountain ecosystem and considerable emphasis has been placed on improvement of the living standard of the mountain population of the Himalayan region.

Of importance too positively was the site, objectives and functions of ICIMOD. Similarly the numerous papers presented were highly interesting and informative. The combined effort, we are sure, will contribute greatly to this region.

Mr. Chairman, the Socialist Union of Burma is an Asian country, as such the economic development of the country is highly dependent on agriculture and its produce. Burma has been endowed with an abundance of natural forests. The area of forests approximates 96 million acres and constitute 57% of the country.

It has contributed immensely towards the country's economy where the forest produce presented 24% of our country's foreign export earning during 1982/83. Apart from such economic importance their impact on the ecology, environment and climatic conditions also is, by no means, small.

As inevitably most of these forests are confined to the mountainous region of Northern Burma and the range traversing the eastern, western and central sector of Burma, the improvement of living conditions of these mountainous region is therefore of high significance to the country.

Mr. Chairman, in our development efforts, we are carrying out the programme in which the mountainous region has received equal attention. The national finance of the country has been proportionally allocated for their development and have been increased yearly.

In an approach toward all-round development, attention has been focussed on agriculture, livestock, farming, reforestation and the principal appropriate industries. The scope and assistance to health and education have also been expanded. More roads have been constructed while postal and other communication have been enhanced.

Mr. Chairman, in the development of this region one of our national objectives has been the attainment of self-sufficiency in food. Efforts are being made to replace the traditional type of paddy with the regionally appropriate and high yielding varieties. The cultivation of fruits, vegetables, and garden crops is being attuned to modern scientific techniques. At the same time, our Agricultural Research Institute has assisted in a variety of research in other practices. In addition, fertilizers, pesticides, and sprayers have been made available on an increasing basis. Consequently, these measures have generated a remarkable improvement in mountain agriculture.

Efforts for the adoption of permanent terrace cultivation in lieu of shifting cultivation has also been undertaken. Evidently, these measures have been one of the attributes for improved agriculture. Therefore, our government has annually increased investment towards these. The benefits have been tangible and helped toward a wider acceptance in the participation of the people of these areas.

Mr. Chairman, I had earlier mentioned the role of the forestry in our national economy. I had also recounted their economic importance to the mountainous regions. My government has been extending all efforts for the protection and conservation of the forests in the mountainous regions of Kayah, Karen, Kachin, and Shan states. The approach adopted has been:

1. Systematic protection and conservation of the hills, existing national forests; and
2. Reforestation of the denuded areas.

The inhabitants of these mountainous regions meet their needs for timber and fuel from these forests. Besides, the multitude of villagers in these regions depend on water from the springs and streams generated from these forests. The livelihood and sustenance of the people of this region are highly dependent on the permanency of these forests. They have, thus, under the guidance of pertinent bureau concerned fully cooperated in the protection of these forest areas and their watersheds.

Mr. Chairman, reforestation and afforestation is being undertaken with the following four objectives:

1. The extraction of commercial supply forests using valuable tree species, such as Teak, Pengru, Betau for domestic use and exports.
2. The extraction of local supply forests, using fast growing species for the supply of house posts, fencing, fuel, and charcoal.
3. The extraction of industrial supply forests, using fast growing soft wood for utilization in paper and match factories.
4. The extraction of protection of forests using climatically suitable species for the protection of watersheds, prevention of erosion, and maintenance of watersheds, that supply reservoirs and dams.

We wish to inform that in addition to the 1 million acres we have planted during the past 4-Year Plan, 3 million acres more are to be planted during the current 4-Year Plan.

Mr. Chairman, our major problems in the mountainous region have been extensive soil erosion and soil depletion which have been taking place over a considerable number of years. The Forest Department has accordingly been undertaking the following measures:

1. Areas extensively damaged by gully erosion, are being patched;
2. Barren hilltops are being reforested with the fast growing species; and
3. The reforestation of forest cover on hilltops and terrace cultivation along the slopes have been established for educational purposes.

Mr. Chairman, in the foregoing summarization, I have

attempted to portray the efforts being undertaken for overall development, forest protection, water management, and assurance of favourable climatic conditions. These measures are being implemented under the special plan with fixed targets. The plans in Shan and Karen states are being carried out with assignment of science graduates in agriculture and forestry. The active participation of local populace, however, is extremely important. Here the pertinent bureau concerned and peasant organizations have rendered leadership, support, and encouragement and helped them achieve success in their endeavours.

Mr. Chairman, the problems and concepts of integrated mountain development are very numerous and complex. Con-

certed efforts, both at the national and international levels, will be required to meet these challenges.

We are here today for the inauguration of an International Centre for the Integrated Mountain Development. The sponsors of this Centre, the Government of Switzerland, the Government of the Federal Republic of Germany, UNESCO and the host country, the Kingdom of Nepal, deserve high credit for their dedication to this purpose.

We sincerely hope that this Centre will serve as a model for this region and contribute immeasurably towards the concept of mountain development. We wish it all success.

Thank you.

Country Statement—China

Qin Lisheng

At the invitation of His Majesty's Government of Nepal and the International Centre for Integrated Mountain Development, the Chinese Delegation is very pleased to be able to attend the inauguration of this Centre today. Now, allow me, on behalf of the Chinese Government, to extend our heartfelt congratulations on this happy occasion and to express our sincere appreciation for your kind invitation and the hospitalities afforded to my delegation.

The International Centre for Integrated Mountain Development is an international mountain research institution of a scientific nature, established with the initiative and active participation of the United Nations Educational, Scientific, and Cultural Organization and active support and financial assistance of the Federal Republic of Germany, Switzerland, and His Majesty's Government of Nepal. The Centre is planned to be a focal point for multi-disciplinary documentation, training, and applied research, as well as a consultative service for resource management and development activities, as stated in the Draft Work Programme. We are convinced that the Centre will play an important role, particularly in the Hindu Kush-Himalayan region, in disseminating scientific information, promoting training and exchange, strengthening applied research, and providing advisory services in connection with mountain development.

Environment protection and natural resource management is one of the most pressing problems of our times and has arrested the attention of all nations. The problems of the Hindu Kush-Himalayan region are as serious as those existing in the Alps and Andes regions. The establishment of this Centre, which aims at stabilizing environments, promoting the national economies of the countries, and improving the living standards of the mountain people, conforms to the objectives of the International MAB Programme and the general wish of the peoples of various countries. The People's Republic of China,

like many other countries in the region, is a developing country, a considerable part of which is mountains. She shares the same problems as other countries in the region. Mountain development in our country also calls for a multi-disciplinary and integrated approach to these problems. For this reason, my country supports the setting up of this Centre and wishes the Centre success in achieving its goal of contribution to promoting the economy of the mountainous region.

As I have just mentioned, China is a country many parts of which are mountainous. Mountain development is an important link in the whole chain of China's national construction. Therefore, the Chinese Government has now, as always, attached great importance to integrated mountain research and development. With the aim of conserving nature and developing mountainous areas in a comprehensive manner, combined efforts have been made by multi-disciplinary scientific expeditions to the Himalayas and Mount Qomolangma in Tibet; Tianshan Mountains and To Mur Peak in Xingjiang; Taihan Mountains in North China; and Wiyi Mountain in Fujian Province. The same activities are also going on in the Hengduan Mountains. As a result of these scientific surveys, a great amount of valuable data has been collected, providing the scientific basis for the country's long-term planning of integrated development of agriculture, forestry, animal husbandry, and other occupations in these mountainous regions.

The establishment of the International Centre for Integrated Mountain Development is, indeed, a great event for the peoples of various countries in the region. We are willing to co-operate with the countries concerned in the smooth operation of the Centre to ensure that the Centre will contribute, both in theory and practice, to integrated mountain development internationally, in general, and regionally, in particular.

Thank you.

Country Statement—India

N.N. Jha

In this entire region of the Himalayas, we, as one of the countries directly benefiting from them, are deeply conscious of the thousands and thousands of years of history and tradition that have bound us, the peoples of the Himalayas, to the Himalayas themselves. When I use the term, "peoples of the Himalayas", I use it in a very liberal sense, that is to say, to cover categories of persons living both within them and immediately below them.

The Himalayas have shaped the thinking, and almost everything else, of a very large sector of the northern part of the Indian subcontinent, involving millions upon millions of people. It is, perhaps, only appropriate that the Himalayas, despite the occasional fury unleashed by them, have carefully nurtured and sustained us and conferred immense benefits on the peoples of the area—even more than they may be aware. The Himalayas have given them the life-sustaining waters which have enabled them to give full vent to their creative genius and give rise to several different civilizations. It is, therefore, appropriate that sometime at this point of time in this vast span of timelessness, one should pause and, in one's own humble way, return with gratitude something to the Himalayas. In this case, it is obviously a question of managing, preserving, and renewing their ecosystems.

India is rather uniquely situated, vis-a-vis the Himalayas, because we have, first of all, territorial jurisdiction over a very large proportion of them. We are, at the same time, directly affected—in that region which we control, as well as other regions below other Himalayan countries—by any imbalance or deterioration in the environmental ecology of the Himalayas.

We, in India, therefore, together with the other Himalayan countries, have a very special responsibility for preserving and renewing their ecosystem.

We are always grateful for the assistance that other countries may be able to render towards this noble and very laudable objective. It must be borne in mind, however, that the functioning or the success of the Centre—the functioning of which will be watched with great interest—will really depend on the outcome of a meeting of minds. This meeting of minds, apart from the work the Centre may carry out in the future, will have to be conditioned by governmental action in the areas concerned. We must not, at any time, arrogate to ourselves—that is to say, those who are working in the Centre or those who will work even indirectly with it from time to time—the role of arbiters or the decision-makers for the entire Himalayan area.

It is first and foremost the Himalayan countries which have the responsibility and, while any external input that may come to it is always welcome, the primary responsibility will always lie upon them, which includes the important decisions that may be taken in the future regarding the renewal and preservation of the Himalayan ecosystems.

We certainly welcome the assistance of other countries from other similarly affected areas, but there is a difference between high population area models and low population area models. The two have some relevance for each other but are not identical. It is in that context that it is a question of supplementing local or indigenous efforts, not supplanting them. This is a very important distinction which, for the successful future working of the Centre, one must bear in mind.

Earlier, Dr. Maurice Strong, in his excellent statement, likened the Centre, its foundation, and its inauguration today, to that of a newly born child which has to be very carefully nursed and nurtured and looked after until it grows into adulthood. We must keep in mind the fact that the newly born child has to be nurtured by his parents, or, at the most, by very close relatives, not by the neighbour next door. This is a very important consideration which, I think, we shall have to follow as the rule of thumb in this case also.

Over the last four days, we have been working out the work programme, among other things, for the future functioning of the Centre. It is, indeed, an interesting work programme, but I would like to suggest that before it is formally considered as officially a part of the documentation of the Centre for future implementation, it might be a useful idea to give it a very extensive airing and individual hearing in the eight countries concerned. I am sure that when the document prepared in the last four days goes before experts and others in various international seminars, a great many new ideas—ideas which could even supplement the programme already adopted—would arise. They would be of considerable assistance to the future functioning of the Centre. Therefore, one should not be in a tremendous hurry just to go ahead and implement something merely because it has been discussed in these four days here in Kathmandu, however laudable and worthy the individual contributions may have been to it.

We are aware, for example, that in the Himalayan areas the greatest nuisance, or the greatest danger to ecology, has been deforestation. This is something that the Centre, and, even more, the governments of the member nations will have to concentrate upon much more in the years to come. For example, deforestation has been caused, as we all know, by lack of fuel for cooking and heating purposes. It is here, just to cite an example, that the bio-gas examples could be very relevant. We have about 500,000 such plants operating in India, and, perhaps, it is just this kind of sharing of experiences among ourselves that could initially set the ball rolling in a happy direction.

With these words, may I thank you once again and once again convey my warm appreciation to the Government and people of Nepal for their very kind hospitality.

Thank you.

Country Statement—Pakistan

Hasan Nawab

At the end of this symposium, which coincides with the end of autumn in Nepal, the season of "mellow fruitfulness", we see the rawness of our ideas about ICIMOD ripen into a burgeoning programme of action.

While embarking on this programme on the basis of a truly felt need, let us, here and now, clear our ecological philosophy of all obscurities. As I see it, heredity and environment are the two ultimate categories of the phenomenon called Life. Of these, environment is our immediate concern. It has both clearly discernible parameters and imponderables that defy analysis. It is one of those things that is to be treated as a whole. It intimately affects the totality of living organisms within its ambit, its flora and fauna, the plant and the animal, including man. By constant interaction with it, the living organisms attain an equilibrium, a balance that is delicate and precarious in the extreme, even in the case of a gigantic mountain, like the fragile heart beating in the body of a rugged human being. Erosion of the topsoil constitutes the heart-break of the giant called the mountain.

Culture, to me, is the ultimate product of environment in the long chain of cause and effect. A dynamic culture is only a movement of the human ecosystem in time. It is the accumulated overlayings of ages on that basic foundation. But it is the prerogative of man only. Other living organisms, the plants and the animals, live and have their being at different environmental levels other than the cultural level. Environment is an ecosystem in general. Cultural is a particular, human ecosystem. It is a

value system that applies only to a human society and not to an animal herd.

I would, therefore, like to see all the phenomena of environment in the light of culture, its end product. Paradoxically enough, we know more about cultures or value systems than about ecosystems in general. In ICIMOD we will have to use our cultural insights in the generalized study of ecosystems of mountains.

Both systems have common features. Culture is earth rooted. So is an ecosystem. Both have a delicate balance and are always precariously poised on the brink of irreversible disruption. Societies suffer anguish when thrown into a changed culture; so do herds of cattle and yaks when their environment is changed; so do the groves of trees and plantations when their ecosystem is disturbed by logging or landslide.

For ICIMOD, the watchword will have to be a multi-disciplinary approach to all problems of mountains instead of a mono-disciplinary methodology. Forestry is not the only subject relevant in the management of forests; there is the biology of forests, the economics of forests, the history of forests, the sociology of forests, and their people. A total tackling of problems will alone make ICIMOD a viable institution in future. We hope that the overall guidelines which will be provided from time to time to ICIMOD by its international Board of Governors will steer it clear of the otherwise usual course of lopsidedness and routine.

Sponsor Statement

Dr. P. Weinard

Counsellor, Embassy of the Federal Republic of Germany, Kathmandu

I have the honour and privilege, on behalf of the Government of the Federal Republic of Germany, to congratulate His Majesty's Government of Nepal and to simultaneously express our sincere thanks to all the governments of the region, the international organizations, and the individuals who have helped during recent years in establishing what we call ICIMOD today.

The new acronym stands for an idea and a philosophy which has been neglected during the last several decades in which macro-technology and industrialization have dominated our globe, a period when man has started to behave as the master and manipulator of his environment instead of recognizing that he is a part of it. The results are apparent everywhere. Most of the decision-making parts of our global society are heavily influenced by an urban oriented leadership. Under such circumstances, it is not easy to find support for neglected areas such as the mountain ecosystems of the world.

The history of man is everywhere the history of misuse of natural resources. The present Mediterranean ecosystem is but one obvious example of the consequences of human misuse in the past.

But there is no need to go back to the Greeks and the Romans. In a time when mankind feels more and more unsafe under the deterrent atomic umbrellas, the basis for our life is endangered more seriously by our misuse and destruction of natural resources. But the conflict between technological progress and the destruction of the ecosystems is old.

In my home country, for example, development and environmental protection were in conflict many times. The first railway construction in 1835 was linked with the first public protest movement of people concerned with environmental protection.

Only 150 years later we are confronted with what will be called the most radical change in our ecosystem. Industrial pollution and the acid rain phenomena, with their implications, is linking the European fate with that of the Hindu Kush-Himalaya region. The reasons for the growing fragility of our ecosystems are different. The effect is finally the same. And here is exactly where ICIMOD has to find its role. And here is simultaneously the justification for an international approach.

Throughout the symposium, nearly every speaker has stressed the need for a catchment area or a natural boundary approach.

These boundaries are different from the man-made political ones, perhaps the first step towards destruction. ICIMOD's primary task is to transcend political boundaries and contribute to the economically, as well as ecologically, sound development of mountain systems, so that a rapidly growing human population can live in dignity and peace.

The international status of the Centre will ensure that success and failure in rural development of hill regions in others parts of the world will be shared with the primary mandate of ICIMOD.

Simultaneously, we hope that from the roof of the world, under which ICIMOD has found its place, messages will go out which may encourage and help others to safeguard their mountains and hills in Africa, Latin America, or Europe with the understanding that the hill and mountain regions of this globe provide the resource upon which nearly half of the world's population is dependent.

This is the very basic reason for the involvement of the Federal Republic of Germany in creating ICIMOD. There have been, as you know, several changes in our government following elections during recent years, but it is necessary to state that there was never a change in the understanding that international co-operation should concentrate predominantly on the development of rural areas and the protection of natural resources and ecosystems, altogether linked with the basic aim to contribute to employment and better employment distribution.

We hope to share the obligation of supporting ICIMOD in the near future with other countries and organizations within and outside the region. On the basis of national independence, unquestioned equal rights, scientific objectivity, professionalism, and dynamic leadership, ICIMOD will serve in the Hindu Kush-Himalaya area as a big learning machine, a place of sharing experiences, and a creative starting point for new ideas for an ecosystem approach that will allow mankind to live in the mountains as an area of great beauty, as well as a cradle of human creativity, not only beyond the year 2000 but for the centuries to come.

In all modesty, my home country and its citizens, through the Government of the Federal Republic of Germany, will try to contribute to that as best as we can.

Statement

His Excellency Peter S. Erni Ambassador of Switzerland

Mr. Chairman, Excellencies, Ladies and Gentlemen,

Let me say what a great privilege this is to be able to bring to you the wishes and the greetings of the Swiss Federal Council and the people of Switzerland. The President of the Swiss Confederation, Pierre Aubert, whom you have invited in his capacity as Foreign Minister, has asked me to express his regrets for not being able to enjoy the immense pleasure of a journey to beautiful Nepal and, in particular, to Kathmandu, and he sends you warmfelt congratulations for the inauguration of ICIMOD.

We Swiss feel very happy that a long association with the Himalayas has created a strong friendship with each of its communities. These close links will certainly surprise nobody. Mountain people have special relations. They know well what is behind their tanned faces, their rugged fingers, and their slow steps. They know all about the hard struggle for their well-being and the spiritual satisfaction of reaching the highest peaks. It is therefore only natural that Switzerland felt honoured to be called upon to participate in this multi-national developing scheme for the improvement of living conditions and the environment in the magnificent world of the Himalayas.

The basis of this Swiss co-operation is, in fact, a very simple law which has been accepted by the Swiss people about 10 years ago, called the Development Co-operation Law.

It stipulates that the assistance provided by public funds must profit the neediest—the grassroots. No doubt that ICIMOD aims primarily at decent living conditions of a group of people who have, one might say, a much steeper approach to prosperity than those in the fertile plains and lands.

We Swiss appreciate in ICIMOD particularly the goal of the integrated global mountain development. Our present economic achievement with one of the highest GNP per capita is the result of centuries of hard labour and of a harmonious co-existence among the several valley communities with different languages

and cultures. The historians will agree when I say that the need to help each other, the solidarity among the valley communities leads to a compact, socio-economic structure with all its advantages and influences in favour of the integration of private and public initiatives as well as its influence on civic behaviour.

We heard from Dr. Strong today, and yesterday from Prof. Rosser, that when there is need for co-operation of this kind we must mobilize the intellectual talents, all available intellectual knowledge, to assure the success of an organization like ICIMOD. Prof. Rosser added rightly that there is a huge potential of this intellectual talent in this very region. We can certainly agree, this is the most important point of your co-operation. This Swiss Law, which I mentioned just a while ago, states in this respect that the benefits of development co-operation must promote self-reliance and that is what we have in mind when we co-operate in ICIMOD.

A harmonious development, of course, is the function of a balanced integration of all factors involved, across the borders as well as across non-relevant reservations of minds. And we from neutral Switzerland hope sincerely that the non-political multi-national approach to improve the economic stability with all the forces concerned might further contribute to the mutual confidence in this region and in the world.

At this point, I would like to thank very much His Majesty's Government of Nepal for the warm hospitality extended to the Swiss in general and to us in particular. We are enjoying it very much and, I am sure, that this is only a token for what you are going and to provide for the infrastructure of ICIMOD in the seat agreement and I am sure this warm hospitality will be instrumental for success of this endeavour. Be assured, Mr. Chairman, Ladies and Gentlemen, of the sympathy of Switzerland for this organization and for all of us.

Thank you very much.



Inauguration of ICIMOD, the Rt. Hon. Prime Minister of Nepal Sri Lokendra Bahadur Chand.



The Hon. Fatteh Singh Tharu, Minister of Education, welcoming Director-General of UNESCO, His Excellency Dr. Amadou—Mahtar M'Bow.



The Rt. Hon. Prime Minister of Nepal and H.E. Dr. M' Bow after Inauguration.



Dr. Rama S.J.B. Rana, Chairman, and Dr. Maurice Strong at the Inaugural tree planting ceremony.

PART III SPECIAL EVENTS

Children's Painting Exhibition ICIMOD Symposium and Inauguration

C.B.S. Kansakar, ICIMOD & G.L. Pradhan, CTSDC

On the occasion of its First International Symposium and Inauguration, the International Centre for Integrated Mountain Development in co-operation with His Majesty's Government of Nepal, Ministry of Education, and the Curriculum, Textbook, and Supervision Development Centre (CTSDC), presented an exhibition of paintings by school children based on the theme, "Man and His Environment." The exhibition featured one hundred paintings submitted by children between the ages of eleven and seventeen from lower-secondary and secondary schools of eight districts in the Central Region of Nepal.

Using a variety of media—coloured pens and pencils, water colours, charcoal and showing a wide range of skills from very simple to quite sophisticated, these children eloquently expressed their perceptions of the environments in which they lived, played, and worked every day. If some paintings spoke of the joys of man living in an idealized harmony with nature, then others spoke of the sorrows and misfortunes that can happen when man falls out of harmony with nature.

The Children's Painting Exhibition was the surprise "hit" of the entire ICIMOD conference. The organizers knew that these illustrations would draw interest when they saw the quality of the contributions. What was gratifying was the pleased reaction and intense interest of the Symposium and Inauguration participants from around the Hindu Kush-Himalaya region and the world when they had the opportunity to view the children's works. People returned many times to look once again and would remark often over the imagery and perceptions of these young artist/observers. Strong interest was expressed in finding ways to preserve and reproduce many of these illustrations.

The Exhibition began as an idea of the Interim Committee of ICIMOD in March 1983 as a way of highlighting the relationship of man and his environment, one of the themes of the Symposium and Inauguration. In July of 1983, ICIMOD Committee members and officials of the Ministry of Education and the CTSDC met with the District Education officers of the eight districts to agree on the organizational details of a competition leading to the Exhibition.

Slide shows focussing on environmental problems were organized in all eight districts through the Watershed Management and Sanitation Department to familiarize the students to the contest theme. The movie, *Fragile Mountain*, was also shown.

ICIMOD and CTSDC representatives visited the districts to help explain the details of the competition and to supply drawing paper, coloured pencils, water-colours, and other art supplies.

Each school requested to select the best five paintings or drawings produced by their student artists and submit them to CTSDC by mid-September. The schools were informed that the best paintings would be selected by a jury of ICIMOD and HMG officials and professional artists to exhibit at the ICIMOD conference. The top fifteen child artists would each receive special prizes of medals and certificates to reward their efforts. In addition, the fifteen winners would receive an invitation and

expense-paid transportation to attend the opening of the Exhibition and to receive their prizes in an awards ceremony on the evening of December 2 at the Nepal Royal Academy of Science and Technology.

The competition generated a great deal of interest and in all, 244 paintings were submitted, of which 100 were selected for the exhibition.

The ICIMOD Children's Painting Exhibition added significantly to the success of the Centre's First International Symposium and Inauguration. ICIMOD reproduced one of the paintings as a postcard and is exploring ways to have a 1985 calendar made. In the meantime, the fifteen prize winners were framed and placed on permanent display at ICIMOD headquarters in Kathmandu.

A DRAMATIC PRESENTATION ON INTEGRATED MOUNTAIN DEVELOPMENT

On the second day of the Symposium, in a unique departure from the more customary practice of giving papers or lectures, Dr. Rudolf Hoegger, Vice Director of the Swiss Directorate of Development Cooperation and Humanitarian Aid and Board Member of ICIMOD, presented a live dramatic performance dealing with the concept of integrated mountain development, its necessity, possibilities and its many constraints.

The idea of using a play was born earlier in 1983 as result of conversations between Dr. Hoegger and his colleagues and staff of the Swiss Association for Technical Assistance (SATA). The Interim Committee of ICIMOD had asked SATA and the Swiss to prepare a paper based on their twenty-five years of experience in mountain development in Nepal. Dr. Hoegger and his colleagues decided that they could most effectively express their ideas and concerns through a drama.

The group defined the key problems of integrated mountain development—and the subject for the proposed play—as lying not in the planning, technical, or academic fields, but among the affected people and groups themselves and their institutions.

Improved communications between all parties is of the highest necessity if the whole society is to work together in solving ecological problems. The deep gulf separating the donor and recipient, officers and farmers, national authorities and local agents, men and women, and low and high castes is characteristic of a fundamental breakdown of communication.

A priority in mountain development is to improve the flow of communication and decision-making. In many cases, this means reversing the usual flow and devising better ways to listen more to what farmers are saying and less to outside or foreign wisdom.

It was agreed that for effective presentation, the drama should demonstrate communication between various groups through a sequence of scenes beginning with a village setting. In addition, an introduction and a running commentary should be presented by a commentator.

The sponsors of the play felt that theatre groups and other organizations in Nepal should be given the opportunity to design

and perform a play dramatizing these ideas. An open competition was announced in *The Rising Nepal* inviting interested groups to submit entries.

Five plays were submitted and SATA appointed a jury to judge the entries. Mr. V.B. Malla, a leading dramatic authority and member secretary of the Nepal Royal Academy, looked at the dramatic organization and qualities; Mrs. G. Rana, a well-known writer, examined the effective use of language; and Dr. K K. Panday, an agricultural engineer and rural development specialist, judges the plays on development content and message.

The panel selected two plays for trial performances and the one entitled, *The Chandragiri Hills*, written by Steve Tamang, was finally selected.

The play was presented at the Symposium by Dr. Hoegger. The message of the play is a story of poverty, over-population, competition for alternative employment as the forest is lost as a safety valve or emergency resource in times of need, ignorance, underdevelopment, exploitation by the powerful, and man's shortsightedness and indifference towards his fellow man and the natural environment in which they all live.

The following is a summary of the main points and action of the play.

The Chandragiri Hills

Setting

It is the twilight hours in Chandragiri village. The villagers, bone weary from their day's hard work in the fields or the forest, are returning home. Many of the village people are gathered around the village tea stalls. These tea stalls serve as an excellent fora for the villagers to come and share their ideas and exchange information. Woodcutters and charcoal burners, together with women carrying loads of grass and dry twigs, come down to the tea shops and rest for a while before retiring to their huts for the evening meals.

The Village Life

In one such tea stall, a worried looking woodcutter greets the rest of his colleagues and enquires whether the rest of them have heard about the latest announcement on the radio about the Chandragiri Hills being chosen as a protected forest in order to facilitate an integrated watershed management project. On hearing this news the rest of the villagers are eager to hear more about it. Urged to carry on about the latest development this confused and angry woodcutter elaborates more on the radio announcement, made all the more lively by his limited perception and his arguments against such a project.

The idea of a receding forest, the extinction of flora and fauna, the loss of soil cover, the drying up of water sources, the frequent landslides, and the inter-relationship of all these phenomena to the felling of trees is beyond the grasp and imagination of the poor villagers. Many of them suspect trickery by development workers and "change agents". To these poor villagers, whose main preoccupation is to earn enough money to feed themselves and their families by selling wood or charcoal in the bazaar or digging stones in the quarries for the contractors, it appears for certain that this project and such others will "snatch the last bit of bread from their mouths."

The Villager's Plight

If the villagers think that any measures to protect the forest from encroachment and pilferage is an act of hostility against

them, then they are not too far wrong! To the villagers the forest is the last resort to which they can go for help. A family in a tight financial situation goes to the forest, takes the wood, and sells it in the bazaar for its survival. The farmer uses the forest for his fuelwood, for fodder and forage, to graze his animals, to collect roots and berries and tubers for his family's sustenance, and gathers dried leaves for manuring and for his animal stalls.

Being so dependent on the forest, having little or no land, and without other skills or training for alternative or off-farm employment, what else can these mountain dwellers do? They are living the same isolated lives shaped by the sheer magnitude of the mountains and high hills, as did their forebears a thousand years ago. The only exception being perhaps the occasional drone of the jet-planes overhead, heralding an era of space age technology. But they are indifferent to such symbols of modernity. They have learned through experience that such modern inputs as electricity, safe water, high yielding seeds, and fertilizers arrive too infrequently. Little wonder that they are so immune to new ideas, innovations, or change. It is this crisis in confidence that is the challenge of mountain development.

The Village Ruling Order

The village ruling order is always present to counsel and advise the simple villagers on the dangers that accompany development. These village elites often have their own vested interests in the timber and construction sectors and try to prevent any development works designed to uplift the living conditions of the masses. Education, awareness, economic, and social development of the simple villagers will destabilize the prevailing power structure in the village. This is too real a threat to be ignored by the village elites. Mountain development will always have to reckon with such forces when implementing programmes.

The Government

The government and its administrative bureaucracy is generally concentrated in the capitals, or big cities and towns. Its extension arms and field activities are severely constricted because of limited skills, lack of technical and managerial personnel, or the motivation and incentives that are required for individuals to work in remote and hazardous mountain areas. The bureaucracy is unwieldy and usually lethargic.

The Politicians

Politicians are generally well informed about the precarious state of environment in the Hindu Kush-Himalaya regions. They also manage the affairs of the nations. The politicians are therefore an important category through which legal and institutional arrangements can be made for mountain development. Many decisions taken on political expediency, however, have harmed the healthy development of forests and the environment.

International Aid

The countries in the Hindu Kush-Himalaya regions have received tremendous goodwill through international aid. Financial and technical assistance is usually readily forthcoming. However, it is the duty of the host nation to guide the diverse components that make up international aid. This, of course, would be ideal but not all nations have reached a point of development which allows for guiding this diverse composition of donors. In the absence of a firm strategy, mountain development, even with the help of the international community, may not achieve its desired results. International aid, therefore, must transcend its individual characteristics and work

together with others to reach the goals of mountain development.

The Moral

The moral of the play is that no one individual, no matter how good, has a panacea for mountain development. The establishment of ICIMOD must be seen in this light. Its central aim is to co-ordinate and bring the pool of resources in the regions

together. The answer to mountain development lies in the ability of the nations, the institutions, and the people in the Hindu Kush-Himalaya region to work together. The measure of success of mountain development now and in future will be gauged when hostile yet simple villagers like those of the Chandragiri Hills can plant some trees for themselves. That will signal the beginning of an era heralding a change in the minds of the people!

APPENDICES

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Dec. 1-4, 1983

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Symposium and Inauguration

DECEMBER 1 to 7, 1983

At the Royal Nepal Academy

Kathmandu-Nepal

PROGRAMME OF THE SYMPOSIUM

(Subject to minor changes, see daily announcements)

Wed., November 30, 1983

1600-1800 —Registration at the Royal Nepal Academy

1800 —Opening of Exhibition "The Environment of Man in Nepal" and Reception hosted by ICIMOD, at the Academy

Thu., December 1, 1983: The view of the countries of the region

Plenary Session

0900 —Welcome

—Keynote address by Dr. Ratna S.J.B. Rana: Mountain Development Towards 2000—Challenges and Opportunities.

—Opening of the Symposium

—Statements from representatives of the countries of the region on the problems of mountain environment and development, their awareness, approaches to cope with them and expectations from ICIMOD. Speakers from Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan.

1230 —Lunch at the Academy Compound

1400 —Country-statements continued

1730 —Closure of the first day

1930 —Dinner hosted by ICIMOD

Fri., December 2, 1983: The concept of integrated mountain development

Plenary Session with introductory papers and discussion

0900 —The Hindu Kush-Himalayas: Their environmental development and cultural diversity. (Dr. John Lall)
—Main factors contributing to the pressure on land, increase of population, intensive use of natural resources, vulnerable environment. (Dr. John Cool)

—The concept of integrated mountain development: necessity, possibilities and constraints. (Dr. Rudolf Hoegger)

Scenic play by SATA (Swiss Association for Technical Assistance, Kathmandu)

1230

—Lunch at the Academy Compound

1400

—Towards a more rational management of the renewable natural resources: the contribution of the "green sector". (Dr. H. Meyer-Ruehen).

—The role of other sectors in integrated development: industry, tourism, transportation, communication, (Dr. Q.K. Ahmad)

—Alternative energies for the hills (Mr. Gyani Shakya)

—Discussion

1730

—Prize Awarding Ceremony for Children's painting contest

1830

—Closure of the second day

Sat., December 3, 1983: The concept of ICIMOD

Plenary

0900

—The role of ICIMOD: A presentation of the Centre (Dr. Gisbert Glaser)

—Prepared Statements by scientists and practitioners on the draft work programme of ICIMOD, 1984/85

—Constitution of work groups

—Lunch at the Academy Compound

Work groups

1400

—Discussion within work groups on the draft work programme of ICIMOD, 1984/85

1730

—Closure of the third day

1800

—Visit of Franco-Nepalese exhibition on Ecology and Development at the "Centre Cultural Français."

Sun., December 4, 1983: Conclusions of the Symposium

Work groups

0900

—Continuation of the discussion within work groups

1200

—Lunch at the Academy Compound

1300-1500

—Tree plantation in commemoration of the Inauguration of ICIMOD, by participants of Symposium, at Godawari.

1500

—Coffee served at Academy Compound

1530

—Summary reports of the work group leaders

1700

—Conclusions of the Symposium by the Director designate of ICIMOD, Prof. C. Rosser.

- 1730 — Closure of the Symposium
 1830 — Reception hosted by the Ministry of Education
 1930 — Cultural Programme at the Royal Nepal Academy

- Population Education for Farmers Project, all in Kathmandu.
 5) Hazard Mapping, in Kakani-Valley.
 6) Pertinent scientific institutions and work in Nepal.

INAUGURAL PROGRAMME

Mon., December 5, 1983 at the Royal Nepal Academy

- 1030 — Welcome address by the Chairman of the Preparatory Committee for ICIMOD, Hon'ble Minister of State for Education and Culture Mr. Fatteh Singh Tharu
 — Introductory Speech on ICIMOD by the Chairman, Board of Governors of ICIMOD, Vice Chancellor, Royal Nepal Academy for Science and Technology, Dr. Ratna Shumsher J.B. Rana.
 — Address by the Director General of UNESCO Dr. Amadou Mahatar M'Bow.
 — Keynote speech by Dr. Maurice Strong
 — Inauguration and address by the Prime Minister, Rt. Hon'ble Lokendra Bahadur Chand.
 — Vote of thanks by the Secretary General, Preparatory Committee for ICIMOD, Secretary, Ministry of Education and Culture Dr. N.N. Singh.
- 1200–1400 — Lunch Break
- 1400 — Statements by the Hon'ble Representatives of the countries of the region and of the Sponsoring countries.
- 1700 — Closure of the Inauguration Conference.

EXCURSION PROGRAMME

Tue., December 6, 1983

The Integrated Hill Development Project (IHDP) at Danda Pakhar.

Wed., December 7, 1983

Alternatives:

- 1) Kulekhani Hydro Power Scheme and related Watershed Management.
- 2) Forestry: nursery and reforestation of Chautara
- 3) Fire places, Watermills and Small Hydel in and around Kathmandu.
- 4) Remote sensing, Watershed Management and Conservation Education Project, and

SPOUSE PROGRAMME

Our distinguished guests wishing to attend the spouse programme are kindly requested to meet Thursday, Dec., 1 10.00 a.m. at the reception hall of Shanker Hotel, for fixing schedules.

ICIMOD: A PLATFORM FOR DIALOGUE

The Symposium and the Inauguration Conference are organized in order to mark the commencement of operation of ICIMOD.

The objectives of the Symposium are:

- to compare notes on the problems and trends of resource development, environmental degradation and human welfare in the Hindu Kush-Himalaya—towards the year 2000;
- to refine the concept of integrated mountain development;
- to share practical experience in development action in the region;
- to elaborate further the role and tasks of the Centre.

In order to achieve these objectives the Symposium provides a platform for dialogue between government and private sector specialists in mountain development, planners, scientists and extension workers, as well as relevant specialist staff of bilateral and international organizations who run cooperative programmes in the region. The majority of the participants are coming from the region concerned. Some specialists are invited from other major mountain regions in the world and/or countries with a high relevant scientific and action-oriented capacity. The overall number of participants is restricted to some hundred in order to facilitate discussion and exchange of ideas between participants. Participation is by invitation only.

The Inauguration Conference includes the formal act of inaugurating the Centre. In addition, it provides an opportunity for high-level decision-makers, mainly from the region, to take note of the results of the Symposium, to learn about the Centre and to advise ICIMOD on their views regarding integrated mountain development.

Field excursions are organized during the two days following the Conference. They are aimed at demonstrating problems and projects in hill areas and at facilitating more indepth discussions.

The participants have received a draft work programme of ICIMOD some weeks ahead, as a base for discussion.

International Centre for Integrated Mountain Development

Statutes

PREAMBLE

WHEREAS there is a profound need for concentrated efforts to be made setting forth integrated approaches to regional development planning in the Hindu Kush-Himalayan area to improve the ecological and economic conditions of life of the local populations.

WHEREAS, with the intention of meeting the needs for institutional arrangements to develop these integrated approaches, His Majesty's Government of Nepal, the Government of Switzerland, the Government of the Federal Republic of Germany and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have agreed to sponsor the creation in the Kingdom of Nepal of a centre to be called the International Centre for Integrated Mountain Development (hereinafter referred to as the "Centre") for the Hindu Kush-Himalayan region.

Whereas the activities of the Centre shall be of a scientific and technical nature and shall not include questions of a political nature.

WHEREAS the sponsors intend to provide funds or other contributions to enable the Centre to assume its functions.

WHEREAS all countries with territories in the Hindu Kush-Himalayan mountain systems are invited to participate in the activities of the Centre and all other countries outside the region are invited to support the functioning of the Centre.

WHEREAS the intergovernmental Programme on Man and the Biosphere (MAB) of UNESCO provides an appropriate structure for international co-operation to further ecologically and economically sound mountain area development.

WHEREAS His Majesty's Government of Nepal and UNESCO, having agreed to develop the Centre, have signed the attached Agreement to that effect, now therefore a centre to be known as the International Centre for Integrated Mountain Development shall operate in accordance with the following provisions.

CHAPTER I OBJECTIVES AND FUNCTIONS

Article 1: Objectives

The primary objectives of the Centre shall be to help promote the development of an economically and environmentally sound mountain eco-system and to improve the living standards of mountain populations of the Hindu Kush-Himalayan area which, for the purpose of these Statutes, includes Afghanistan, Bangladesh, Bhutan, Burma, China, India, Nepal and Pakistan. To this end the Centre will serve:

- (a) as a multidisciplinary documentation centre;
- (b) as a focal point for training and applied research activities; and
- (c) as a consultative centre in scientific and technical matters for all the countries of the region upon their request.

Article 2: Functions and Activities

- (1) In fulfilment of its foregoing objectives, the Centre shall
 - (a) collect, evaluate and make available information and results of:—

- (i) research programmes and projects
 - (ii) development projects
 - (iii) other published and unpublished material related to the economically sound development of hill and mountain areas;
 - (b) assist in the identification, preparation, execution and evaluation of relevant programmes and projects.
 - (c) give advice to governments and non-governmental institutions of the said area on new programmes and on all issues related to the development of mountain areas;
 - (d) serve as a clearing house for information for all parties engaged in such development and help to make use of existing know-how.
 - (e) produce and distribute relevant information for the different client and target groups;
 - (f) support and undertake post-graduate training in all subjects relevant to mountain development;
 - (g) host national, regional and international seminars and conferences in order to strengthen the idea of economically and ecologically sound development of hill and mountain areas on a worldwide basis;
 - (h) promote, conduct and coordinate applied and problem-solving research activities;
 - (i) perform such other related activities as may be appropriate in furtherance of its objectives.
- (2) The Centre will provide assistance, advice and support to countries and non-governmental institutions at their request.
 - (3) The Centre shall establish and operate the installations necessary for the achievement of its objectives.

CHAPTER II PARTICIPATION

Article 3: Participating States in the Area

1. The Centre shall be an autonomous international institution at the service of the States belonging to the Hindu Kush-Himalayan area. These States may participate in the activities of the Centre and use its services.
2. With the exception of the Kingdom of Nepal, which is a participating and sponsoring state *ex officio* by reason of its particular contribution to the establishment and operation of the Centre on its territory, these States may participate in the activities of the Centre and use its services upon notification to that effect being given by them to the Director of the Centre referred to in Article 8 hereunder. The Director of the Centre shall in turn notify His Majesty's Government of Nepal and the Director-General of UNESCO accordingly.

Article 4: Sponsoring States and Institutions

1. Formal sponsorship of the Centre shall be open to all Member States and Associate Members of UNESCO, international governmental and non-governmental organisations, and private or public institutions of a scientific and cultural nature subscribing to the objectives and principles of the Centre and accepting the provisions of these Statutes.

2. Member States and Associate Members of UNESCO and any organization or institution referred to in paragraph 1 of this Article which express a wish formally to sponsor the operation of the Centre or its specific activities, shall transmit a notification to the Director of the Centre to this effect. The Director shall inform His Majesty's Government of Nepal and the Director-General of UNESCO of this request and consult the award of Governors as to whether, in the case of sums offered which exceed 15 per cent of the respective annual budget of the Centre, the offering party may be given the status of a formal sponsor of the Centre.
3. The details of the procedure for accession to the status of a formal sponsor of the Centre shall be laid down by the Board in its rules of procedure.
4. The Specific rights of formal sponsors of the Centre are laid down in Chapter III hereinafter.

Article 5: Collaboration and Assistance

1. Any State, organization or institution which, without asking to become a formal sponsor of the Centre, wishes to collaborate or assist in the activities of the Centre or to support its functioning, shall formally notify the Director of the Centre to that effect, giving details of the ways and means it proposes to effect such collaboration or assistance. The Director shall inform the Board of Governors accordingly.
2. The nature of such collaboration or assistance and the procedure by which it may be effected shall be as laid down by the Board in its rules of procedure.

CHAPTER III GOVERNMENT ADMINISTRATION

Article 6: Principal and Subsidiary Organs

1. The principal organs of the Centre shall be:
 - (a) The Board of Governors (hereinafter referred to as the "Board")
 - (b) The Directorate
2. The Board may establish such subsidiary organs or other subordinate bodies as it may find necessary.

Article 7: Board of Governors

Section I: Composition

1. The Board shall consist of eleven members;
2. It shall be constituted as follows:
 - three members appointed by His Majesty's Government of Nepal representing the Kingdom of Nepal as the founder State and host country of the Centre;
 - one member representing UNESCO and appointed by its Director-General;
 - three members representing the States of the Hindu Kush-Himalayan area, excluding Nepal, and appointed by the Director-General of UNESCO upon the recommendation of the Bureau of its Man and the Biosphere Programme;
 - four members representing the formal sponsors provided for under Article 4 of these Statutes and elected by the Board. In the election of such members, regard shall be paid to the scope and substance of the respective contributions made by the sponsors concerned to the functioning of the Centre.
3. The members of the Board shall be appointed or elected for three-year terms. Vacancies among the members by reason of their resignation, death, incapacity or any other cause

preventing them from exercising their duties as members before the expiry of their term of office shall be filled by the respective represented bodies concerned. The successors shall be appointed the elected for the remainder of the term of the member who is being replaced.

4. The members of the Board are eligible for reappointment to a second term, but shall not serve more than two successive terms. To ensure continuity of policies and operations of the Board, members shall serve staggered terms in accordance with paragraph 5 of Article 22.

Section II: Functions and Powers

5. The Centre shall operate under the authority of the Board, which shall govern the Centre in all matters.
6. To this end, the Board, in addition to exercising other functions specified in these Statutes, shall:
 - (a) determine the policy of the Centre and issue general directives on the functioning and work of the Centre;
 - (b) develop and approve the programme of activities of the Centre;
 - (c) consider and act on all contractual programmes or agreements entered into by the Centre;
 - (d) establish policies and principles for the guidance of the Director in the appointment of the staff and that of temporary consultants and experts;
 - (e) select and appoint personnel at the director levels of the Centre under such terms as may be deemed necessary and appropriate;
 - (f) review and revise the organisational structure of the Centre;
 - (g) scrutinize, revise and approve the regular budget and the operational budget of the Centre in accordance with Article 13;
 - (h) approve annual reports on the work of the Centre and audited accounts;
 - (i) appoint auditors and independent review committees;
 - (j) invite consultants or observers to attend the Board meetings as deemed necessary;
 - (k) adopt such rules and regulations as may be deemed necessary for the efficient functioning of the Centre, including staff, salary and financial regulations;
 - (l) have such other powers and perform such other functions as may be necessary, suitable and proper for the attainment of the objectives and functions of the Centre as set forth under Chapter I.

Section III: Procedure

7. The Board shall meet at least once a year and at each meeting shall elect one of its members as Chairman.
8. The Board shall adopt its own rules of procedure and other internal rules and/or regulations necessary for the due fulfilment of its functions.
9. The Board may establish such subsidiary organs or subordinate bodies as it deems necessary for the performance of its functions.

Section IV: Voting

10. Each member of the Board including the Chairman shall have one vote.
11. The presence of the majority of Board members shall constitute a quorum for the purpose of deliberating and taking decisions at meetings of the Board.
12. Decisions of the Board shall be made by a majority of the members present and voting, unless otherwise specified in these Statutes.

Article 8: Directorate

Section I: Composition and Appointment

1. The Directorate shall be composed of a Director and a Deputy Director. They shall be of different nationality. However, one of them shall be of Nepalese nationality.
2. The Director and Deputy Director shall be appointed for a period of four years, by decision of a two-thirds majority of all members of the Board. They shall be eligible for one such further appointment. Their term of office may be terminated by a decision of the Board taken in the aforesaid manner.

Section II: Functions and Powers

3. The Director shall administer the Centre and shall be responsible to the Board for the operation and management of the Centre and for ensuring that its programmes and objectives are properly developed and carried out. In the Director's absence, his functions shall be assumed by the Deputy Director.
4. The Director shall implement the policies determined by the Board, follow the guidelines laid down by the Board for the functioning of the centre and carry out the directives of the Board. Specifically, the Director is required to:
 - (a) prepare and submit to the Board draft programmes and operational plans;
 - (b) prepare and submit to the Board the estimated budget for the following fiscal period;
 - (c) recruit and manage a qualified multidisciplinary staff;
 - (d) prepare and submit to the Board an annual report of the Centre and such other reports as the Board may request on the Centre's activities;
 - (e) keep and have available for review by the Board and other appropriate parties, financial accounts and other records on a current basis;
 - (f) perform such other functions as are entrusted to him by the Board.
5. The Director shall be the legal representative of the Centre. He shall sign all deeds, contracts, agreements and other legal documents which are necessary to ensure the normal functioning of the Centre within the scope determined by the Board. Contracts and agreements which affect the location, expansion, restructuring or dissolution of the Centre or major issues of the relationship with the host country are subject to approval by the Board.
6. The Director shall take part, without the right to vote, in all meetings of the Board.
7. The Deputy Director shall be kept informed of all major decisions of the Director. He shall be entrusted with his own fields of responsibility at the Directorate level concerning different divisions and activities of the Centre.

Section III: Staffing

8. In carrying out its tasks, the Directorate shall be assisted by such other staff as the Centre may require. In the performance of their duties, the Directorate and the staff shall not seek or receive instructions from any government or from any authority external to the Centre.
9. The staff shall be appointed by the Director under rules and regulations to be made by the Board.
10. The recruitment of staff shall be based solely on professional competence and personal qualifications, but with due regard being paid to the international character of the Centre.
11. The paramount consideration in the employment of the staff and in the determination of the conditions of service

shall be the necessity of securing the highest standards of quality, efficiency, competence and integrity.

CHAPTER IV CO-OPERATION AND CO-ORDINATION

Article 9: Principles

1. In pursuing its objectives and carrying out its activities, the Centre shall seek to co-operate closely with all national and international institutions concerned with the problems of integrated mountain development.
The Centre shall endeavour to complement, not compete with, such institutions and shall keep abreast of their policies, practices and capabilities.

Article 10: Relations with other institutions

1. The Centre may establish appropriate relations with governmental, intergovernmental, non-governmental, and other organizations whose activities are related to its objectives.
2. Within the framework of these relations, the Centre may enter into agreements or establish working arrangements with such organizations.

CHAPTER V FINANCIAL MATTERS

Article 11: Financial Administration

The financial administration of the Centre shall be carried out in accordance with the provisions of this Chapter and the Financial Regulations to be adopted by the Board.

Article 12: Expenses

1. The expenditures of the Centre shall be met from the regular and voluntary contributions of participating States and sponsors and from any other revenue it may receive for services rendered.
2. The expenses of the members of the Board in connection with the meetings of the Board shall be borne by the respective represented countries or institutions.

Article 13: Budget

1. The budget of the Centre shall be drawn up for each fiscal period by the Director in accordance with the said Financial Regulations, and approved by the Board.
2. The budget shall be divided into:
 - (a) the regular budget, covering the revenues and expenditures for administration, short-term advisory services provided by the staff, training services and other regular expenses provided for in the annual programmes of the Centre;
 - (b) the operational budget, covering the revenues and expenditures for technical assistance projects, long-term advisory services provided by the staff, and other related activities.
3. The Board may require the Director to present supplementary or revised budget estimates if circumstances make it necessary.
4. In addition to the budget for the following fiscal period, the Director shall draw up an overall estimate of expenditure and revenues for the next three fiscal periods and submit it to the Board for approval.

Article 14: Accounts and Auditing

1. The Director shall keep an accurate account of all receipts and disbursements.

2. The Board shall appoint auditors and determine their term of duty. The auditors shall examine the accounts of the Centre, particularly in order to certify that the expenditures have conformed, within the limits to be specified in the Financial Regulations, to the provisions made in the budget, and shall perform such other functions as shall be set out in the Financial Regulations.

CHAPTER VI LEGAL MATTERS

Article 15: Status and Legal Capacity

1. The Centre shall operate as a non-profit making, autonomous institution, international in character and non-political in management, staffing and activities.
2. The Centre shall enjoy on the territory of the Kingdom of Nepal the personality and legal capacity necessary for the exercise of its functions.
3. Within the scope of these Statutes, the Centre shall have the following powers:
 - (a) to receive, acquire or otherwise obtain from any governmental authority, national or local, foreign or domestic, or from any corporation, company, association, person, firm, foundation, or other entity, whether international, national or regional, such charters, licenses, rights, concessions or similar rights, and assistance, financial or otherwise, as are conducive to and necessary for the attainment of the purposes of the Centre;
 - (b) to receive, acquire or otherwise obtain from any of the above-mentioned bodies, whether by donation, grant, exchange, devise, bequest, purchase or lease, either absolutely or in trust, contributions consisting of such properties, real, personal, or mixed, as may be useful or necessary to carry out the purposes and activities of the Centre, and to hold, operate, administer, use, sell, convey or dispose of the same;
 - (c) to enter into contracts;
 - (d) to employ persons;
 - (e) to be a party to legal proceedings;
 - (f) to do and perform all acts and things as may be found necessary, expedient, suitable or proper for the furtherance, accomplishment or attainment of any or all of the purposes and activities of the Centre.

Article 16: Location

The seat of the Centre shall be in the Kathmandu Valley in the territory of the Kingdom of Nepal. The location may be changed within the Kingdom of Nepal by the Board by a decision of a two-thirds majority of all its members.

Article 17: Privileges and Immunities

1. His Majesty's Government of Nepal shall apply to UNESCO and its officials and experts, including those made available to the Centre, and to Centre's staff members and other officials, as well as to the representatives of States and institutions entitled to attend the sessions of the Board of Governors, the provisions of the Convention on the Privileges and Immunities of the Specialized Agencies to which it has been a party since 28 September 1965.
2. The members of the Centre's Board of Governors and its Director and Deputy Director shall enjoy, during their stay in the Kingdom of Nepal and while exercising their duties, the privileges, facilities and immunities accorded to members of foreign diplomatic missions accredited to the

Government. These privileges shall not, however, be accorded to the nationals of Nepal.

3. Such agents as UNESCO may make available to the Centre under the UNESCOPAS programme or any other equivalent programme shall enjoy the status, privileges, facilities and immunities set out in the agreements concluded to this effect.
4. The Government shall, upon the request of the Centre or the participating Government concerned, authorize the entry, free of visa charges, the sojourn on its territory and the exist therefrom of any person invited to attend the session of the Board of Governors or proceeding to the Centre on official business.
5. The goods, assets and income of the Centre shall be exempt from all direct taxes. Further, the Centre shall be exempt from the payment of any fees or taxes with respect to equipment, supplies and material imported or exported for its official use.
6. The Centre may have accounts in any currency, hold funds and foreign exchange of any kind and transfer them freely.
7. The Government shall be responsible for dealing with any claims which may be brought by third persons against UNESCO, against members of its staff or against other persons employed by the Centre and shall hold the Organization and the above-mentioned persons harmless from any claims or liabilities resulting from operations of the Centre under these Statutes, except where it is agreed by the Organization and the Government that such claims or liabilities arise from the gross negligence or wilful misconduct of such persons.

Article 18: Settlement of Disputes

Any question or dispute concerning the interpretation or application of these Statutes shall be referred for decision to the Board and, if the Board fails to find a solution, subsequently to an arbitration tribunal as the Board shall decide under its Rules or Procedure.

Article 19: Amendments

These Statutes may be amended by decision of the Board taken by a two-thirds majority of all its members. Notice of proposed amendments together with the full text thereof shall be mailed to all members of the Board at least eight weeks prior to the meeting of the Board at which the proposal for the proposed amendment is to be examined, unless such notice is waived by all members of the Board.

Article 20: Dissolution

1. The Centre may be dissolved by decision of a two-thirds majority of all members of the Board, if it is decided that the objectives of the Centre have been achieved satisfactorily or if it is decided that the Centre will no longer be able to function effectively.
2. In case of dissolution, the disposal of assets, including land and fixed capital improvements thereon, shall be decided by a two-thirds majority of the members of the Board.

Article 21: Entry into Force

These Statutes shall enter into force sixty days after the coming into force of the Agreement between the Kingdom of Nepal and the United Nations Educational, Scientific and Cultural Organization.

Article 22: Transitional Provisions

1. The first meeting of the Board constituted in accordance with Article 7, paragraph 2, but without the sponsoring members, shall take place, at the latest, within six months of the entry into force of these Statutes.
2. Until that day, the functions vested in the Board and the Directorate shall be exercised by an Interim Committee composed of two representatives of His Majesty's Government of Nepal and one representative each of the Director-General of the United Nations Educational, Scientific and Cultural Organization, the Swiss Government and the Government of the Federal Republic of Germany.
3. The Interim Committee shall arrange for the necessary measures to be taken to ensure the functioning of the Centre. In this respect, the Committee shall convene the first Board meeting and make proposals for the election of the four sponsoring members under Article 7, paragraph 2, as well as for the appointment of the first Director of the Centre.

4. The election of the remaining Board members and the appointment of the Director shall take place during the first Board meeting.
5. All members of the Board initially so appointed shall serve for a three-year term. A system of staggered terms shall be established at the beginning of the subsequent term. According to this system three members shall serve for one, four members for two and four members for three-year terms respectively. The members whose terms are to expire after one and two years shall be chosen by lot to be drawn by the Chairman of the Board.
6. The Interim Committee shall adopt provisional Rules of Procedure, which shall govern the Centre and its organs until such time as the Board may adopt Rules of Procedure.

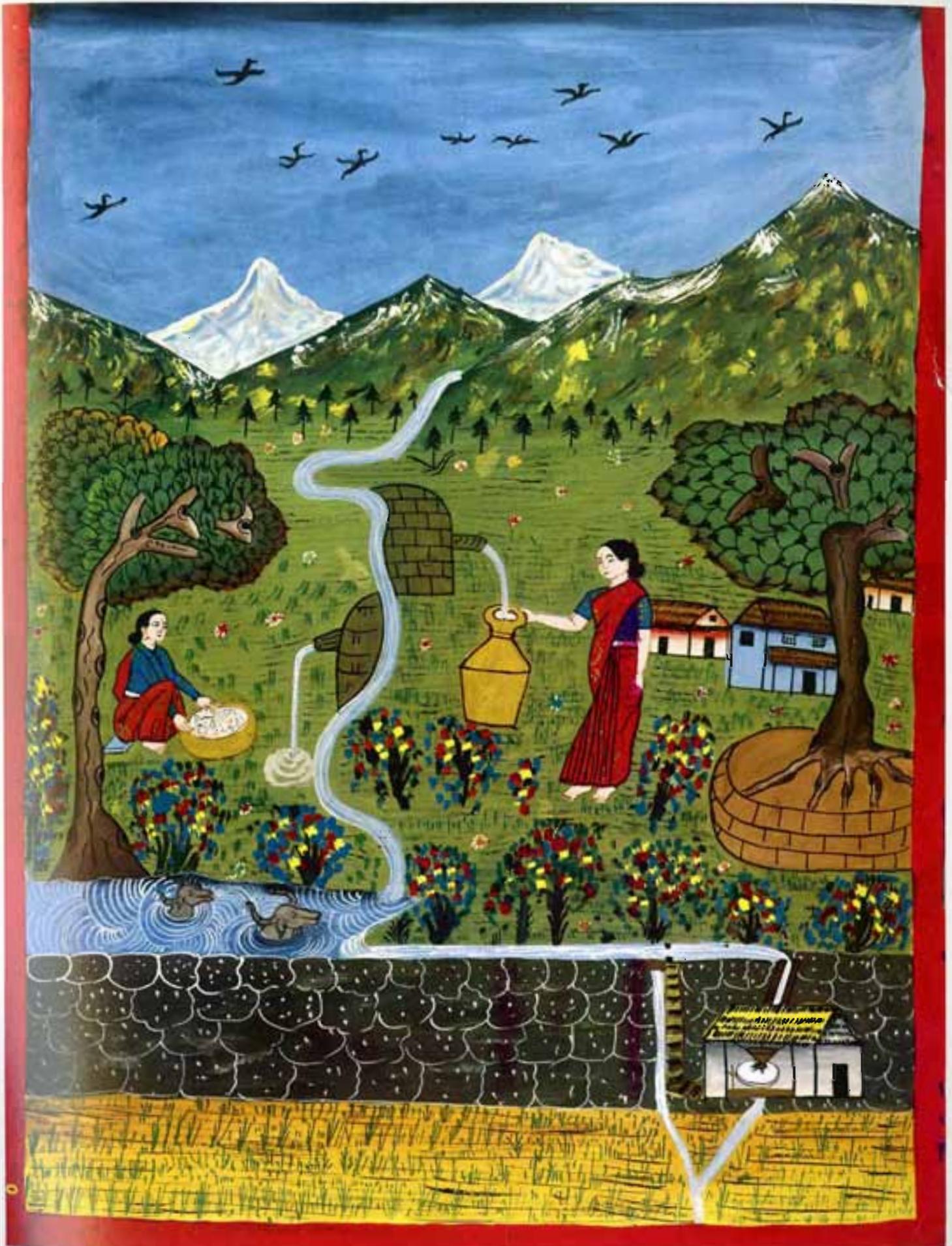
Article 23: Authentic Text

The authentic and original version of these Statutes is here by established in the English language.

Cover photo and Photos on page 14 and 76—credit: Mrs J. Storrs

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