Recommendations

X

Strategies for Transformation of Educational Systems for Sustainable Mountain Agriculture

Academic Courses

- The first issue was agricultural education systems and the curriculum. The degree programme being offered in all the universities in the region was found deficient with regard to mountain agricultural development. This was true for core as well as applied courses. The practical component in agricultural education systems was also found to be relatively weak. The main reason for poor quality and lack of practical focus was probably that labour is not thought to be a very dignified undertaking in this part of the world. Students and professors do not like to go to the field and engage in practical work with their own hands.

  It was the general consensus that, in most of the universities, educational standards and quality of education were declining. This was mainly because of the lack of external reviews and evaluations. Many of the changes in the courses and the performance were mainly the result of internal reviews and decisions.

- It was felt that, at the B.Sc. level, there should not be much specialisation in agriculture, and courses in entomology, plant pathology, horticulture and a number of other agricultural subjects should be included. The consensus was that a person with a BSc. degree cannot be seen to be a specialised professional. It is here that some courses in mountain agricultural development could be added, in order to overcome the gaps and weaknesses in practical training which are common throughout most of the agricultural institutions.

- It was recommended that an internship programme be introduced at least for one year, because, with one year, you can cover all the seasons as well as different livestock operations. This internship could be on the farmers' fields, if some farmers are willing to support this programme, or it could be at the research stations. By making it mandatory, the students will have to finance it themselves.

- Another recommendation was to have periodic external reviews of the curriculum. If programmes are regularly poor, it may be necessary to cancel some of the courses. In order to generate a better

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appreciation of the social and cultural values and customs of particular societies in mountain areas, students should also be made to take courses in other departments of the university, e.g., anthropology and sociology. Inputs from the farmers in the courses and practical work were also considered very useful, and these should be provided by seeking their help. Regular meetings with farmers will assist the universities to be more responsive to their priorities and concerns.

Vocational Training

It was generally agreed that the curricula should be divided into degree and vocational programmes. Some of the universities were already offering some vocational programmes at different levels. One was the Diploma Course after 10 years of High School: one year diplomas or two year diplomas for middle-line technicians from government departments. In some cases, vocational training was being offered to farmers. It was agreed that as formal diploma courses created problems of compatibility with formal academic courses, non-diploma training courses should be recommended for mountain agricultural development. Such courses should be open to farmers and entrepreneurs. These should help them to enter into agribusinesses by providing them with the technical knowhow needed to start a business or make certain improvements in their businesses or help them to learn new post-harvest processing techniques, etc. More specialised vocational courses on income-generating activities as well as improving technical knowhow were seen as being very important for mountain areas. Special focus can also be given to the problems of mountain women. Innovative approaches for the dissemination of knowledge that already exists in the universities was also needed. The recommendation was to use the mass media such as the radio programmes. Where television is available this can be used.

Human Resources' Development

Faculty improvement in terms of technical skills and overall quality was considered very essential. In-breeding in the universities had increased. Universities were very often hiring their own graduates, and this might be a reason for the lack of new inputs and ideas in most of the courses in the universities.

Another problem was that there were too many local students that had to be accepted by compromising every aspect of academic standards.

Summer Schools and Fellowships

It was recommended to interchange faculty staff among regional universities and research institutions. There might also be possibilities of exchange between some universities and international agencies like ICIMOD. Universities should adopt the practice of faculty sabbatical leave where, after six to seven years of work, a faculty member is eligible to go on leave for one year with full salary. The member can spend this period at some agricultural research system or in another university where she/he can

be involved in teaching or research or both.

It was recommended that ICIMOD should serve as a focal point for short-term training and summer school. In summer most of the students are gone and the faculty is less involved in teaching, so they have more time for short-term training. This type of training might not be sufficient to increase their productivity or technical knowledge but could serve the purpose of regional exchange from which one could learn a lot about others and their work.

ICIMOD can play a major role in this particular case. It was also recommended that student fellowships be provided for both exchange of students within national university systems and also outside to various international agencies and universities.

Information Exchange

The need to establish mechanisms for exchange of information among regional educational research institutions was strongly emphasised. Information about new technologies and innovations can be facilitated through better communication links.

The creation of a technical database for mountain agriculture was important and ICIMOD could be a focal point for this.

Committee of Vice Chancellors

It was also considered useful to create a committee of Vice Chancellors representing one university from each HKH Region, and such a committee could meet periodically and discuss the needs of the universities and the region and identify ways in which the universities could play a more effective role in development of sustainable mountain agriculture.

University and Agricultural Extension

Regarding the role of the university in extension and agricultural extension education, it was agreed that some universities in the region, especially those in northern India, had been playing a very effective role in extension and advisory services. But, in general, most of the universities in the region were operating in isolation without links with the farmers. They also lacked a proper emphasis on extension education. In most universities, the subject of extension education had not even been defined properly. The recommendation was that extension education should become an integral part of teaching and research. Teaching cannot be effective unless we know the problems of the farmers and can provide reasonable solutions to these problems. Agricultural universities should have strong links with the farming community, and these can be established through effective extension services.

It was also suggested that advisory committees at district level should be established within the jurisdiction of the university. Highly-qualified professors should serve as members of the advisory committee. We should try to incorporate more income-generating activities by introducing medicinal plants, floriculture, herbal medicines, etc. The faculty should also be involved directly in extension pro-

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grammes.There might be some constraints, but, in most of the universities, the faculty is already spending ten to fifteen per cent of the time in extension activities. We should accelerate a two-way communication network between the university and the farming community. Unless the university or the faculty is aware of what the farmer is doing, effective communication links cannot be established. The farmers can come to the district extension office and discuss their problems, priorities, and concerns with the faculty who can then take them back to the university and try to find solutions. The technologies being generated at the university could be first tested in these centres before the farmers and then modified as the need may be. Two-way communication links between the university and the farming community are critical for an effective agricultural research education and extension programme.

Natural Resources' Management

The next issue was natural resources' management. It was observed that, in the HKH Region there was a general deterioration of natural resources. The recommendation was that the ecological situation affecting agriculture should be understood and efforts should be made in all the ecological regions to harness the indigenous knowledge and practices of mountain people for the management of natural resources.

Funding

Lack of adequate funds is a general problem for all agencies today. Without a reasonable amount of funding, research, training, and extension simply cannot be undertaken. There is too much government control and regulation over funds at present, as most of the research funds come from the Government. Government rules and regulations are very rigid. There should be some flexibility as far as the universities are concerned. Lack of innovative research has been another problem area, and universities have to become more and more self-financing through innovative programmes.

The private sector should also be tapped. It was recommended that at least 10 to 15 per cent of the State Agricultural Budget should go to support agricultural research, whether it is based in the departments or in the universities.

Many new entrepreneurs in the agricultural sector would most probably be willing to finance university research if they derived some benefits from the research work to be carried out. Many students are also willing to pay higher tuition costs if they can receive good education. This is being demonstrated in many institutions in the region.

Interdisciplinary approaches were emphasised. An important aspect of inter-regional cooperation was to overcome the communication gap between different universities and research institutes even within countries. In the past there was no appropriate forum. ICIMOD can play a more active role here.

Association of HKH Universities

An association of the universities in the HKH Region was recommended. It was suggested that the universities could contribute a small amount for this type of regional cooperation. ICIMOD could serve as a focal point for annual/regional conferences to share new discoveries and ideas. ICIMOD, being an international centre, could play an effective role in this type of annual conference. ICIMOD should serve as a communications' link between regional universities and government line departments. As already mentioned, there was a lack of cooperation and coordination between the universities. ICIMOD could again play a very effective role in bringing together universities, line departments, and others involved in mountain development.

The communications' gap between the universities and the farming community is a very important issue. Lack of effective communication between the universities and the farmers or the private entrepreneurs is very apparent. Universities are working in isolation in most cases. They do not feel that they are obliged to the farming community. The time has come to start acting in such a way that the farmers and tax payers benefit from the work. Otherwise, there will be no basis for continuing support.

The universities should not only produce graduates for employment, but they should also be in a position to produce future businessmen in the field of agriculture. Innovations are the solutions to the problems of mountain agriculture. Our main target should be to identify new income-generating activities and to start new entrepreneurship. An educated person, instead of looking for a job, should be able to establish his own job from which he can make a decent living.

For many organisations, routine work is always of a higher priority than innovations. So there is likely to be lots of resistance from many sides. Unless we can make the needed changes by becoming more responsive and accountable, the future will remain very shaky.

Redefining Research Priorities for Sustainable Mountain Agriculture

Agro-ecozoning

There is a great need for agro-ecozone referencing in the HKH region. Unless we have an agro-ecozone reference, it will be a difficult task to define research priority. Socioeconomic studies or farming systems' studies or agricultural operations have to based on the concept of agro-ecozones. Different countries have their own agro-ecozones for mountain areas. One classification system would be very useful for the HKH Region. There is a need for the creation of databases for each farming system in the different agro-ecozones and for the dissemination of such databases also. Some of the national agencies are doing this for their countries. They have the database and are also the clearing agencies for this type of information. Information on different farming systems in different countries

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can be coordinated by some agency and made available to other researchers in the region.

Very High Hills and High Hills

In the very high and high hills, there are both cold and arid regions as well as cold and humid regions. Both of these require different types of approach. In the cold and arid mountains, there are some common crops such as cabbages, cauliflowers, beans, and pumpkins, Among the livestock, yaks are the most popular. The problem here is low moisture availability. In these regions, if moisture is available then, because of the very high photosynthetic efficiency as a result of very high radiation, the performance of vegetable crops is excellent. So the main concern is that moisture availability should be assured. As the dominant system here is livestock, the carrying capacity of pastures is a major concern. While there are many research areas, the most important was considered to be water harvesting and efficient use of water, mainly snow.

The development of these water resources involves both harvesting as well as conserving it. If the systems are efficient, it is possible to increase the cultivated area two to three times. Regarding the humid and other high hills, the crop range is greater with spring wheat, barley, mustard, buckwheat, and potatoes. In summer, there are excellent mustard crops even at 14,000 masl in certain regions. Buckwheat is, of course, a common crop.

There is livestock diversity. Sheep, cattle, goats, mules, and *chauri* (a type of yak) are found. The problems here are low fodder availability because of the low productivity of the crops and high pressure from livestock. Productivity is affected by the very unfavourable temperature regime. There has not been much work carried out on increasing the productivity of these crops under the temperature regimes found in these areas. This is one of the major concerns. The low productivity of crops and livestock in general is another major concern. It was felt that this region suffers the most on account of the lack of information and because of the inaccessibility of the area. The research strategy is to assess the optimum level of the carrying capacity of the pasture and devise management strategies based on this. There are very few studies on flora composition, or on ways to enrich the flora of alpine pastures. For the development of suitable crop varieties and their management, selection needs further strengthening. Environmental resources such as plant population regimes, planting time regimes, harvesting time, and so on have economic potentials but should be pursued only after careful study in these highly fragile ecosystems. Regarding the improvement of livestock, experiences in other countries of the region, as, for example, experiences with yaks in China, should be taken advantage of by the other countries. Mechanisms for the exchange of such information should be developed while also continuing systematic breeding work. Evaluation of flora and fauna, for their cultivation and use, botanical surveys, and expenditure need to be carried out.

Some countries, e.g., India have already done this. Others need to undertake similar activities.

Mid-Hills

In the mid-hills one finds mostly mixed farming systems consisting of crops, livestock, horticulture, and forestry. It is very difficult to say which one is dominant, because in one place one might find horticulture and livestock as dominant regimes (Western Himalayas) while in others (the Eastern Himalayas) crops and horticulture may be dominant. The major crops here are maize, rice, and millet with citrus and stone fruits. There are also other subtropical foods, vegetables, and cash crops. Tea and cardamoms are very common in this region. The predominant livestock are cattle, goats, and pigs. The number one problem for this region is soil erosion. As rainfall is high, the runoff is also high and carries with it a lot of soil. Because of the slopes, the soil erosion aspect is a serious problem.

Water management practices are poor and, because of this, in spite of the huge water potential, there is a lot of wastage. The focus has been on harvesting rainwater. With huge losses of water and soil, excessive amounts of soil nutrients are also lost, affecting soil productivity. Emphasis should be on soil and water conservation farming technologies. On the slopes, while there must be a contour system of planting in most of the hills, potatoes are planted across the contour lines. If proper soil conservation technologies are provided, the problems of soil erosion could be reduced.

It is important to emphasise that, if a complete package is not given to the farmers, they will not follow the soil conservation practices, and this will lead to further problems. There is also potential for the introduction of tree-based farming systems. Tree introduction is considered to be a major intervention for fodder and firewood. It is already seen in the systems in Nepal and Sikkim. Species that are productive have to be promoted. Certain types of trees could also help to enrich soil fertility. There are also appropriate water harvesting technologies for the efficient use of water. Small reservoir structures can be used for irrigation. Fodder and livestock management and the development of agro-processing are also important. However, unless one has a suitable marketing outlet and processing structure, horticultural or vegetable development will not be of much value, and, consequently, it is very important to have access to markets.

Low Hills

The low hills have crop-dominant farming systems, with mainly rice and maize. Wheat, mustard, other oil seeds, subtropical fruits, tropical fruits, vegetables, and livestock are also found. The major problem here is again water. Unless there is irrigation, the dry slopes are not very productive. Since cropping is intensive and biomass removal is very high, plant nutrients are constantly needed. Strategies for development should focus on management of water resources and their efficient use, improvement in crop and livestock productivity, promotion of extension education, and development of post-

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harvest technologies. In addition to this, integrated use of nutrients and integrated pest management systems are very critical for this region.

The potentials for intercropping of legumes as a source of rizobium induced nitrogen addition is very high. All the biological nitrogen-fixing crops can be intercropped, e.g., maize with soya beans. This kind of intervention can enrich the soil and reduce the need for chemical fertilizers. Although shifting cultivation is the main farming system in the Eastern Himalayas, alternatives to it are being found. These have focussed on improvement of the existing shifting cultivation practices through introduction of improved varieties.

Information Exchange and Interaction

Regarding the mechanisms for interaction with ICIMOD, the general consensus was that there should be access and flow of information among mountain-based institutions with regards to education, research, and training. It was thought that ICIMOD might directly interact with the institutions in the mountain areas of the HKH Region to collect and disseminate information. With regard to exchange of technologies, materials, and personnel, this would have to be routed through accepted channels in each of the countries. A consortium of the resource persons in member institutions should cooperate with ICIMOD in monitoring activities and promoting mountain development priorities. The consortium approach can help ICIMOD to improve organisation and implementation of programmes in the Region.

Consolidation and Coordination

The universities in the Region also need to consolidate their research, education, and extension activities within their own countries for the exchange of information. Within the countries, there is also a need for coordination so that someone working on something knows what is happening elsewhere in the country.

Livestock Research

In the case of livestock, breeding is important, but there are other factors also that influence the productivity of livestock, for example, husbandry practices, housing, and other management aspects. These should be considered in the research priorities to be undertaken to improve the productivity of the livestock. The diseases of livestock in the high and very high areas have not been mentioned. There are many livestock diseases in these areas. Research should be carried out in mountain areas where the livestock, pasture, and ranges are important with the objective of eliminating diseases from such areas. Range and pasture development to improve the productivity of sheep and goats should receive high priority.

In the past, the focus has always been on more production-oriented research, and now it is time to be more people oriented. Strategies that promote equitable management of scarce resources should be developed. It is always more difficult to get groups of people to work together to produce something.

Strategies for Creating Regional and International Partnerships and Alliance for Sustainable Mountain Agriculture

Mountain Agricultural Development Committees

In order to ensure full representation of farmers and their agenda at the national and regional level, each country should consider the establishment of national mountain agricultural committees (to include livestock and forest resources) at the central, state, provincial, and local district levels. Chairmanship of these committees at the central, state, provincial, and local levels should be on a rotational basis.

Inventory of Mountain Development Resources

Each country should carry out, through an inter-institutional team, an analysis of the institutional framework in each territory and prepare an inventory of what is what and who is who institutionally and individually for mountain development. Second, a focal point should be identified from among the various institutions. This could also rotate between organisations in a country. Third, identify the subject area specialisation, thematic research components, human resources, strengths and weaknesses, gaps, and so on in each institution. Fourthly, coordination mechanisms should be identified. Fifth, the sources of national and international funding should be identified. Reports on mountain agriculture, their conclusions, and recommendations, including a directory of institutions, should be disseminated widely.

Principles for Partnership

Principles for partnership focus on using participatory approaches. Focal points should not be inward looking. Diverse institutional stakeholders were needed. Functions should be based on institutional capabilities. Developing consensus through participatory programme planning was advocated. A two-way flow of communication and a feedback mechanism were needed. At the regional level, ICIMOD should act as a focal point for these activities. ICIMOD should establish a regional mountain agricultural advisory committee made up of representatives of national resource committees and convene a meeting of committees at the earliest possible date, and as and when required. All institutions working on sustainable mountain development in the region should share their respective policies, plans, publications, etc, through their national focal points. ICIMOD should be the regional depository for all research information data and for repackaging and dissemination of the same by using both publications and the electronic media. Short-term regional refresher courses and in-service training programmes should be developed for government officials, researchers, and educationalists as well as for extension agents and formal organisations.

Gender and Sustainable Mountain Agriculture

Internalising Gender

Throughout this conference gender issues have been frequently touched

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upon. Most of the presentations and discussions have mentioned them as a need in educational institutes and research institutes, but it has never gone beyond that. So it was felt that more information is needed on how women are to fit in specifically to the research, extension, and education programmes of our institutions. Interestingly the language of this seminar is gender biased. The farmer is always refered to as 'he'. Even when we refer to professors or researchers they are always 'he', 'his',` and 'him'*. This language reflects our own internal thinking. We have sufficient studies/ observations from the Region and we know, without any doubt, that women are in fact the predominant farmers in the region. Substantial re-orientation in our thinking to begin referring to the woman farmer and her husband is required.

Once we can realise this fact and internalise it in our own minds than there will be a gender focus. If we remember that our primary farmers are females and our primary clients are therefore female then the rest of it will follow.Our research becomes focussed on the female. Research then takes her needs into account. Extension will design programmes around the needs and constraints of female farmers. The main problem lies in our own attitudes and minds. Old habits die hard. It is not an easy thing to change. In some cases it is believed that research carried out at the household level will automatically bring in the gender perceptive. This is one good step, but if we think of farmers and know that they are female, we do not even need to look at the household level. Household implies there is a male farmer with his wife busy doing domestic chores. So why not focus on the female farmer?

Mainstreaming Gender

Women-specific activities are often those with low status and low remuneration. Because of this, many times, without knowing, we are promoting women's status as a marginalised position. We would like to suggest that women be seen in the mainstream agricultural activities of research, education, and extension. It has been recognised that women have been neglected in the past. We need to become aware of developments in this field, including the need to get involved.

Overcoming Gender Biases

More specific adjustments to the curricula to include gender concerns for students at all levels are necessary. This could be in all fields. We first need to look at the curriculum and see if it has a gender bias. Most likely it does. It is coming from our training and our education largely, so we need to first examine those textbooks and the curricula to see where the bias is coming from and how we can change and correct this. Courses on participatory methods for researchers and extension workers should be taught. This could be under a social science curriculum or it could be also under an agricultural research methodology. If we really do participatory research properly, we will have to involve the perspectives of all the concerned agents, and that should include women, as well as low caste and other

* Note to the readers: This tendency has been 'noted' by the editor on the relevant pages.

Women farmers engaged in vegetable cash crops farming, Hurla, Himachal Pradesh, India
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groups, that researchers and extentionists might normally miss out. We also recognise that one way to get over the inaccessibility problem that always faces extentionists is to, in fact, mobilise local women leaders to help assist in the change process in extension, to teach them to become trainers in order to quickly spread the technologies to women in the region.

Organising Mountain Women

Why not first identify the local women's organisations in the region that could be used to help and offer them training in extension? Where they do not exist perhaps other organisations could assist with establishing such groups since we know now from experience that women are able to work together better when they are organised. We have a lot of examples of this from rural support programmes. This makes it much easier to deliver services to them and also helps them become more effective agents in development. They are more confident in bringing up their own needs and demands for services from other institutions. It is also proposed that agencies linked to other organisation, such as NGOs working in the region, promote women's empowerment and help improve their capacities. It is also suggested that training materials could be developed for non-literate women since many of the women in the mountainous region cannot read and write, and the traditional extension materials, even in local languages, may be useless. Partnerships should be built between scientists, extension workers, and rural women. A certain level of decentralisation is required so that women can benefit from training held near to their homes; since as we all know they are very busy, and they often find it difficult to travel very far outside to attend training. All available means of information transfer should be used, including radio, T.V., and folk theatre. The cultural constraints that male extension workers face in dealing with women can be overcome by organising groups of women. However, the reality is such that there will never be sufficient female extentionists to meet the needs, and, therefore, male extentionists need to take on the responsibility also. There are ways to sensitise them about women's needs and methods for communicating with women.

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Women's Knowledge and Skills

Regarding skill improvement and the need to provide women with marketable skills, it is important not to marginalise them. In the areas of research, it would be useful to conduct research on time-saving technologies to reduce women's workloads and free them for more productive activities. We know across the mountains what the major constraints on women are, and, therefore their low levels of participation and development are a result of them being overworked and too busy. Scientific organisations are not addressing these problems. Technologies to reduce women's workloads are not being emphasised. For women, this is a necessary pre-condition before they can be fully involved in more significant development activities. We should also conduct research on women's indigenous knowledge, including mountain agro-biodiversity. Particularly relevant is the significant knowledge they have of seeds, seed production, seed storage, and seed management. When talking about biodiversity, loss of knowledge and loss of resources must also be kept in mind. Women must become involved in gaining a better understanding of gender processes. Also we need to conduct research through participatory methods on rural women's specific needs and constraints. We need to understand these better and develop extension programmes accordingly to address those needs. We need to conduct on-farm and adapted breeding trials for livestock with women on their own farms. We need to understand clearly which sex is involved in which activity and to what degree. We suggest that information be collected on the work that agricultural institutions are involved in in the field of gender. We should collect information on technologies for women, particularly the time-saving, drudgery-reducing ones. There are lots of technologies, but most of them do not seem to be adopted by women or even other local people. We need to look into this. Sometimes the green technologies related to agroforestry can in fact reduce the workloads of women. ICIMOD could facilitate the compilation of a directory of resource persons in this topic. ICIMOD is working on institutional strengthening of some agricultural institutions in the region to address these concerns of farm women and to sensitise the staff of the institute. One such pilot programme is being held at the University of Solan. This is just the beginning. ICIMOD will probably be undertaking similar activities with other universities also and would like to develop programmes on mainstreaming gender in agricultural institutions in the mountains.

We should encourage women to enter every field and at all levels. The option should be open. This is the best way to internalise gender concerns and not by reservation of seats, positions, etc.

Regarding upgrading technology, just handing technology over to people is not enough. We must put them in a position to earn financial profits. This is why we have emphasised the need for women's organisations, because it is often through organisations that this kind of confidence and empowerment can come about.