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Mountain Agriculture: Current State of Education and Research*

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Introduction

In order to begin the discussion on mountain agricultural education and research we need to look at some of the basic ideas about mainstream development strategies as the education and research systems are strongly interrelated with these. Many believed that growth and increasing investments in new technology would provide all the answers to the problems of poverty and inequality and also help to restore the environment. It was believed that, by providing high-yielding varieties, better irrigation, more investments in new inputs, and promotion of trade and exchange, the problems of food and stagnant agriculture could be resolved. Many of these assumptions are now being questioned and this is best captured by the debate on sustainable development.

Whether or not the biophysical environment can support certain types of intervention in agricultural development is a very important question before agricultural education and research systems. Conventionally, there are two views about mountain

areas. The first view is related to the perceptions of people outside mountain areas. Their views are that mountain areas are good places generally for relaxation, that people in mountain areas have very colourful lifestyles, and that these should be preserved as museums for posterity and not be altered by development. A related view of the outsiders is that the resources in mountain areas must be used for the development of the plains and urban areas. As mountains do not have the absorption capacity to justify the huge investments needed to develop these resources, such as power and forests, these should be developed for users in other areas.

The second view is an insider's view — a view that is more mountain friendly. This view sees the mountains as a home for a large number of people. Mountains are living environments as much as any other and, indeed, one of the most complex ecosystems found on earth. Mountain areas need to be protected, rehabilitated, and developed as much as any other ecosystem or economy. It is in this context that the question of mountain agricultural research and education needs to be examined.

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The Changing Nature of the Mountain Agricultural Economy and Environment

What is wrong with mountain agriculture today? If in the past it was seen as a relatively successful system, what has changed now? The population density in mountain areas has moved from low to very high. Agricultural systems are no longer able to provide adequately for the needs of the households, and this has increased the pressure on fragile mountain resources.

Seasonal migration is now becoming more and more permanent migration, because the capacity of the mountain agricultural economy is declining. Many areas under shifting cultivation and pastoral nomadic systems, with rotational cultivation and grazing, now have decreasing fallow periods. Semi-permanent cultivation is becoming permanent cultivation with increasing soil erosion and declining soil fertility. There has also been a reduction in the diversity of crops. Previously hill farmers used to grow many different crops in just one season but more and more areas are changing to monocropping. Regarding forests, apart from deforestation, the patterns of ownership and control are also changing with resource tenures moving from community to individuals and private groups. Settlement patterns were dispersed and small, and people were close to their homesteads, but now there is increasing agglomeration. The economies have moved from being those based on barter systems to those based on cash as mountain areas become more monetised.

In spite of the large population, there is still a scarcity of labour during different seasons. The burden on women is increasing and a higher proportion of children makes up the labour force. Mountain farmers are increasingly being seen as sacrificing long-term strategies for short-term needs. Mountain farmers can no longer afford to think too far into the future. Most of the resource management mechanisms dependent upon institutional mobilisation, cooperation, and partnership are breaking down. Mountain people do not have too much faith in governments also because most of the governments have been more interested in extracting resources out of mountain areas and have not put back enough for the benefit of mountain people, their agriculture, and their economies.

Factors behind the Changes

There are a few common problems that mountain areas share with all poor and developing areas. On the demand side, the main problem is the rapid growth of population, both human and livestock. The livestock population has also put tremendous pressure on forest and pasture resources. The main challenge is how do you manage the scale of demand - the demand for food and other resources? Many of the policies did not properly look at the problem of mountain environments. Many policies related to resource extraction were indiscriminate insofar as their impact on mountain people and their environments were concerned. Policies were never sensitive to the mountain specificities like inaccessibility, fragility, and marginality. Policies were also slow in

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developing some of the opportunities that existed in mountain areas. Mountain areas have a goldmine of indigenous knowledge, but this was hardly used for designing more appropriate policies and programmes.

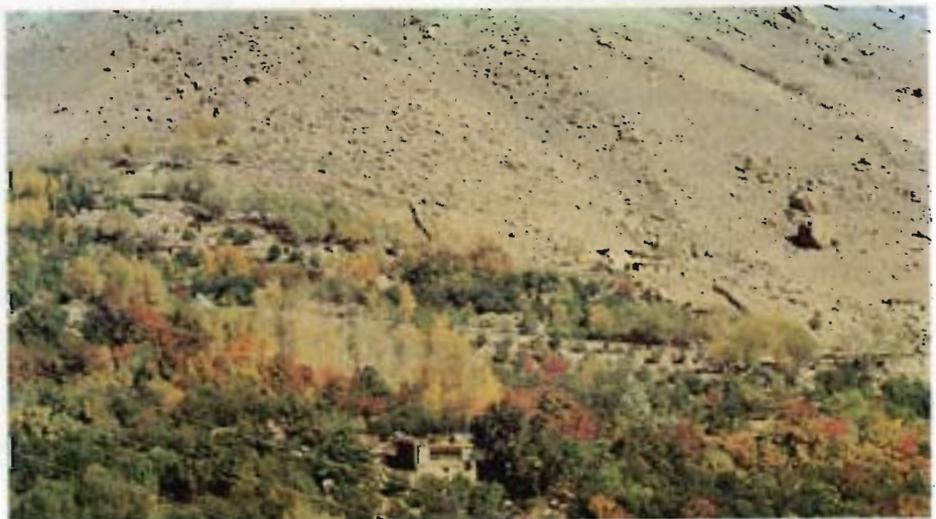
There were also data gaps and lack of understanding. Knowledge about mountain farming systems, the economics of natural resources, role of indigenous knowledge, changing production processes, and so on, was very limited. Understanding regarding farmer responses to different opportunities and challenges in different ecosystems was absent. How did the different components of mountain farming systems interact with each other and how did the system break down? Which components were more critical than others? Linkages between agriculture and natural resources in mountain areas are fairly apparent. More recently, the economic aspects are also becoming very important. How do we value many of these resources so that we can convince policy-makers that it is worthwhile investing in mountain areas, that mountain farmers are

making rational decisions and need to be supported just as much as farmers in the plains?

Status of Mountain Agricultural Education and Research

The reviews of agricultural research, educational, and development policies in the HKH countries undertaken by ICIMOD revealed a number of things. First, agricultural education in mountain areas has had very low overall priority. Secondly, the whole issue of agricultural education in comparison to general education was a very new field in many of the countries in this region. It did not have a very long history. Consequently, the experience was very limited. Many institutions were still experimenting with different options.

The low overall priority is because of the relationship of education with the job market. In order to make the educational system credible, it is very important that it is integrated with the job market. Agricultural education has suffered because agricultural



Many parts of the cold and dry zone of the HKH have niche for promoting horticulture
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graduates have great problems finding employment opportunities. Even when agricultural institutions were looking for qualified people, overall job prospects were relatively bleak. If this is the prevailing situation in general agricultural education, the problems with mountain agricultural education are not difficult to imagine.

Agricultural education suffered from a lack of adequate integration between agricultural research, extension, and education. The agricultural education system was too theoretical, of poor quality, and had poor linkages with field-level problems. Education was highly compartmentalised in terms of very specific narrow subjects that did not allow a person to go out and tackle problems of a multi-disciplinary nature. Environmental aspects did not figure at all in agricultural education. Issues related to women (critical for mountain agriculture) did not figure in the curriculum. Planning by agro-ecological zones was lacking. Most courses were commodity focussed — with a heavy emphasis on lowland crops. Traditional community management systems for natural resources were also largely overlooked.

What about agricultural research? There is a lot of diversity in the agricultural research system in the region. For instance, the main research system was very strongly commodity oriented. The main crops were rice, wheat, and maize in food crops and tea, coffee, cotton, and tobacco in commercial crops. Some of this is slowly changing. Bhutan, for instance, having experimented with different types of agricultural research system is now emphasising a focus on

renewable natural resources. It is organising its research departments and human resources on the basis of particular types of resource. Lumle and Pakhribas research stations in Nepal have worked with a farming systems' orientation and have had some success.

The other aspects of agricultural research and education systems are that there were highly centralised systems. South of the Himalayas, the experiences have been very strongly those of centralised systems. There was one main agency guiding and controlling the research agenda and activities throughout the country. In China, judging from experiences in one of the counties in Sichuan, the system was relatively more decentralised, with information flowing from both top-down and bottom-up. It was also a strongly farmer-responsive system and has worked very well so far.

Another issue was whether it was a government or university-based agricultural research system. While government agricultural research systems dominated in the region, a few university-based agricultural research systems were also developing. At present, it is difficult to assess which is more effective as both of these systems have not been very effective, at least in mountain areas. There are a few examples in which research has had a very positive influence on mountain agriculture with the introduction of cash crops and high-yielding varieties. Once research systems have provided high-value crops that are marketable with the appropriate technology, farmers have accepted

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Farmer and her husband: sericulture farming family of Ningnan County, Sichuan, China
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these without question. The main limitation has been that only small areas have been able to benefit from these inputs. The environmental impact of these new systems has not been assessed — people are now more aware of the effects of monocropping, loss of gene pools, and pollution of soil and water from increasing use of chemical fertilizers and pesticides. Research has also neglected women farmers. Most of the decisions regarding agriculture are made by women in the mountains, and yet there has been no recognition of this in teaching, research, or in extension.

The issue of funding is also very important. Resources are extremely limited and, unless a major effort is made to pursue available resources far more effectively than in the past, this will continue to be a major problem. In this context we need to learn from each other through a partnership or a consortium approach or we will not achieve very much. The effort needed is the type of action that achieved the green revolution. It is a challenge to see if we can do the same

thing for mountain areas. Integration of research and education is essential. It is costly to have education and research bifurcated as in the past. The dichotomy should be broken down. There have been some good experiences to draw on in identifying effective ways to bring these together. There are also new directions in research and education and more of the same based on past research and education may not be appropriate. Priority areas for mountain agriculture need to be identified, and this means looking at some of the new areas. Investments in creating capacities and building up capabilities are essential as these are very limited at present.

One last point here is related to trade, exchange, and the green revolution. It is increasingly believed that the Green Revolution may be losing steam - not only because the potential areas have been covered, but also because of the environmental impacts. Just as each area must now find optimal solutions for its agriculture, so must the mountains. The search everywhere is for sustaining growth in productivity

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without further deterioration of the environment, and our education and research systems must find answers to this on a priority basis.

Discussion

A wide range of issues was raised in the discussion following the presentation. Commenting on the need to further strengthen integration between agricultural research, education, and extension, it was noted that a lot of information was already available. Efforts should be mobilised to synthesise the information. This exercise was essential in order to avoid repeating past mistakes. Regarding priorities for research and education in mountain agriculture, greater emphasis was needed on the development of traditional mountain crops. Points were raised with regard to the preservation of mountain agricultural biodiversity. With increasing commercialisation, mountain farmers preferred to grow high-value crops rather than traditional low-yielding subsistence crops. Insofar as the activities of existing research

centres were concerned, it was pointed out that many of these operated in isolation, displaying weak linkages with the farmers. Many comments were made regarding the need to give greater priority in mountain agricultural education and research to mountain women. As the bulk of the farming responsibility was falling on the shoulders of mountain women, future research needed to find the answers to their problems. More micro-level studies needed to be undertaken for different agro-ecological zones in order to deal with their specific problems. It was also agreed that the absence of physical and social infrastructure in mountain areas was a major limitation to developing mountain agricultural education and research. Development of infrastructure in mountain areas was costly and needed to be promoted selectively, based on agroeconomic potentials. Insofar as technology arising from research activities was concerned, it was also essential to focus on the most effective methods for its dissemination.

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