

# Perspectives of Educational Institutions on the Challenges of Sustainable Development of Mountain Agriculture

## IX

### Appropriateness of the Existing Academic Training and Human Resources' Development

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Everywhere in the developing world, we hear criticism of educational systems — that universities have failed to produce graduates who fulfill the needs and requirements of development. This could be a genuine criticism to some extent, but it could also be a gross exaggeration. Most of the criticisms suggest that the curriculum is outdated as teaching is just involved in passing materials from the notesheets of the Professor to those of the student without much qualitative change in the latter.

It is useful to start out by identifying some of the needs of modern society that we expect to fulfill through our agricultural graduates. The first development responsibility is to serve the needs of our farmers who are also the centre of our development activities. In most of the universities, we have been emphasising crop prod-

uction, increasing crop productivity through improved soil fertility, livestock production, better yields, and so on. But what we have forgotten is the farmer. In most of the universities, including the university I belong to, this fact has been overlooked. We have been unable to tell our students about the needs of the farmers, their values, customs, and how we should adapt modern technology to his\* requirements. Whenever we look at the Green Revolution or any other development projects, the participation of the farmer has been minimal. As somebody once said, there is no transfer of knowledge from the professor to the student if it does not go through the brain of either of them. Exchange of notes alone makes little difference. Unless there is participation of students in the curriculum development process and in our classrooms, we cannot create a sense of participation. Similarly, with the farmers, they should participate in all development projects that are going to affect them and our teaching should focus on ways to promote this to make it more relevant. The Harvard model of teaching tries to do just this - where the professor is not supposed to teach only, but also to participate in discussions with the students.

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M. A. Khan

\* For his, read also hers (ed)

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The next aspect is planning and decision - making. What exactly are we trying to diffuse among the farmers? Are these social innovations or innovations created to improve technology or both? Is the objective of education to change behaviour or improve skills? Is it to improve technology or engage actively in a process of social innovations? In my opinion, the main objective of education is to bring about a change in behaviour. If there is a change in the behaviour of the students, then we can expect them to bring about changes in the behaviour of the farmers. And that change in behaviour will lead to adoption of improved technologies. Our need for human resources for future development should be looked at very carefully.

The next issue is local models for education and extension. So far we have been importing different models from abroad. The Training and Visit (T&V) System and many other models have been a failure in most countries. What we need to do is develop models based on our experiences and learn from each other. Our systems have therefore a major role to play in providing answers to our development needs. The relevance of agricultural education will depend upon how successful the graduates are in the field. Obviously agricultural graduates in any field — livestock, crop production, soil science, and so on — must be technically competent. They must be able to raise crops. They must know what type of livestock production exists and the type of practices that are being followed, including ways to improve local production practices.

Our curricula should provide the technical inputs needed to make the individual competent in handling practical matters. The theoretical aspects must be properly balanced with the practical aspects. There is also the issue of economic analysis and soundness. Graduates in agriculture must be able to demonstrate to farmers that certain technologies or innovations are economically viable. Such demonstrations can focus on either the maximisation of profits or the minimisation of costs. The third area we have to look at very carefully is scientific competency. Graduates in agriculture are required to demonstrate to farmers through scientific experiments. They must have some basic background in science to carry out small experiments on the farmer's fields. The fourth area is farming competency. As far as farming competency is concerned, graduates must be able to grow crops in the ways in which farmers are growing them. They must be able to raise livestock. This is the area in which most of our graduates are deficient, as they have practically no experience in working with farmers, nor adequate practical training.

The last area of competency is communications. Unless our graduates are able to communicate with the farmers on their level and in their other language, there is little value in their knowledge to the farmer.

To properly communicate with farmers, it is essential to understand their value systems, their social systems, speak the same language, and practically demonstrate new agricultural techno-

logies in ways farmers can understand and use in their environment. Without these there is no effective communication with farmers. This is the main problem at present with our agricultural graduates. This is one reason why agricultural graduates are hesitant to go and work with farmers in rural areas. We therefore have to look back critically and see how these issues in development are integrated into our agricultural curricula. In my university we have introduced internships in which students are expected to spend a good part of their time in the field with the farmers. We are working with a three-year degree programme and one full year of internship. Students can work either individually or in groups and learn about the different problems of agriculture in the field with the farmers.

### **Agricultural Education and Research in the Northeast Indian Himalayas**

*M.P. Singh, Vice-Chancellor,  
Central Agricultural University,  
Imphal, India*

In 1993 the Central Agricultural University for the States of the Northeastern Indian Himalayas was established. The principal objective behind the establishment of agricultural universities in India, such as Punjab Agricultural University, was to address the problems of agriculture, and, more specifically, food shortages faced by India during the 60s. It was for this reason also that many of the agricultural universities were established in the potential agricultural belts in Punjab, Haryana, Western U.P., and the southern part of India. Later

on, when food problems became less serious, agricultural universities were established in other areas to look at other issues as well. In Himachal Pradesh, the University of Horticulture and Forestry was established. In the northeast, there are seven campuses of the Central Agricultural University spread throughout six hilly states. Our approach has been to develop curricula that are most appropriate to a particular area. Each agricultural university is free to prescribe its own courses. It has complete autonomy, and there are differences in curriculum between the universities. For example, in the northeast, the curriculum includes studying about tea and coffee. In the northeast, the demand for milk is not as great as that for animal meat. In our animal husbandry courses, we are trying to incorporate these aspects to make our teaching more appropriate to local conditions.

One problem in trying to be strongly location-specific (in teaching) is that the graduates do not always stay in these areas. When they move and find out that their knowledge and skills are not relevant to problems in other areas, they have great difficulty in fitting into the needs of other areas. In the Indian Union, one can move from one State to another. Under the NARS, i.e., the Indian Council of Agricultural Research (ICAR), people can be transferred from Jammu Kashmir to Kerala or from the northeast to the western part of the country, e.g., the Maharashtra and Gujarat regions. Because of this, some uniformity and standards have to be maintained. This is the reason behind the establishment of the Deans' Committee to review the courses every ten years; it

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is to incorporate the latest developments and maintain some uniformity in standards, while retaining the freedom to make certain changes at local level. There should be some flexibility. In order to enhance the practical side of the courses, every student, depending upon the college, is given one hectare of land for group cultivation. The entire cost has to be borne by the students and the profit is also theirs. They cannot employ hired labour. The entire farm operation has to be carried out by the student or the group.

Unlike previous programmes, at present we have a four-year degree programme in all professional courses such as agriculture, veterinary science, home science, agricultural engineering, and others. We are trying to maintain some degree of uniformity, taking into consideration the overall requirements in India, but, at the same time, a major focus is also on simultaneously meeting local demands, needs, and requirements. For hill and mountain areas we may require more specific courses. We need to think of this within the overall framework, because the overall acceptability for other areas cannot be overlooked.

### **Educational Institutions' Experience in the Western Himalayas**

*K. P. Nautiyal  
Vice-Chancellor  
Garhwal University  
India*

At present, given the rural setting of Garhwal University, subjects such as

horticulture and forestry are being taught along with other subjects. These two subjects were selected because of their relevance to the sustainable development of mountains areas. The students have the option to choose these subjects, and they can also select them for post-graduate studies. Apart from this, there is also an autonomous research centre focussing on high altitude plant physiology, and this has been providing a very good service to the people.

The university is also involved in providing different types of training through small centres in different areas, including centres addressing some of the problems of mountain women.

The aim was to open these courses to attract the youth of these areas, so that they could go back to their villages and work with the people there. However, the impact so far has been fragmented on account of different constraints.

Insufficient manpower, limited linkages with adjacent agricultural universities, lack of funds for exchange of students and staff with other agencies, limited infrastructural facilities, no extension budget, and so on are some of the important constraints which seriously dilute the efforts being made by the university to address mountain development problems. Keeping in mind the requirements of the mountains and their development, all students are exposed to some of the special courses, e.g., modern methods of agroforestry and horticulture, importance of traditional crops, the need to develop high-value, low-volume products, the possibility of

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*K. P. Nautiyal*

domesticating wild fruits, and the development of appropriate processing are some of the important subjects being taught which are relevant to mountain areas.

To develop human resources in all the above aspects, the university needs high-level inputs. While governments are convinced and committed, international agencies, such as ICIMOD, can also play a very important role in helping to achieve the goal of developing suitable human resources for sustainable mountain agriculture. An important area for support is the exchange of faculty and information about mountain agriculture and related subjects. ICIMOD should also extend its support to sharing experiences from the regional countries on agricultural courses for mountain areas. Close partnerships among the regional countries, facilitated by ICIMOD, will be a welcome step in promoting sustainable agricultural development in mountain areas.

### **Mountain Agriculture and Education, New Challenges Ahead**

*R.P.S. Tyagi, Vice-Chancellor  
Himachal Agricultural University  
Palampur, Himachal Pradesh  
India*

I think the education system in this part of the world is very important for sustainable development. We are at a junction at which the challenges are many. The most important challenge is the emerging economic scenario on the national and global level. We are very conscious of it. The existing

educational systems in India or Pakistan or Bangladesh, or other countries in the region, have more or less the same pattern. Today, the expansion has been so fast that the quality of the programme has deteriorated.

The curriculum has been divided into too many separate units. While there is a core element which is common, consisting of the basic and applied aspects, the need is for diversification. Although the students entering agricultural universities today are much more informed than in earlier times, the demands today are also much greater. There is a great need to improve the quality of educational programmes. In India today, there are 31 agricultural universities and the intake is about 22,000 undergraduate students every year. The faculty number about 15,000. If we include the ICAR Institutes, the number of scientists increases to about 22,000. This is a vast resource and should be used effectively for the development of our agricultural sector.

Our information system is very weak. Neighbouring institutes do not know what others are doing.

While we borrowed the American land grants' model for our agricultural universities during the 1960s, we have not succeeded in creating the culture and environment to make this model functional in India. Very recently, the Indian Council of Agricultural Research established a Deputy Director General of Education who is responsible for coordinating all the agricultural universities. There is also an accreditation board that will

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R. P. S. Tyagi

function as a regulatory body. It will be visiting universities, examining their infrastructural facilities and staff, and making decisions regarding whether or not the college can be recognised for the purpose of undertaking degree programmes. There are no doubt many problems. But new responses are also being made. Collaboration between all the parties concerned is very essential for the future of our agricultural educational programmes and institutes.

### **University of Agriculture and Technology, Pantnagar, and Its Experiences in the UP Hills**

S. C. Mogdal  
Vice Chancellor,  
University of Agriculture and  
Technology, Pantnagar, UP, India

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S. C. Mogdal

Pantnagar university has the responsibility for the entire hill area of Uttar Pradesh. A very strong hill research and extension centre has been established at 6-7,000 ft. In this centre three dozen PhD scholars live, work, and undertake different experiments. At the university, an adequate infrastructure for research, teaching, and extension has been created.

There is a fully-fledged College of Forestry and Hill Agriculture with a very strong extension wing. A series of diagnostic surveys was carried out and, on the basis of these surveys, we identified some of the important problems of the hill areas. One of the major tasks for our scientists is that of managing the resources in the hills. Understandably the hills have a lot of problems, but they also have very

valuable natural and human resources.

In terms of natural resources, the major problem faced by hill farmers is the degradation of forests. Clearly, this cannot be stopped unless we find alternative sources of energy. Scientists are working on these alternative sources of energy. Fortunately, the hills have many alternative sources of energy in the form of sun, wind, and water. We have ongoing research projects in all these areas. Through experiment, we have identified multi-purpose trees suitable for plantation on farmers' fields and in nearby villages. These trees will give them fuel, fruit, and will also improve the hill environment. We have also many innovations in water harvesting, particularly for rain water. We also provide training in farming systems.

Regarding gender, it is well established that mountain women are the farmers mainly responsible for mountain agriculture. Most of the able-bodied men have migrated to the plains and left behind their women or the elderly. These women are busy with domestic chores, rearing children, doing other work in the home, and being responsible for agriculture or horticulture as the case may be. They have to go about seven to eight kilometres to fetch drinking water and a similar distance to gather fuelwood, fodder, and foliage. These are the problems of hill women. Most of the extension workers are males. These are critical problems for our agricultural education, research, and extension systems.

We have a network of various research stations and extension units in the 12

hill districts where we work. Through these, we are organising training for farm women on the campus and, because it is difficult for them to move from their farms to the training centre, we are also organising on-farm or in-village training for women.

Regarding sustainable farming systems, one important aspect is that these farming systems not only have to be sustainable but also market oriented. It seems to me that these two aspects are almost irreconcilable. It is a big challenge to find systems that are environmentally safe, eco-friendly, and market oriented. The right combination could make them sustainable.

What we need to do is to find eco-friendly farming and cropping systems and then find the marketing channels for the outputs from these systems. But this is not easy. I am not against farmers becoming prosperous. They should also have the right to earn a decent income. But, in the process, they should not damage the environment. As most farmers do not monitor their environment, somebody else might have to do it for them so that timely corrective measures can be introduced.

Mountain farmers generally have very small pieces of land, and they produce food for only three to four months in the entire year. For the rest of the period, they have to depend upon money coming from the plains. Therefore, providing 12 months' food security to the hill farmers is a high priority in hill development programmes. This could be done by providing alternative sources of earnings to hill farmers through

activities such as horticulture, small-scale industries, mushroom production and packaging, sericulture, rabbit raising, milk production, apiculture, off-season vegetables, vegetable seed production, and so on. The list is fairly long and many of these can help improve the economy of the farmers. One of the major problems here is communication. In spite of rapid changes everywhere, hill farmers have not harvested the fruits of this development. All the agricultural universities in India have been connected, as indicated earlier, through Internet. We need to ensure that the hills are connected through Internet and other information systems so that they can take advantage of changing demand conditions in different places.

NGOs can also play a great role in taking the farm produce from the hills to the markets. In China, Korea, and other newly developing countries, farmers are reported to be receiving about 60 to 70 per cent of the final value of the produce. Here farmers hardly receive 10 to 20 per cent. We must protect the farmers from exploitation by creating systems that are farmer owned and managed.

Research and technology linkages have been well developed in India with the help of ICAR and state government structures. With these agencies, the dialogue is increasing. There is representation on the research and extension advisory committees. Farmers are also being represented on the research advisory committees. These are very important changes that will help to promote the sustainable development of hill agriculture. While

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S. M. Farouk

there are many problems, activities on numerous fronts are also being organised.

### **Technical Research in Universities and Linkages with NARS**

S. M. Farouk  
Vice Chancellor, Bangladesh  
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In Bangladesh, we have one agricultural university which is a multi-disciplinary, multi-faculty university established in the early 60s, more or less on the pattern of land grant colleges in the United States. We are providing education, research, and a little bit of extension. Research is mostly at the Master's and PhD levels.

Master's degree students have to write a thesis as part of the curriculum and PhD's are based completely on research. There are no courses at the PhD level. This research is mostly demand driven. The Bangladesh Agricultural Research Council is the apex and coordinating body determining the national research priorities in the agricultural sector. We have been conducting research for the last 20 years, and some of the research findings are now beginning to reach the farmer. We have been able to release some crop and vegetable varieties along with simple technologies in fishery development, agricultural engineering, irrigation systems, vaccine production, livestock management, and a few others.

One of the main weaknesses is poor linkages within the educational system.

The National Agricultural Research System is comprised of about 10 institutions which are fairly autonomous. The Agricultural Research Council does not have any administrative or financial control over these organisations. It just coordinates and awards research grants and research contracts from the funds it receives from the Government, international donors, and other agencies. While the agricultural university is formally represented on the Research Council along with some of the major agricultural research institutions, this linkage is formal. The scientists from various institutions also get together and formulate research projects at times, but this cooperation is more or less voluntary. There is no system of working together on a regular basis. This problem is being addressed now, as comprehensive NARS legislation has been drafted which will hopefully integrate the NARS components and bring together the scientists and resources. We hope this will overcome the current difficulties experienced in formulating research programmes and implementing these on the ground.

Out of 10 or so research institutes, only the Bangladesh Research Institute is multi-crop, multi-commodity, and multidisciplinary oriented. Most of the others are mono-disciplinary or mono-commodity oriented, e.g., the tea research institute, forest research institute, rice research institute, jute research institute, and so on. These are all under different ministries. For example, the Forest Research Institute is with the Ministry of Forest and Environment, the Rice Research Institute is with the Ministry of Agriculture, the Fishery Research

Institute is with the Ministry of Livestock and Fisheries, and so on. The coordination problems are huge. Hopefully, the proposed legislation will bring about more integration and greater cooperation among the agencies.

We have not so far given much focus to hill agriculture. The Bangladesh Agricultural Research Institute and the Forest Research Institutes have some work in the Chittagong Hill Tracts. From the early 90s, we have been trying to address some of the problems in hilly areas — such as gender, diversification of crops, and farming systems' development. Hopefully, in collaboration with ICIMOD, the hill areas and their farmers will also begin to receive greater attention in the future.

The gender issue is becoming very important, as we have found that, during the last 20 years, more women are coming into farming. Although the statistics do not reflect this, we can see it while visiting the villages. As already indicated by other speakers, the small farming families are being split up and the males are going out to cities and even abroad for employment. Thus women are left behind and are engaged in farming, small-scale poultry raising, goat raising, and vegetable gardening. In the hill areas the scenario is a little bit different. As the tribal people in the hill areas are traditionally matriarchal families, women take the leadership in all family affairs. Integrating gender issues with all our research projects has been a policy decision of the agricultural university, and this will ensure greater attention to this issue in the future.

With the traditional focus on rice and jute, there is a need to diversify agricultural production. Depletion of soil nutrients and other problems have also made it necessary to motivate the farmers to diversify their cropping systems by growing off-season vegetables, oil seeds, and other crops. Traditionally, a village family is not happy if it cannot grow rice for its own consumption. If they have to buy rice, they are considered to have a low status in society. So farmers grow rice, even if it is more economical to do something else. While this psychological barrier is gradually breaking down, our research should also provide appropriate crops and the teaching and extension services should motivate them to understand better the opportunities available in the context of their overall priorities.

Another problem is that we are losing our qualified manpower. Many well-trained people are being lured away to Australia or New Zealand, and this is a big problem in Bangladesh at present.

### **Capacities of Universities in Extension Education and Extension**

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Y.S.P. University of Horticulture &  
Forestry, Solan, Himachal Pradesh,  
India*

In the case of Himachal, there was some concern about the university taking over the department's extension role because of manpower and other resources' constraints. However, after extensive discussions, a clear line of demarcation between the university and State department has been

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established. It has been now accepted that the university extension education programme will be at the front line, and this is also the first line extension programme.

A very close relationship exists between the department and the university. Specific functions have been identified, such as farm advisory, communication, and training services. Under the Farm Advisory Service there are programmes such as technology verification at the farmer's level, technology refinement at the farmer's level, technology extension at the farmer's level, and demonstration and correspondence course programmes, including a farmers' club and the use of a watershed approach.

Under the training programme, there are two short training courses for extension personnel from the State Department. The State Department has accepted that technology generation should be within the university, and that university personnel are also the best to impart the training needed to upgrade the professional capabilities of the extension personnel of the State Department, voluntary organisations, and semi-government organisations, including the co-operative sector. Even the fertilizer industry people are receiving training from the university. Unemployed graduates for self-employment have very similar programmes in various sectors. Similarly, many universities have special correspondence courses under different educational programmes and here the farming advisory services and correspondence courses are complementing each other reasonably well. While the

theoretical aspects are taken care of by the correspondence courses, the practical aspects are covered by programmes under the district units of the *Krishi Bigyan Kendra(s)* (Agricultural Science Centres).

For communication purposes, there is also a video production programme. With the permission of the All India Radio and the National Radio Network, we have started to produce regular farming programmes. We also have a very big publications' unit for publishing in local languages. For each of the agroclimatic zones, we recommend special packages reflecting the specific recommendations suiting the particular agroclimatic conditions.

A farmer's magazine is published in various languages, depending upon the area covered. ICAR is also publishing in English and local languages. Once a technology is considered suitable by the extension and research wings of the university, then it is demonstrated on the farmers' fields with the full participation of the farmers and local extension personnel. Thereafter, they take the technology to the farm, and this is done through various mechanisms. The same approach is used for feedback, identification of new problems, and for communication to the Directorate of Research for initiating new research programmes. There is very close coordination between the research and extension within the university and between research and the State Department and the agricultural extension education programme. The interlinkages are very strong and provide a reasonable direction for the university research programme.

## **Expectations from Universities and Other Issues**

*M. Bashir, Director General,  
Department of Livestock,  
Govt. of Balochistan, Quetta,  
Pakistan*

I believe the expectations from the universities are very high and the responsibilities these universities and institutions are sharing are on a higher scale still.

The point is whether the universities or the educational institutions are up to the expectations and whether they are adequately client-oriented or not, particularly in terms of addressing the needs of the farmers.

It was rightly pointed out that probably the products of our universities being sent out to market are not of adequate quality, and the farmers are not satisfied, not to talk about other organisations. This is a very poor state of affairs! The exceptions are always there, but the overall situation is that the products from the universities are not up to the mark, or of good standard, and therefore we should look into this problem very seriously. If you take the case of sustainable mountain agriculture, the courses that are taught in our institutions have been mainly brought from the plains; the courses have been borrowed from those developed for the agriculture in the plains. With the passage of time we are making changes, but there is a need to look into the matter seriously. We should come out with a very unique syllabus for institutions located in the Hindu Kush-Himalayan Region. The courses need to be designed ac-

ording to the needs of the environment, the aspirations of the farmers, and the potentials of the market place.

The next point is institutional stability. This is important because institutions take time to develop and without stability we cannot expect good results from these institutions. We need to decrease interference from outside, whether it is political interference or other types. Adequate facilities and infrastructure should be provided so that the institutions with the mandate for research can do a good job. The research is divided between the research institutions and agricultural universities. There is also some duplication with the same problems being examined by different research institutions. This duplication should be removed. Research should be the responsibility of the universities. I think a good example is the University in the Indian Himalayas, Himachal Pradesh Horticulture and Forestry University, which has produced marvellous results. It has incorporated education, research, and extension. Fellow scientists should first emphasise good research work. They should also help to build up confidence amongst the farmers who are the main clients. The outreach programmes of the universities are very weak at present. The programme should work in two ways, so that we not only go out to the farm but also invite the farmers to come to our institutions. This dialogue has always yielded very good results. Twice or thrice, when we called meetings of the farmers and had direct communications with them, it yielded very good results.

Another very important point is gender participation. In most mountain areas,

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*M. Bashir*

**Erosion is going on all the time, but it is not visible. We have to save the natural assets as soon as possible**

M. Bashir

100 per cent of all agricultural activities are undertaken by women because the men are out in search of jobs. In the past we have ignored this group. We have been able to admit some female students in our college. Even with low ratios we are seeing some very good results amongst the rural community. As a source of dissemination of knowledge amongst women, there are different barriers for male contacts and consequently women extension workers and professionals should be encouraged.

Lastly, I would like to discuss the problem of monoculture. Farmers have abandoned the cultivation of apples, because of many problems, viz., insects, low yields, costs, and so on. Natural resources, such as soil,

are also deteriorating. I am a scientist, and I have been working for the last 15 years in those areas in different capacities. I have worked with various organisations. What I see is that natural assets are being degraded and very little attention is being given to this aspect. The sooner we look into these problems, the better. Erosion is going on all the time, but it is not visible. We have to save the natural assets as soon as possible. I feel it is the responsibility of the universities and agricultural research institutions. The challenges are enormous, particularly in the mountains which are still very neglected. I hope fellow scientists will pay greater attention to the mountains in the future. Where there is a will, there will be a way.