Chapter One
Background & Rationale

A Phenomenon of Change

The sustainable development of the HKH region across eight countries (i.e., Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan) is a challenge assigned to ICIMOD. Over time, the region has witnessed sequences of change in the edaphic, abiotic, and socioeconomic environments. These changes occurred as a consequence of neglect and inappropriate use of mountain resources. If unchecked, this phenomenon could pose a very real danger to the ecological balance of the region, to the extent of irreversible disruption.

In the absence of economic transformation, a scenario of poverty, inequality, and marginality within subsistence-based mountain communities will prevail. Economic development is slow and is not concurrent with the rapidly increasing demographic changes. It is expected that the population in the HKH could double within two to three decades, and this demographic phenomenon may altogether change socioeconomic structures. It would further intensify socioeconomic compulsions that would encourage local inhabitants to overexploit the fragile environment upon which, invariably, their survival depends.

The Compatibility of Mountain Agriculture

Mountain agriculture is a blend of various farming and livestock production systems. These systems were developed over time and were compatible with food security, self-reliance, and a slow rate of change in economic/material demands. Different components of agriculture were successfully integrated, resulting in an important adaptive strategy. Farmers had little urge to intensify their agricultural operations. However, they did adopt various practices to handle the 'mountain specificities' and constraints. These practices were refined through local experience and could be called 'indigenous technologies'. These technologies were low in cost and agriculture-friendly.

Demographic pressures linked with development processes are now questioning the applicability and sustainability of traditional agriculture. Over two-thirds of the people in the HKH region, still dependent on farming, are affected by recent changes. In trying to limit the adverse impact of these changes on their livelihoods, it is possible for them to make the choices given below.

- To intensify agricultural operations and expand the scale of operations

In fact, this is happening in terms of expanding crop cultivation in environmen-

tally sensitive areas and/or increasing the number of animals in herds and flocks, etc. The trend has endangered the biophysical properties of the climax mountain ecosystem.

- To look for off-farm employment or other sources of income generation

Off-farm employment opportunities within the HKH region are limited because public and private sectors are merging. Therefore, some of the job-seeking population is displaced and moves to areas towards the lowlands; their lack of other skills besides farming makes them eligible to work only as poorly paid labourers. Other ways of making a living, such as setting up a small business, are not possible due to lack of resources and training. The social consequences on both sides are rarely pleasant.

- To increase farm income by employing appropriate technologies

Farming communities have managed to survive for generations by using local resources on the basis of their indigenous knowledge. A consistently changing economic and environmental situation proposes a modification of conventional practices of agrarian societies in the HKH region to keep pace with the process. A technological breakthrough could help to sustain these mountain farming systems.

Farmers do recognise their problems. The solutions, and also the problems, are certainly linked to their indigenous capabilities and limited technical skills. This does not mean that indigenous knowledge is not capable of addressing the new era challenges. Simultaneously, many modern technological solutions failed in reality because they were never compatible with local culture and knowledge. Therefore, while development interventions should be based on indigenous knowledge, there should be a process of blending indigenous with exogenous knowledge.

Emphasis on Indigenous Knowledge

Indigenous knowledge cannot be applied indiscriminately, nor is all knowledge always equally useful. However, it does operate within a given socioeconomic and spatial set-up and plays an active role in the culture of a particular community. Integration of indigenous knowledge while developing or selecting a technology would present the technology as one sensitive to the local culture, and this would be an additional advantage for its smooth dissemination at the grass roots' level. It could be promoted as an appropriate, viable, and sustainable technology. An indigenous approach when introducing a new technology could also ensure its cost effectiveness.

Based on the experiences of various international development specialists, Warren and Cashman (1988) have suggested some important projections for incorporating indigenous wisdom in the process of effective technical change for sustainable agriculture and rural development. They stated that dismissing local knowledge would encourage the adoption of practices leading to undesirable effects through the inappropriate use of local resources, besides undermining the delicate balance of the local cultural or natural environment. It would subsequently cause decline in the society's well-being.

It is possible to modify all indigenous knowledge based technologies to make

them appropriate for dissemination. Some technologies can be borrowed in their totality from other cultures. For example, old tyres are commonly used for making water containers and other domestic utensils in Balochistan, Pakistan. These containers are cost-effective, long-lasting, and environmentally friendly. The technology can easily be replicated in other regions. Another such technology is the smoking of orchards using wind direction during the winter in order to protect fruit trees from frost injury.

Most indigenous technologies show considerable scope for improvement. With a little modification, each one could emerge as a highly appropriate means of generating income. For example, the flock owners of Balochistan convert their daily surplus of whey into small dry balls of skimmed milk, locally called *khurud*. It is stored for long periods under ordinary conditions for daily use and is also sold in the market. This primitive technology can be successful in other countries as a means of generating income.The product, a highly nutritious food supplement, can be marketed throughout the world simply by improving the hygiene of the production process, adding various flavours, and by packaging and marketing it in a popular form.

Sustainable development of mountain agriculture requires a well-balanced mix of technological innovations in order for technology to become the main determinant of development (Kaimowitz 1990). It could be based on a continuous flow of new and appropriate technology. A good menu of technologies, i.e., indigenous and modern, offers better choices to local farmers and reinforces competitiveness among technologies. It also motivates the local users to propose improvements or modifications of available technologies to meet different, specific situations.

What Makes a Technology Appropriate

Fresco (1986) defined technology as the means by which inputs are transformed into outputs. A popular agricultural technology in one region may not necessarily be applicable in another region. Many factors such as socioecological paradigms (Gupta 1992) and cultural and political parameters determine its acceptance in a particular place. The technology should address immediate problems and needs of local farmers. It should match the biophysical environment and local sociocultural conditions. Simplicity would be another desirable feature because a complicated technology could discourage the user. It should support, strengthen, and integrate traditional farming systems and overall land-use plans.

The sustainability of an appropriate technology in a particular area would depend very much on its impact. Impact should be measured at the level of the individual farmer as well as at the community level. It could be measured using welfare indicators such as increased farm income, reduced risk, resource conservation, improved livelihood, better security, and overall economic growth (Kaimowitz 1990).

The appropriateness of a technology should preferably take into account the gender issue. The technology should equally benefit all gender segments. Technologies are mostly male-oriented and usually displace the female population. If a technology were to be used exclusively by males, it would be inaccessible to about

50 per cent of the total population. A significant impact on overall welfare in an agrarian society can be made possible when both men and women have equal access to farming technologies. It is recommended that women should be considered 'preferred clients' when preparing a menu of farm technologies.

ICIMOD – A Technology Promoter

Sustainable use of mountain resources demands ecosystem-friendly technologies. Dissemination of this kind of technology could change the socioeconomic scenario of mountain communities besides conserving resources. Many farmers have now realised that adopting such technologies could increase field productivity. However, a majority of farmers do not have access to information about potential farming technologies due to inadequate documentation and dissemination of the relevant materials by the public institutions concerned.

Potential technologies could be indigenous, new, or a blend of both. An indigenous technology from one region could be used successfully as a new technology in another part of the world. Over time, certain improvements could strengthen significantly the role of different technologies for economic and agricultural growth.

A case in point is that of seabuckthorn, a 'magic' plant growing in Russia, China, and most parts of other HKH regional countries. Seabuckthorn is now being promoted as a highly successful, new technology all over the world based on the success of Chinese seabuckthorn models. It is believed that many other indigenous technologies in different HKH zones are not being documented. If information on these technologies was documented and disseminated, they could be replicated in other countries. Similarly, some modern technologies with their origin in scientific research could be adopted 'intact' or with certain modifications. Information on their usefulness and application under specific circumstances could attract farmers of other similar eco-zones to replicate the techniques with anticipated profitability.

Realising that most farmers do not have ready access to such information, ICIMOD is committed to promoting appropriate technologies as per its Regional Collaborative Programmes (I & II). This requires the pooling of all kinds of potentially useful technologies by a central information bank. Each technology must be accurately described in order to facilitate dissemination. For this purpose, the Mountain Farming Systems' Division (MFS) of ICIMOD has accepted the special task of promoting an appropriate farm technology package. This package aims to improve the productivity of small mountain farms without degrading the resource base, and at the same time, integrates gender concerns into mountain agricultural development. The technology package would equip the national and regional extension services to carry out their activities with maximum efficacy.

In this context, the MFS mobilised various institutions from countries in the HKH and organized a meeting of experts in Kathmandu in 1996. One of the specific objectives of this meeting was to develop a methodology for documenting appropriate farm technologies and dissemination approaches in different agro-ecological zones of the HKH region.

Methodology

This information was collected with the collaboration of focal institutions in China

(CAS, Beijing), India (Dr. Y.S. Parmar University of Horticulture and Forestry, Solan, HP) and Pakistan (NADRI, PARC, Islamabad). The technologies were documented in various parts of the HKH countries during 1996-1997.

In each country, field surveys were conducted by a specially coached multidisciplinary team. Participatory Rural Appraisal (PRA) tools were used for the documentation of appropriate farm technologies. During field surveys, farmers were interviewed with the help of semi-structured questionnaires, in group discussions, and when travelling on survey transects using the guidelines of the officials of the concerned public departments. Government departments and non-government organizations (NGOs), if any, were consulted to help document technologies and to obtain supportive secondary information about the area.

The following technical approaches were considered while documenting the technologies.

- The resource base management and development technologies which focussed on:

  natural resource technologies of a physical nature, used mainly for management, development, and conservation of land and water resources and
  farm resource technologies that increase farm productivity of crops, horticulture, livestock, etc.

- Agroenterprise-oriented technologies included household processing, storage, marketing, and income generation.

- Gender-specific technologies involving those that might significantly reinforce the role of women in a particular ecosystem.

Objectives

The specific objectives of this work were as follow:

- building a pool of potential technological options and identifying successful appropriate farm technologies for sustainable mountain farming systems in the HKH region;

- disseminating the most promising technologies on a pilot basis and subsequently promoting the most effective options on a large scale; and

- assessing specifically appropriate technologies for rural women to strengthen their economic position.