CHAPTER 2
Revisiting Mountain Perspectives and Himalayan Dilemmas

1. Past Approaches to Agricultural Development in the HKH

Jack Ives and Bruno Messerli (1989) in their classical study, **The Himalayan Dilemma: Reconciling Development and Conservation,** challenged many assumptions and ***cherished myths*** about the interaction between Himalayan farmers and their environment (Ives and Messerli 1984; Ives 1987). Until better research is carried out, the authors argued that the available empirical evidence does not support the thesis that subsistence farmers are destroying their local environments on a pan-Himalayan scale and thereby creating ecological havoc in the plains below (Eckholm 1975 and 1976). They also challenged the scientific and development communities to come up with creative approaches for resolving the tensions between development and conserving the mountain environment.

In agricultural science/development circles, interest in factoring environment into the conventional production equations is relatively new. Over the past half century, for instance, there have been numerous approaches to agricultural improvement in the HKH region by foreign and national organisations, and all of them have centred mainly on increased production as the final goal. The fact is that agriculture in the mountains has been approached as part and parcel of the standard development package applied, rather uniformly, throughout the developing world. The mountains have been treated essentially in the same way as the lowlands and little effort has been made to tailor these internationally-designed approaches to variations in mountain farming systems. Like mini-paradigmatic shifts, as outlined by Thomas

Kuhn (1962) in his **Structure of Scientific Revolutions**, however, the manner in which we have opted to solve the production problem has shifted in different decades, with each period containing its own internal logic and rationale.

Each emerging agricultural development agenda is driven as much, if not more, by global political concerns as by local definitions of the problem. Although the primacy of each approach diminished over time, a cumulative set of demands on agricultural development has evolved over the years. For example, plant breeding to raise yields with hybrid packages reached its apex in terms of popularity in the 1970s, but it did not lose its significance as equity and then environmental issues appeared in the 1980s and 1990s (Rhoades 1989a). The result is that, today, agricultural research is expected to do much more than simply raise productivity; in fact, there are social and ecological concerns that must be accounted for under the new development banner called ***sustainability***. A brief glance at various approaches in Nepal that I have witnessed over the past 35 years is illustrative of these changes (see Table 1 on page 11 for a comparison of selected approaches).

A. Integrated Community Development and Transfer of Western Technology: 1950s-60s

While growth was the primary objective in emerging nations in the years following World War II, agriculture was initially seen as a component of the larger package of modernisation, and this included community development. In western economic thought, there was a prevalent belief in 'stages of economic growth' and that if the right combinations of education, health, infrastructure, technology, and self-help organisation could be

Changes - *D. Miller*

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Table 1: Comparison of Selected Agricultural Development Approaches in Nepal: 1970-1990s[2]

Parameter	Green Revolution Technology (1970s)	Farming Systems' Research (1980s)	Sustainable Agriculture (1990s)
Temporal	**Annual cycle**	**1-3 years' cycle**	**5-25 years**
Spatial	Plot-field	Field-village	Catchment, watershed & ecoregion
Beneficiary	Farmer/ consumer	Households (on-Farm)	Multiple groups (on/off-farm)
Technology	Component	Whole farm system	Complex, ecosystem sensitive
Target	Farm profits/ surplus	Farm profits/ poverty reduction	Monetary/ non-monetary
Role of Farmer	Recipient of technology	Provider of information	Participatory, indigenous knowledge
Policy	Inputs/prices	Marketing	Multiple (society/ individual)
Environment	None	Marginal/on-site	Maximum/off-site
Equity	Irrelevant	Gender/ benefits to poor	Gender/benefits to poor/ intergenera-tional

Source: Adapted from the author's contribution to Greenland et al. (1995)

assembled, then the stage was set for 'take off' to achieve modernisation. (Rostow 1961). The assumption was that Europe and North America (United States and Canada) represented the apex of modernity. Much of the growth technology, models of development, and experience could be transferred directly from the north to the technologically handicapped south. For example, when I came to Nepal in 1962, as a US Peace Corps Volunteer, the integrated community development approach along with ag-

2 The author realises that this table is more typical of Nepal, India, Bangladesh, and Pakistan than of China, Myanmar, or Bhutan - due to the nature of their political systems. However, throughout the HKH, a similar shift in paradigm can be discerned. The table also does not account for intra-national variations in approaches (e.g., Nepal's later focus on 'special' versus 'general' areas).

ricultural extension (US Land Grant Model) were the favoured schemes. In the Rapti Valley Project, where I worked between 1962-64, there were efforts to develop the rural sector in a holistic, integrated fashion. Therefore, the project involved a malaria eradication programme (using DDT), a resettlement scheme, education, road and bridge building, water infrastructure, and health assistance (Rhoades 1978a). I was assigned to a newly established experimental farm with the job of disseminating European breeds and seeds to the new settlers as well as to the mountain regions. During these years, we gave virtually no thought to the impact of farming on the environment. In the case of the Rapti Valley Project, for example, we ploughed up the elephant grass; destroyed the sal forest up to the Rapti River; infringed on the homeland of the tiger, rhino, and elephant, nearly driving them to extinction; and never gave a second thought to what we were doing. In our minds, developing communities and feeding people took precedence over everything else (Rhoades 1978a). Although a few early naturalists sought to raise awareness about the threat to the Chitwan area of the Rapti Project, their voices were not heard until a later decade (1973) when the area was declared the country's first national park (Nepal and Weber 1993:33).

B. The Green Revolution: The 1970s

By the late 1960s, global concern over the famine and upheavals that were predicted to occur in India and other Third World countries led to increased investment in achieving new techniques of food production, a thrust that began in the late 1950s through the efforts of the Ford and Rockefeller Foundations. The answer came in the form of advanced hybrid breeding lines released to national programmes by the newly formed centres of the Consultative Group for International Agricultural Research (CGIAR), especially those with large plant breeding programmes for grains (IRRI, CIMMYT). The challenge to agricultural science was a race against time and famine; the heroes of the day were plant breeders; and the delivery system was the national extension service which only had to deliver the 'packets' of seeds, fertilizer,

and planting recipes to farmers. Unquestionably, on a global scale the impact of the Green Revolution was dramatic, raising production by over 30 per cent by increasing yields and cropping intensities with short-cycle hybrids (Rhoades 1989a).

Cultivated mountain terraces - *D. Miller*

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It was not long, however, before unexpected controversies began to spoil the Green Revolution's parade. Research by anthropologists, rural sociologists, and economists began to detect problems brought about by the adoption of high-yielding varieties (Rhoades 1989a). These issues were not perceived at first as environmental in nature but focussed on equity and social impacts related to the differential adoption of new varieties. Research revealed that hybrid varieties were not accepted uniformly by all groups, especially subsistence farmers such as those found in marginal areas like the Himalayan region. Large, well-to-do farmers in favoured areas (irrigated, flatlands, rich soils, with infrastructure and market availability) were the main beneficiaries. Studies also documented that not only was the Green Revolution benefitting richer farmers, but it may also have had the effect of further impoverishing smaller farmers who were no longer able to complete with new market dynamics (Shiva 1991).

The ***Green Revolution approach*** was tailor-made for homogeneous, irrigated agroecological zones where large numbers of farmers could be readily provided with adaptable HYVs (high-yielding varieties) and inputs by their governments. Despite the rhetoric about ***trickle down benefits*** to small, marginal mountain farmers from the HYVs produced by the international agricultural research centres of the CGIAR, most empirical evidence points to the fact that they had a limited impact (Balogun et al., 1988; Sacay 1987). The HYVs met with limited success due to the broken and highly variable mountain terrain in which each field possesses a different soil type and climate. In the mountains, there was no extension deliv-

ery system (and the attempt to implement the World Bank's ***Training and Visit approach*** failed miserably in all mountain regions). The required inputs of seeds, fertilizers, and water were often absent. Indeed, there is even some evidence that the sustainability of the Green Revolution cannot be sustained even in the favoured lowlands (Byerlee and Siddiq 1994). Beyond a doubt, in highland, irrigated flat valleys, however, where diffusion was possible due to input availability and markets, significant short-term impacts came about because of the shorter, quick-maturing rice and wheat. Double and triple cropping became possible in accessible, irrigated valley zones, and today improved winter wheat varieties are found in these areas throughout the region. Impact on equity, loss of biodiversity, and land/water degradation as a result of the adoption of Green Revolution packages may have been negative, although advances in production and market benefits for favoured 'pockets' cannot be denied.

C. Farming Systems' Research and the 'Small' Farmer: The 1980s

In an effort to correct this undesired social impact of the Green Revolution, a number of development approaches evolved beginning with cropping systems (***constraints' research***) and then **farming systems' research** (**fsr**). In general, farming systems' research has two definitions. One deals with **fsr** in capital letters wherein the focus is a major ecoregion (e.g., lowland tropics, arid or semi-arid zones, mountains) and the holistic improvement and characterisation of the major farming systems in this ecoregion. The efforts of IITA in Africa and ICRISAT in India typify this approach, which often involves designing entirely new, whole systems on experimental stations as alternatives to local, traditional systems. Another approach, **fsr** in small letters (or the farming systems' development approach), deals with on-farm improvement of production and post-harvest systems through close cooperation with the farmers themselves. Through **fsr**, for the first time, social scientists were formally integrated into international and national agricultural research centres and attention was focussed specifically on integrating small

farmers into the research and technology transfer process (Basnyat 1995; Neupane and Sharma 1994). Unlike the earlier transfer of technology era, farmers were seen as important sources of information and were actively involved in on-farm trials and testing (Farrington and Martin 1987). A greater emphasis was placed on indigenous knowledge and on understanding farming in the context of a whole system (Harwood 1979). A special effort was made to involve women farmers and their strategies in the research and development process (for a complete description of various kinds of farming systems' research in the mountains of Asia see Shrestha [1994]).

Involving Women - *D. Miller*

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The farming systems' movement was characterised by both success and failure; although it is difficult to find precise documentation of impacts in the HKH countries, even for Nepal where many **fsr** projects were executed (Basynet 1995). The movement succeeded in placing researchers and farmers in closer contact and elevated farmers' knowledge and priorities to a higher position on the research agenda (Chambers 1994). The emphasis moved away from focus on single commodities and the 'male head of household' to food systems—involving post-production as well as production—and a stress on the household as a producing-consuming unit (Gurung 1994). When viewed in this light, the roles of women, children, and the elderly became more important. While adoption of appropriate technology did not proceed as quickly as in the Green Revolution impacted areas, the closing of the gap between researcher, extension, and marginal farmer through farming systems' research was seen as cost- and time-effective.

The problems with farming systems' research did not lie with its philosophy or methods but often with the agricultural policy and the institutional framework within

which it was expected to flourish. In Nepal, for example, in the 1980s, there was a government decision (spurred on by international donors) to concentrate on farmers in the ***most potential*** areas (***special*** or ***pocket*** areas with irrigation and/or roads and markets), while marginal, dryland (***general***) areas were bypassed (Rana et al. 1988). In addition, agricultural improvement was often targeted according to major zones wherein the high mountains were for livestock, the hills for horticulture, and the adjacent lowlands for cereals and cash crops. This bias towards uniform and standard contexts (a direct outgrowth of the earlier Green Revolution period) ignored local diversity and specific definitions of the problem. Towards the end of the 1980s, the farming systems' research development approach abated and blended into the next phase, that of the environmental sustainability movement.

D. Sustainable Agriculture and Natural Resource Management: The 1990s

The dramatic discovery of the ozone hole in 1988 and documentation of global warming, as well as other world environmental problems, finally thrust the environment on to the agricultural research agenda in the early 1990s (Rhoades 1989a). Although other organisations (e.g., IUCN) had been concerned with environmental issues for many decades, the agricultural establishment—with its 'production at any cost' mentality—was hardly prepared (and many are still struggling today) for the issue of sustainability in which agriculture is expected to remain productive without inflicting harm on the environment. This new phase has had several implications which have a direct bearing on the Himalayan region (Greenland et al. 1992).

First, realisation of the ***limitations to growth*** has cast a dark shadow over the conventional agricultural development enterprise itself (Banskota and Partap 1996). Natural resources are no longer perceived by donor or government agencies as merely a backdrop or the 'milieu' in which to produce more food (higher yields of plants and animals) but in terms of amorphous phenomena such as local and global ecosystemic functioning. In addition to

contingent values (production output), non-contingent values (ecosystem maintenance, biodiversity, water recharge, clean air, sacredness, and bequeath value) are now considered important. The non-contingent values are especially paramount in HKH mountain regions due to the ecology and strong ethnic-ancestral links to the land.

Second, compared to 'component' research in agriculture (crops, soils, animals), combining food production with natural resource management is more complex and complicated for farmers, scientists, and policy-makers. For example, one land user can have an impact on the health and production of another (externalities) or upstream developments can affect the lower watershed. Although immensely more difficult to operationalise, multipurpose sustainable agriculture with a strong agroecosystems' orientation makes more sense in mountainous areas where zonal linkages are crucial and no single crop or farm enterprise dominates.

Third, research institutions, national programmes, and policy-making bodies are ill-equipped to deal with sustainability, especially in mountain settings. A government ministry concerned with conservation of resources may find itself at odds with one promoting food production or land titling. Until recently, short-run goals (annually or even quarterly) in production output were required of projects and, still today, donors require ***impacts*** that are virtually immediate and measurable. However, sustainability is a time product and can only be measured over a 10-25-year period, a fact which conventional science and, certainly, policy-makers have a hard time comprehending. Despite the often heard statement that governments have longer planning horizons than farmers, officials and state bodies have their own short-run agendas which run counter to the longer-run goals of both farmers and the sustainable development agenda of international agencies.

E. Accounting for Diversity in HKH Farming Systems

The foregoing overview of past development approaches clearly suffers from two shortfalls. **First**, the lack of systematic published overviews of the diverse types of

farming and agricultural systems in the HKH makes it difficult to sort out the different ***grass roots*** responses to development approaches and mandates that have been imposed from the outside by international and national bodies. Certainly, there are hundreds of specific studies of crops, animals, districts, and even large landscapes in the HKH. Likewise, there is a wealth of knowledge about the diversity of system types in the heads of scientists and planners who have long dedicated themselves to the study of the region. However, little of this information has been pulled together in a systematic fashion (even in a hard copy atlas of HKH agricultural systems). I will later argue that this task should be taken up with the greatest urgency by the International Centre for Integrated Mountain Development (ICIMOD), the only institution with a regional mandate for the task.

Second, given the lack of a readily-available systematic overview and database, I have relied—as most generalising authors do (e.g., Ives and Messerli 1989; Panday 1995)—on materials from Nepal as a window to the region's agricultural problems. No one realises this shortcoming more than I, but for the moment the best one can do is to alert the reader to the difficulty and the need (see Chapter 5 in this book). If there is one truism about farming systems in the HKH, it is that they are indeed diverse. This immense diversity runs through vertical, social, and physical space (i.e., class, caste/ethnicity, and altitudinal zones) and along longitudinal/latitudinal dimensions. Therefore, an earlier reviewer of this book was absolutely correct to point out that development impacts have not been uniform across the HKH. Contrary to Nepal, for example, Bhutan is a labour scarce and land-forest rich economy. In the Chittagong Hill Tracts of Bangladesh, the in-migration of lowlanders is the major issue, while in India the differences are between the eastern and western Himalayas. In Northern Pakistan and China (Tibet), the problems are defined in terms of rangeland degradation. Indeed, I argue here that all too often there is a disjuncture between local/regional definitions of the problem and solutions being promoted by national and international bodies. This, to my way of thinking, makes a

powerful case for participatory research with mountain farmers (see Chapters 7 and 8 in this book) and for a database upon which to link needs with programmes and technologies (see Chapter 5 and the objectives of Agenda 21, Chapter 13). Our planning map of the future is at present very obtuse, since details about diversity are missing or scrambled.

2. The *Half-Empty*, *Half-Full*, and *Empty* Glass Debate on Himalayan Agriculture

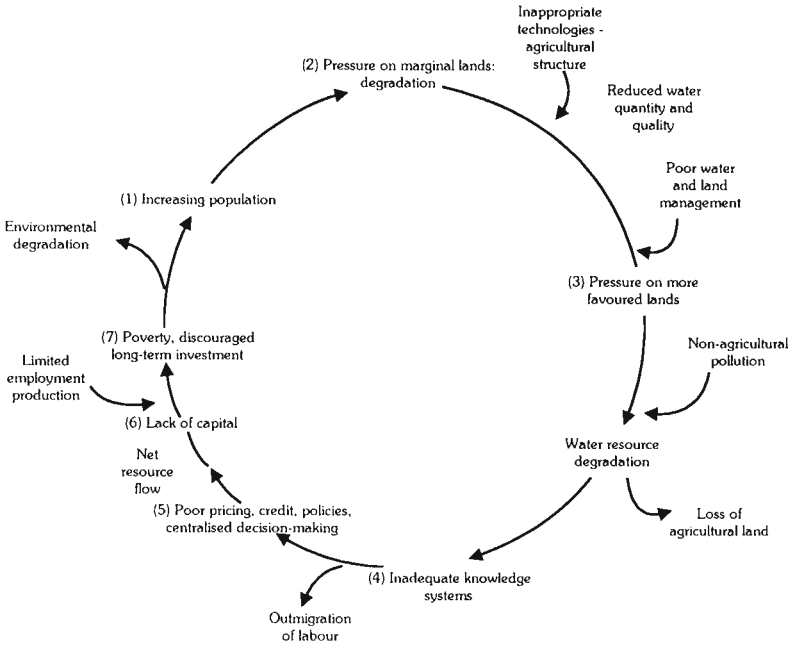
A review of the extensive literature on the past and future of Himalayan agricultural development reveals three dominant strains of theoretical thought. There are many points of overlapping agreement between these positions, but each grows from a different methodology and set of assumptions about causes of the agricultural problem. If seen as scientific or institutional 'discourse' rather than pure 'fact', it is clear that the positions reflect differences in political biases, academic training, and institutional support (Thompson and Warburton 1985). Although each looks at the same phenomenon—the same glass of water so to speak—each arrives at their own interpretation. It is also evident that proponents of each position are self-selecting and spend precious little time reading other points of view. The first approach I call the ***half-empty*** perspective of the pessimistic Neo-Malthusian classical economist; the second, the more optimistic ***half-full*** approach of the Boserupian cultural/historical ecologist; and the third one empties the glass by rejecting both views as myopic in light of world system dynamics. A solid understanding of the underlying assumptions of these different perspectives is absolutely crucial if we intend to establish a dialogue among basic and applied researchers to resolve the Himalayan dilemma. I also argue in this book that we need to move beyond these three theoretical positions in the immediate future by creating a new integrating science of **Montology** which treats the mountains as a legitimate field of study in their own right, requiring its own theoretical applied science.

A. The Neo-Malthusian Viewpoint: The Half-Empty Crowd

Taking their cue largely from the pages of Thomas Malthus (n.d.) and economist Theodore Schultz (1964), adherents of this position argue that traditional mountain agriculture can no longer meet the demands of a rising population and market integration. This position states that, in the past, when population and environment were presumably in balance, traditional agriculture was both sustainable and appropriate (APROSC and John Mellor Associates 1995). The scenario generally painted is one of historic, isolated, relatively stable communities, with low population densities and low-input extensive farming which have been recently (generally benchmarked at the end of WWII) disrupted by rapid population increase, poverty, commercialisation, and sometimes misguided government interference (Jodha and Shrestha 1994; Karan 1989; ICIMOD 1994 and 1995; Sharma and Banskota 1992). In response to the ***push factors*** of poverty and overpopulation, mountain peoples expand on to fragile slopes or downwards to the lowlands where they are seen as contributing to deforestation and further environmental destruction (Denniston 1993). This leads to the conclusion that a 'crisis' is looming (Sheddon 1987; Ives and Messerli 1989). A search is then launched for negative ***unsustainability*** trends related to the resource base and productivity (degradation and declining yields). Figure 1 (page 21) reflects a typical drawing of the 'Cycle of Poverty and Land Degradation' so commonly presented in defence of the economic-Malthusian argument (Rhoades and Harwood 1992). Although based on a somewhat oversimplified Malthusian premise, the causal chain between population growth and resource growth is the "hinge" on which a rather pessimistic future rests (Macfarlane 1976: 299). The population is seen to expand to absorb the food resources available and then overshoot until halted by "moral restraint, vice or misery" (Malthus n.d.).[3]

3 The most commonly cited of Malthus's propositions is that "population grows geometrically (exponentially), resources grow arithmetically." Some agree that it is not yet true, but that one day Malthus's prediction will catch up with us.

Figure 1: The Cycle of Unsustainability (Rhoades and Harwood 1992[4])



Although personally guilty of drawing such circles, I admit there is an unintentional 'blame the victim' bias in this kind of thinking. The cycle always starts from the farmer's poverty, poor farming practices, and breeding habits (too many children) which in turn lead to increasing downward spirals of natural resource degradation and irrelevance of local knowledge systems (Hornberry 1990:453-456). Clearly, this model is popular with many agricultural scientists, since it gives a clear role for transfer of yield-enhancing technologies and model systems to overcome low production and raise income. In income-generating projects, an improvement in household cash flow is seen as the panacea of all ills or at least as a primary motor for poverty alleviation. If income can be raised,

4 Visualising unsustainability as a 'process' can illustrate how many agricultural systems become locked into a degenerating spiral driven by interlinked socioeconomic and biophysical factors. Although the process will vary from place to place, a generalised 'cycle of unsustainability' can be identified, as can its components. Both biophysical and socioeconomic problems play key roles in the process, each feeding on the other.

it is assumed people will have fewer children, they will adopt more modern, land-intensive technologies, there will be less land degradation, and sustainability will be achieved. Raising incomes can come about by better state policies for credit and price structures, re-orientation of trade, improved infrastructures and markets, and off-farm employment. In recent years, some proponents of this position have recommended that modern and traditional systems of production can be blended and combined with participatory research to accomplish income generation and environmental protection (Jodha and Shrestha 1994; Jodha and Partap 1993).

B. Historical-Cultural Ecologists and Boserupians: 'The Half-Full' Crowd

The second viewpoint tends to see the Neo-Malthusians *half-empty* glass in a more optimistic light as a *half-full* glass, although like the Neo-Malthusians they still see major problems in the mountains. It is over the explanation of the presumed crisis that this group parts company with the Neo-Malthusians (Pitt 1986). Starting from a longer historical viewpoint, their central argument is that many of the presumed linkages between population growth, land degradation, and deforestation are either exaggerations, still unproven, or outright myths (Fox 1993). Many problems, such as deforestation, are neither recent nor caused by population pressure (Griffin et al. 1988). In fact, deforestation in Nepal can be traced to the nationalisation of communal forest lands in the 1950s by the Government, thereby alienating local people from their ancestral institutions and controls. Unconvinced of the ***Himalayan Degradation Theory*** of the Mathusian economists, Ives and Messerli (1989:9) call for a more rigorous definition of the more systematic research into the issues in order to overcome the uncertainties (cf. Fricke 1989). Two main points arise from this position.

First, whatever the causes of population growth (better health and nutrition, externally imposed conditions, social security needs), it is not a sufficient, independent 'cause' of land degradation. Drawing on the models of the counter-Malthusians, especially Ester Boserup (1965) who

presents a strong argument for seeing demographic growth as an independent variable and economic change as a consequence, the historical cultural ecologist attempts to turn Malthus on his head by arguing that population growth is essentially the only force strong enough to motivate people to intensify production (Fricke 1993). Boserup even goes so far as to argue that population growth is not only a necessary cause of economic development but a sufficient cause (Tiffen and Mortimore 1994).

Second, instead of 'blaming the victim' the cultural ecologist strongly believes that local communities have the tremendous internal strength to solve their own problems and, rather than being the source of the "problem", they in fact possess many indigenous answers (Stevens 1993). Many cultural ecologists and geographers have contributed a great deal of literature on the finely adapted nature of mountain societies (Netting 1981; Rhoades 1979). As a result of studying them intensively from the inside over long periods of time, these scholars argue that mountain peoples have, through trial and error on the mountain slopes, learned to cope with the special demands of living in these unique environments (Rhoades and Thompson 1975). There is, for example, evidence, from several areas of Nepal, that farmers are actually increasing their forest areas on their own (Gilmour and Nurse 1991; Fox 1993; Carter 1992; Virgo and Subba 1994). Given the extreme demands of precarious seasonal weather and a vertical and fragmented terrain where a single zone will not support a household, it has become necessary for mountain people to evolve strong local support institutions and adaptive strategies which guarantee survival. These adaptive strategies include systems to regulate populations in times of stress; diversification of the economy; combination of private and communal land-use systems; and rich, refined indigenous knowledge about how to live in these harsh conditions (Rhoades and Thompson 1975; Brush 1976).

Some cultural ecologists argue that ***development*** or ***modernisation*** is not necessarily a desirable process, and, if pursued blindly, mountain cultures and natural systems will be left in a more precarious position than before. For example, promoting high-yielding, uniform crops

Waiting for Market - *D. Miller*

Promoting high-yielding, uniform crops or fruit orchards may reduce the diversity of strategies by making hill farmers dependent on inputs and distant markets.

or fruit orchards may reduce the diversity of strategies by making hill farmers dependent on inputs and distant markets. Some Neo-Malthusian classical economists believe that the cultural ecological position is based on romantic anthropological thinking that ignores the real economic and demographic forces which have rendered traditional practices obsolete. The cultural ecologist rises to disagree with this pronouncement of the death of tradition, arguing that it is still alive and well in mountain communities, if given half a chance to express itself in local development initiatives (Messerschmidt 1995).

C. Dependency and Globalisation Theorists: The Empty Glass Crowd

A third position, which also is sometimes referred to under the rubric of political economy, rejects both of the above positions on the grounds that they fail to understand the unequal and exploitative relationship between nations and national regions within the present world capitalist economy (Allan 1991; Kreutzmann 1995; English 1985). In some cases, it is argued that mountainous regions were exploited long ago by feudal centres of power such as those of the Mughal and Sikh dynasties in India (English 1985). Dependency theorists agree with the Neo-Malthusians that the mountain economy is being "transformed", but, instead of seeing economic growth as a positive force, it is often viewed as an extractive, exploitative one. Acording to this interpretation, social forces from the outside are seen as the primary ***transformative mechanisms***, while local social processes and biophysical adaptations are less important (Allan 1991). Growing from the

writings of Andre Gunder Frank (1967) of the Frankfurt School of Sociology and his Latin American colleagues and, later, Immanual Wallerstein (1975), the dependency theorists argue that rural societies—such as those found in the HKH—exist on the periphery of the ongoing expansion of the world capitalist economy. This global economy is constructed around centres of concentrated industrial and post-industrial wealth in the West, which are linked, in turn, to satellite centres in colonial and post-colonial countries which maintain the same structural exploitative relationship with their own rural hinterland. As high energy centres (e.g., Europe's industrial core) they depend on the rural 'periphery' areas to supply the raw materials (food, timber, minerals, labour, water) necessary for the functioning of the urban, industrial, and post-industrial cores. In this relationship, the exchange is always unequal and exploitative. Raw materials, labour, and land in the periphery area are grossly undervalued in relationship to the costs of core manufactured products and real estate due to the demands of the profit-exploitative relationship. Post-independence modernisation and development regimes are seen as ways in which core markets can penetrate the periphery for both the extraction of raw materials and the opening of new markets for manufactured products or services (Greenberg 1993). The overall process has the end impact of creating a semi-employed ***rural proletariat*** in the peripheral areas which is dependent on the core for both goods and income.

From this perspective, which for the most part offers little hope from development since exploitation is embedded in a world system racked with unequal power relations, mountain regions are the prime example of peripheral, marginalised zones fed upon first by the more capital-intensive core regions (e.g., urbanised India to the Himalayas or the Peruvian Coast to the Andes) and, indirectly, by major industrial/post-industrial centres of the west and far east. As suppliers of raw materials, especially hydroelectric power, food, forest products, minerals, and unskilled labour, mountains remain on the opposite side of economic development (i.e., underdevelopment). For the world capitalist system to function, low returns to

land, labour, and raw products at the source are necessary so that value added through the industrial process will end in higher profits. The growth of cities and the pursuing of cheap food policies by central governments to feed urban populations are reflected in low economic returns to the rural sector. In dependency theory, modernisation and most forms of development aim to maintain the *status quo* of the structural relationships between marginalised regions and the core (Hatley and Thompson 1985; Bista 1991). The more recent, post-modern critiques of the dependency theory, however, have rejected the notion of a passive acceptance of external exploitation by marginal peoples. Instead, they argue that marginal peoples react in diverse ways to this penetration of capitalism with their own adaptive responses which belie a passive acceptance of external market control (Marcus and Fischer 1986).

D. Finding the Full Glass: Is it Possible?

I am not the first to point out—given the complexity of the causes of environmental change in the HKH—that there is a tendency towards reductionist analysis of mountain problems which, in turn, precludes the emergence of a commonly agreed upon 'paradigm' of the presumed agroeco-crisis (Metz 1989; Thompson and Warburton 1985; Greenberg n.d.). Quantitative data sets are besieged by incompatible statistics, research methods and agendas, and by scale contrasts. Given this, is it possible to rise above the confusion and state something with certainty?

I suggest that the answer lies in the creation (or revival) of the science of **montology** which will rely less on shop-worn theories, models, or approaches provided by experiences **outside** the mountain reality. It is not that the three polarised perspectives outlined above do not have something to contribute, but they fail to account for the dynamic and creative role of people in shaping and reshaping the landscape, in degrading and restoring the same landscape. Neo-Malthusian economists blame traditional farming systems for the problems, seeing them as 'low in productivity', destructive to the ecology, and lacking a responsible orientation towards the future

(Greenberg n.d.). Dependency theorists see the ecological and economic 'crises' as a result of colonial and post-colonial structures, contrasting these with a presumed harmonious and ecologically balanced indigenous past. The historical cultural ecologists are often too eager to contrast 'traditional' agriculture with 'western' forms, declaring that in some way the local farmer is 'in balance' with, or 'adapted' to, the mountain environment, while modern agriculture is inherently destructive. A true mountain perspective would be less reductionist, would recognise mountain farmers as active agents in transforming and retransforming the landscape, and would understand that local populations are simultaneously **creators** and **destroyers** of their environment. That a bond (***a sense of place***) between the people and the land exists cannot be denied, but the past is not fully remembered nor can the future trajectories be predicted. Mountain peoples are also not mere pawns in a global politico-economic game but, through a ***politics of location***, are now actively engaged in using and responding to those external forces (even including copying international environmental language). The point is that local people (who have always been changing) possess a resilient capacity to survive, and it should be the role of mountain scholars, activists, and planners to make it possible for this traditional capacity to express itself.

Although we are far away from developing a **montology** based on *in situ, in vitro* experiences and perspectives, and which would offer its own mountain-specific paradigms, some noble attempts have been made to bring a mountain perspective into our socio-ecological and development theories. The most ambitious and convincing articulation of a truly mountain perspective was developed by the Mountain Farming Systems' Division at ICIMOD in the 1980s and 1990s.

3. Rethinking the Mountain Perspective

Over the past two decades, mountain scholars have argued that researchers, planners, and development specialists need to adopt a mountain perspective as a corrective to flatland, lowland assumptions and programming

which do not match mountain needs (Rhoades and Thompson 1975; Rhoades 1989b). Mountains have policy and development requirements that differ from those of the flatlands, mainly because of verticality, aspect, climate, and complexity, a fact first driven home in the 1930s. In 1936, Aldo Leopold wrote his famous article, "Thinking Like a Mountain." Again, in the 1970s, in a series of articles by anthropologists and mountain geographers (Rhoades and Thompson 1975; Brush 1977; see Guillet 1983 for a review) the uniqueness of the mountains was stressed and a guarantee of failure given imposed flatland designs and technologies.

Building on this past literature, but developing the idea of a mountain perspective in much greater detail, Jodha and his colleagues at ICIMOD have fleshed out components of the mountain perspective that are important to planners and policy-makers (Jodha 1990; 1995a; Jodha et al. 1992; Jodha 1995b). According to Jodha, the mountain specificities are inaccessibility, fragility, marginality, diversity, and niche. The first three specificities are seen as constraints to be overcome, whereas diversity and niche are seen as opportunity characteristics which need to be exploited by mountain farmers. The consequence of policy-makers ignoring these specificities is a mismatch between development and mountain needs which thereby explains project failures (see a synopsis in Jodha and Shrestha 1994). In attempting to answer the question of why mountain agriculture is stagnating, Jodha sees two causes: i) the declining efficacy of traditional systems due to population pressure; and ii) the failure of conventional development due to its insensitivity to mountain specificities and an integrated approach. In order to help understand this mismatch, Jodha developed ***indicators of unsustainability*** specific to mountain conditions. Although this part of the formulation is well within the neo-classical position, ICIMOD went on to make significant contributions in three development areas: raising the awareness of policy-makers, studying the relevance of transformed mountain areas, and identifying improved technologies for sustainable agriculture.

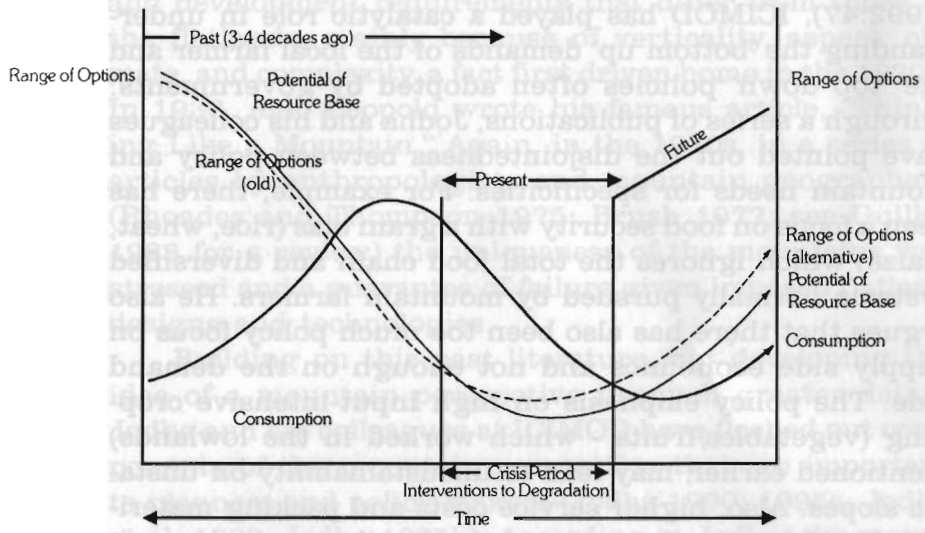
A. Raising the Awareness of Policy-makers

In line with a recommendation made by Brian Carson (1992:47), ICIMOD has played a catalytic role in understanding the 'bottom up' demands of the local farmer and the 'top down' policies often adopted by governments. Through a series of publications, Jodha and his colleagues have pointed out the disjointedness between policy and mountain needs for specificities. For example, there has been a focus on food security with a grain bias (rice, wheat, maize) which ignores the total food chain and diversified systems normally pursued by mountain farmers. He also argues that there has also been too much policy focus on supply side economics and not enough on the demand side. The policy emphasis on high input-intensive cropping (vegetables/fruits - which worked in the lowlands) mentioned earlier, may lead to unsustainability on unstable slopes. Also, higher service costs and packing materials placed further demands on the fragile mountain environment. Many lowland institutions imposed on mountain communities have displaced traditional forms. In a summary statement of his position, Jodha concludes (1993):

> *Operational implications in terms of development policies and programmes for mountain areas will involve de-emphasising the application of generalised, externally conceived approaches and a greater focus on location-/area-specific planning from below, with the necessary measures of decentralisation and local participation.*

The best and most recent embodiment of ICIMOD's work on policy implications is presented in the proceedings of an FAO/ICIMOD seminar, 'Evolution of Mountain Farming Systems: Sustainable Development Policy Implications', held from October 3-6, 1994. Figure 2 below illustrates schematically the past, present, and future trends of Hill/Highland/Mountain Farming Systems (Shrestha 1995). Largely in accordance with the economic Neo-Malthusian interpretation, the conference accepted the assumption that options have narrowed in the past three

Figure 2: Schematic Diagram of General Trends (Past, Present, and Future Perspectives) of Hill/Highland/Mountain Farming Systems



Note: 1. Interventions include (i) technology, (ii) information, (iii) institutes, and (iv) enterprises.
2. Alternative options include old, new, or combinations of both

to four decades because population/consumption demands have pressurised a declining national resource base. The current situation is one of 'crisis' or 'critical period', the response to which has been interventions, which have had varying degree of success, aimed at creating a wider set of options to augment an improved natural resource base. The emerging issues identified within this discourse were as follow.

- The per capita resource base was degrading and shrinking.
- Some positive changes, particularly those related to production aspects, had been nullified by increased demand.
- Upstream and downstream conflicts were emerging.
- Changing scenarios of farming systems were demanding a higher input of women's labour.
- In-depth understanding of the gender issue was crucial for the promotion of sustainable farming systems.
- Outmigration was increasing.

- Forestry, being an integral part of farming systems, needed new perceptions or redefinitions which could include most tree types such as fodder, fuelwood, fruit trees, and timber.
- Farming alone could not sustain the livelihoods of the people unless off-farm activities were promoted.

The specific policy recommendations were as follow.

1. Develop appropriate technologies which build on existing farming practices.
2. Create marketing outlets.
3. Provide price incentives and subsidies for resource poor farmers.
4. Make credit available, not only for component activities, but for the whole farming system also.
5. Implement research and extension which emphasise the whole farming system and elicit farmer participation.
6. Realign trade in agricultural communities so that the importance of hill and mountain crops is recognised.
7. Provide good physical access as well as improved institutional infrastructure.
8. Promote off-farm employment activities.

While one cannot argue with the value or importance of these policy recommendations, it is important to monitor the trade-offs from implementation of these recommendations as well as to concretely define how they will be operationalised in a way satisfactory to both national governments and farm communities. Apart from the 'farmer participation' mentioned in recommendation Number 5, there is no mention of supporting or involving mountain communities or other local groups. I wish to return to this point in Chapters 6, 7, and 8 of this book. The creation of acceptable policy tools and instruments that can make a difference in farmers' lives will be one of ICIMOD's and the global mountain research community's most important challenges in the coming decade.

B. Relevance of Successful Cases or Transformed Areas

In an effort to understand how transformation has occurred in certain pockets, despite mountain environmental constraints, ICIMOD has undertaken case studies of seven ***transformed areas***: Himachal Pradesh and Sikkim (India), Dang and Illam (Nepal), Miyi County and Ningnan County (Sichuan, China), and the Aga Khan Rural Support Project Area of Pakistan. A review of these diverse situations indicates the following ground rules for success (Jodha 1993).

1. Development needs to be geared towards whether the area is accessible or inaccessible to a road and market. Accessible areas may handle agro-business while inaccessible ones need to focus on biomass productivity and stability.
2. Diversification is achieved through combining traditional and modern technologies.
3. Development should focus on the complete food system (not just components), including the role of markets, post-harvest.
4. Local people should have command over local resources and effective mechanisms to ensure fair shares of the gains from intersystemic linkages.

Some mountain development observers argue that commercial transformation underpinned by road building is the solution to the problems of Himalayan farmers. Accordingly, they believe the exit from the Malthusian disaster is the provision of access and markets, a first step ingredient in overcoming poverty and backwardness in the mountains. This "build it and they shall prosper" philosophy, however, has certain limitations. First, roads alone do not guarantee anything (either markets, equity, increase in incomes, or liberation from tradition) and may even bring about negative results such as landslides or new merchant classes more powerful than the local people. Only by a wide stretch of the imagination can one argue today that Kathmandu or Pokhara have been "sustainably developed" now that they are linked not only nationally by roads but also internationally by air. Benefits from such developments have largely accrued to those

classes capable of taking advantage of the externally-induced cash economy (Bista 1991). While road building may obviously stimulate commerce, there are other cases in the HKH where roads go unused and make little to no difference in the lives of the people affected. Second, there are second generation problems brought about by rapid transformation of agricultural production. 'Pockets' of success can quickly convert to negative cases if prices go sour, disease or pests attack commercial varieties, or one segment of the food system does not function. Like so many other problems and development complexities in the HKH, careful, long-term research on the successes and failures of transformation needs to be undertaken. ICIMOD has already undertaken a great deal and will likely do more analytical research in the near future (Jodha 1993; Partap 1995).

As in the policy realm, the indicators underlying the 'success' cases are largely economic (i.e., rapid increase in incomes, savings' acquisitions, improvement in health or education). Therefore, the logical conclusion is to stress income-generating activities such as those provided by the introduction of horticultural crops for market (Sharma 1996; Teaotia 1993). The implicit assumption is that the lessons from these successful cases can be transferred to areas that have not yet been 'transformed'. Although a careful systematic comparison has not been made between the successful cases vis-a-vis the unsuccessful ones, it seems apparent that geo-political location is crucial. Transformed pockets have historical access to roads and markets (Himachal Pradesh, Ilam, Miyi County, Sichuan, and the AKRSP communities near the road) or the pre-existence of a product-trade linkage (cardamons in Sikkim). The Ilam case study (Sharma 1996) gives three factors necessary for transformation: i) innovative, aware farmers; ii) a range of available options with technological backing; and iii) roads and local markets within a regional community. Although the analogy may be unfair, the transfer of ***successful models*** rings of earlier attempts by the west at transferring their economic/social institutions to modernise the unfortunate Third World. The fact is that prosperous roadside areas with historic linkages start from a different trajectory than marginal, roadless areas. Just as

India created its own path of development distinct from that of the west, so is it possible that subsistence mountain regions will place their own unique brands on the future. However, although I doubt the transferability of economic ***success pockets*** from one place to another (unless similar conditions already prevail), comparative research can reveal why the trajectories have been different. This, in turn, can be useful in tailoring development to specific regions and making sure that development interventions are appropriate for the time and place.

C. Identify Improved Technologies for Sustainable Agriculture in Mountain Areas

A complementary approach to sensitising policy-makers and planners to the mountain perspective has been the identification by ICIMOD of sustainable technologies relevant to mountainous regions. Pilot testing and demonstration of numerous technologies have taken place and some have been diffused widely (e.g., Seabuckthorn). Other technologies include urea molasses block, polythene film technology, sloping agricultural land technology (SALT), beekeeping, sunflower stems as support sticks for vegetable crops, low-cost water harvesting technology, rehabilitation of degraded watersheds, off-season vegetables, and soil conservation methods (Partap 1993; Partap and Watson 1994; other ICIMOD MFS publications).

There can be little doubt about the importance of sustainable improved technologies. All farmers, but especially mountain farmers, are keen to obtain new seeds, tools, breeds of livestock, and management techniques. The Himalayan landscape has been transformed and retransformed over the centuries by farmers who have integrated technologies from afar into their production and post-production systems. Crops such as maize, potatoes, peppers, tomatoes, egg plant, peanuts, and many others are of American origin, although Himalayan farmers now claim them as their own. Each of these crops and other technologies have been introduced; a process which in turn creates patterns unforeseen by the initial adopters.

A question can be raised concerning the role of ICIMOD in the identification and transfer of such technolo-

gies. Unlike the commodity plant breeding centres of the CGIAR, ICIMOD does not have a single major crop or resource mandate (or critical mass of personnel) to be able to impact large numbers of farmers. Similarly, ICIMOD cannot become the extension service of the HKH. However, through systematic identification of major types of farming systems and prioritisation of problems within those systems, ICIMOD can build up the capacities of national programmes to conduct adaptive technology research to address farmer needs. Within this 'mapped' framework of major farming systems, the selection of 'prototypical' technologies as illustrative case studies can be an effective teaching mode.

Research on the importance of appropriate sustainable technologies and transformed pockets in mountainous regions can provide a key to future planning initiatives. Such documented examples defy the pessimism of anti-change naysayers and also illustrate the dynamism of potential change in the mountains. However, it is incumbent on us to understand precisely the reasons for success. In most cases, demand economics was matched by providing the technologies and the infrastructural / market means to local farmers to supply that demand. This will not be the case in all circumstances, given the remoteness of many communities from roads and commercial markets, but a continued search is in order for similar success cases (Sikka et al. n.d.; Sharma 1996).

D. High-value Cash Crops: Potentials and Limitations for Sustainable Mountain Agriculture

Another approach to sustainable mountain agriculture adopted by ICIMOD has been to examine ***replicable success stories*** in cash crop farming. The idea is to study such cases (e.g., apples in Himalchal Pradesh; cardamons in Sikkim; seabuckthorn harnessing in China; potatoes in Nepal) and to explore how such experiences can be replicated elsewhere (Partap 1995; Alam 1990). The assumption underlying this approach is that forms of income generation must be sought in subsistence mountain settings where returns to investment in land, labour, and capital are so low that farmers must either seek ex-

tensive off-farm, seasonal employment or further exploit already marginal, fragile lands (Verma and Partap 1992).

Although an assessment is underway by ICIMOD on an area by area and commodity by commodity basis of the 'success' cases, it is indeed obvious that several of these represent adoptable technologies and systems which address both the income needs of farmers and the societal interest expressed in Agenda 21's goals (see Chapter 6 of this book for a theoretical framework). Cardamon, for example, in Sikkim is a high yielding cash crop which is environmentally friendly (Sharma 1996). Similar qualities exist with Seabuckthorn, mushrooms, aromatic plants, medicinals, and other native plants (Rongsen 1992; Partap 1995:3). These crops and plants—along with horticultural and off-season vegetables—are able to fit into the concepts of ***niche*** and ***comparative advantage*** developed at ICIMOD (Jodha 1993). If mountain farmers are going to compete favourably in the modern world, instead of being swallowed by it, they must be given options and alternatives which give them a role not already occupied and saturated with competition.

Since I spent more than a dozen years working on potatoes (a valuable cash crop for mountain farmers throughout the world), I am very familiar with the potentials and limitations of mountain cash cropping. Certainly, the dramatic returns per hectare reported for apples in Himachal Pradesh are matched by mountain potatoes (net return of US $2,000 or more) if there is an urban market nearby. In such urban settings, as per capita income rises, there is a concomitant increase in consumption of high quality vegetables, fruits, and meat. The dramatic increases in the fast food industry throughout Asia further stimulate the need for such high quality vegetables, particularly in the metropolitan regions lying in the food supply watersheds of highland areas (e.g., Bangkok, Manila, Colombo, Delhi /Calcutta). Even more remote areas of Northern Pakistan have become increasingly involved in vegetable production for distant urban markets, and traders and roads have penetrated the region. McDonald Corporation, the American fast food giant, now has 2,409 outlets in Asia and Burger King, America's No.

2 burger chain, has 333, with ambitious plans to expand dramatically (Updike 1996). These outlets demand not only potatoes, the main per unit profit-maker for such chains, but often cool climate vegetables such as lettuce, tomatoes, mushrooms, and cabbage. Since it is not economical to ship these from the U.S., these fast food giants are promoting vegetable production in the nearby mountains. It must be realised that fast food is not just a U.S. venture, as many Asian entrepreneurs are creating their own chains, with an equal thirst for fast food 'veggies' as well as meat, another highland niche product.

Partap (1995:11-16) has carefully analysed some of the potential drawbacks to the sustainability of cash crop farming. Among these are post-harvest issues (handling, storage, transport, and marketing) which often place the mountain farmer in a disadvantaged situation vis-a-vis lowland traders. As discussed later in this book, marketing cooperatives might be a viable solution to these problems. Another problem is that government and international research and extension focus on global crops, such as potatoes and apples, to the neglect of native crops and plants which are already well adapted and could have high market value (e.g., medicinals, aromatic plants, native fruits, and nuts). These mountain species are part of the valuable, diverse gene pool that needs protection but which is often threatened by the introduction of monoculture of alien crops (Partap 1993). Finally, high-value cash crops often require heavy inputs, especially of pesticides and fertilizers. The health impacts, particularly on seasonal labourers, have raised serious concerns about the quality of life for some sub-populations attempting to eke out a living on the margins of these commercial systems. Perhaps, more importantly, the 'second generation' problems of ecological and social issues need to be understood prior to wholesale promotion of high-value cash crops. Impacts on equity of class, gender, and ethnicity, in particular, need to be further explored. ICIMOD has played, and hopefully will continue to play, a lead role in helping national programmes understand the pros and cons of adopting "successful cash cropping systems" from other regions.

4. Conclusion: In Search of Imaginative Power

In a statement attributed to Dipak Gyawali at the Mohonk Mountain Conference, Ives and Messerli (1989) wrote "*Anthropologists map all the variety and propose nothing; economists impose uniformity and propose everything.*" In addition, I would add that biological scientists set out to find biological problems and, to no one's surprise, find many (e.g., Sharma and Minhas 1993). My review of the mountain literature reveals, with few exceptions, that Gyawali's observation is painfully true. I also agree with him that the only way out of this distress and all too familiar dead end is ***imaginative power***. A new path can be taken wherein the old perspectives are useful but, alone, insufficient for future planning. Conventional science would insist that only one of the perspectives outlined is valid, but "*the revolutionary science appropriate to the Himalaya would insist that there is something of value in all of them*" (Ives and Messerli 1989:250-51). More than that, I would argue, is the need to create an entirely new science of Himalayan studies based on local experiences and perceptions in the face of global change (Himalayan ***montology*** if you like).

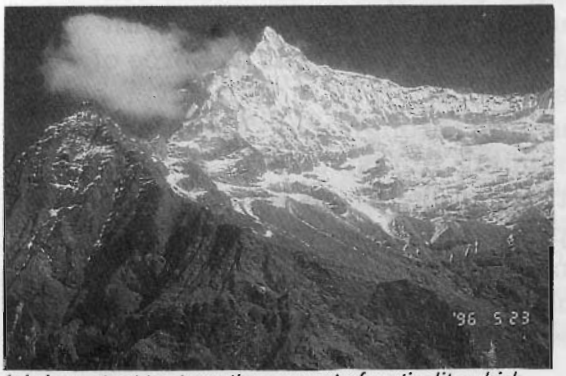
In moving forward with an appropriate synthesis of the many viewpoints on mountain agriculture in this chapter, I repeat again that these research and development issues can only be answered by listening to the farmers and communities themselves. They will be the ultimate judges of the appropriateness of any single approach in their region. The place to resolve the crucial, intellectual battles is outside the capital city, beyond the safe walls of the university, outside the bureaucrat's office, and in the fields or homes of farmers. The approach I favour will be that of stimulating development more on the local communities' own terms, wherein they set their own farming priorities and determine their own goals and means to get there. Increasingly, ethnic minorities—many of whom live in the mountains—are resisting development *per se* (including infrastructure and markets) if it threatens in any fashion the integrity of their ethnicity, indigenous values, social capital, knowledge systems, and genetic resources (cf. the emerging, sticky question of ancestral

homelands; e.g., Thapa Magar [1996]). The search for sustainable solutions for managing natural resources is pointing to these same local initiatives and pride as a source of ideas and energy. Such solutions might include diverse methods such as modernisation through the conventional ***transfer of technology***, building infrastructure, and creating new markets, but it might also occur through revitalisation of traditional production systems, group economic activity, and linking with new global partners on the outside. The solutions are likely to be as diverse as the mountain setting itself (Thompson and Warburton 1985).

Whatever the particular development solutions, there is a need to move away from the dichotomous thinking that drives a wedge into our analysis, separating modern (scientific) from traditional (indigenous) or from transformed/untransformed. This kind of analysis carries us nowhere except into biases and unfounded judgements. Farmers themselves do not think in or act on these terms; they are at a single point in time (today), shaped by a unique past, and moving towards unknown destinies. Therefore, mountain scholars and planners must clearly recognise the need to develop strategies and methodologies for mountain farming systems that transcend simplistic 'traditional' and 'modern' conceptualisations. This vision probably fits well with farmers' own views of themselves; they are neither 'backward' or 'modern' but simply acting as farmers at a point in time based on past experiences and future hopes.

Institutionalising the importance of a mountain perspective in the policies and programmes of national governments and international development agencies has been a major contribution of ICIMOD (see ICIMOD's 1995 framework plan for a 'Regional Collaborative Programme for the Sustainable Development of the Hindu-Kush Himalayas'). Although the seeds of the idea had been planted long ago, the ICIMOD effort to flesh out the details of the mountain perspective and characteristics has been the most ambitious to date. It is now the challenge of other institutions to build upon this perspective and implement it in other major mountain regions. In doing so, it is important to stress the concept of ***verticality*** which is the

A unique mountain specificity - *S.R. Chalise*



It is important to stress the concept of verticality which is the only unique mountain specificity.

only ***unique mountain specificity*** (Rhoades and Thompson 1975; Bandyopadhyay 1993; Troll 1972). Marginality, diversification, fragility, inaccessibility, and niche are found in more or less the same degree and intensity in remote tropical rainforests, deserts, tundra regions, islands, and in some coastal zones. The primary characteristic of mountains, and that which makes them mountains and different from flatlands, is ***verticality*** or altitudinal variation. It does not lessen the power of verticality in shaping mountain agriculture to argue that there are flat valley floors in a few areas or that roads have now reached a few more villages (why is it that most mountain studies are conducted where there are roads, thus lending to an over-emphasis on the impact of road building?). Verticality is what makes a mountain a mountain. Human agricultural adaptations in the mountains can only be understood in the light of attempting to adapt crops and livestock to a zonally stratified landscape across a broken vertical terrain. The compression of agroecological zones, the highly fragmented landscape, and high levels of energy required to farm the slopes are uniquely mountain conditions.