Farmer-led Integrated Upland Watershed Management Trainers' Resource Book

Module 5

Upland Farmers' Livelihood Transformation Process Experiences

Upland Farmers' Livelihood Transformation Process Experiences

Objectives of the Module

Before the objectives are defined, it will be helpful to have a feel of the current general picture of upland mountain watershed ecosystems and the overall livelihood conditions of those who inhabit these mountains.

Background

(1) What are the general features of mountain farming systems?

- Small holdings
- Fragile and marginal lands
- Harsh climatic conditions
- Stagnated or declining agricultural productivity
- Inaccessibility
- Diversity
- Special niches

(2) What is the general scenario mountain farmers depict?

- Farming communities possess diverse sociocultural values.
- They are mostly illiterate and poor.
- They have limited off-farm employment opportunities.

(3) What is the general economic condition in the Hindu Kush-Himalayas (HKH)?

- Poverty is widespread.

(4) Who are the most affected by poverty?

- In the HKH area, the burden of poverty falls disproportionately on:

  - women and
  - children.

Are the food security concerns critical?

- Lately, mountain communities are becoming concerned about:
  - livelihood options and
  - food security issues.

(6) What is a sustainable mountain farming system?

- Crops, livestock, and forestry are the major components of mountain farming systems.
- Farming systems evolved out of or are a combination of these components.
- The farming systems thus evolved are likely to be sustained if they are:

  - economically viable,
  - ecologically sound,
  - socially just,
  - equity responsive,
  - productive,
  - environmentally friendly, and
  - have viable options for sustaining the livelihoods of mountain people.

(7) Are livelihood options for food security available?

- This module will present some sustainable livelihood priority options for food security which have been identified.

(8) Who are the target groups of this module?

- Planners
- Field workers and their trainers

(9) Should planners, field workers, and their trainers be well versed in the following issues?

- It is crucial for planners and field workers currently engaged in managing mountain watersheds to have a better understanding of:

  - transformation processes and
  - livelihood priority options.

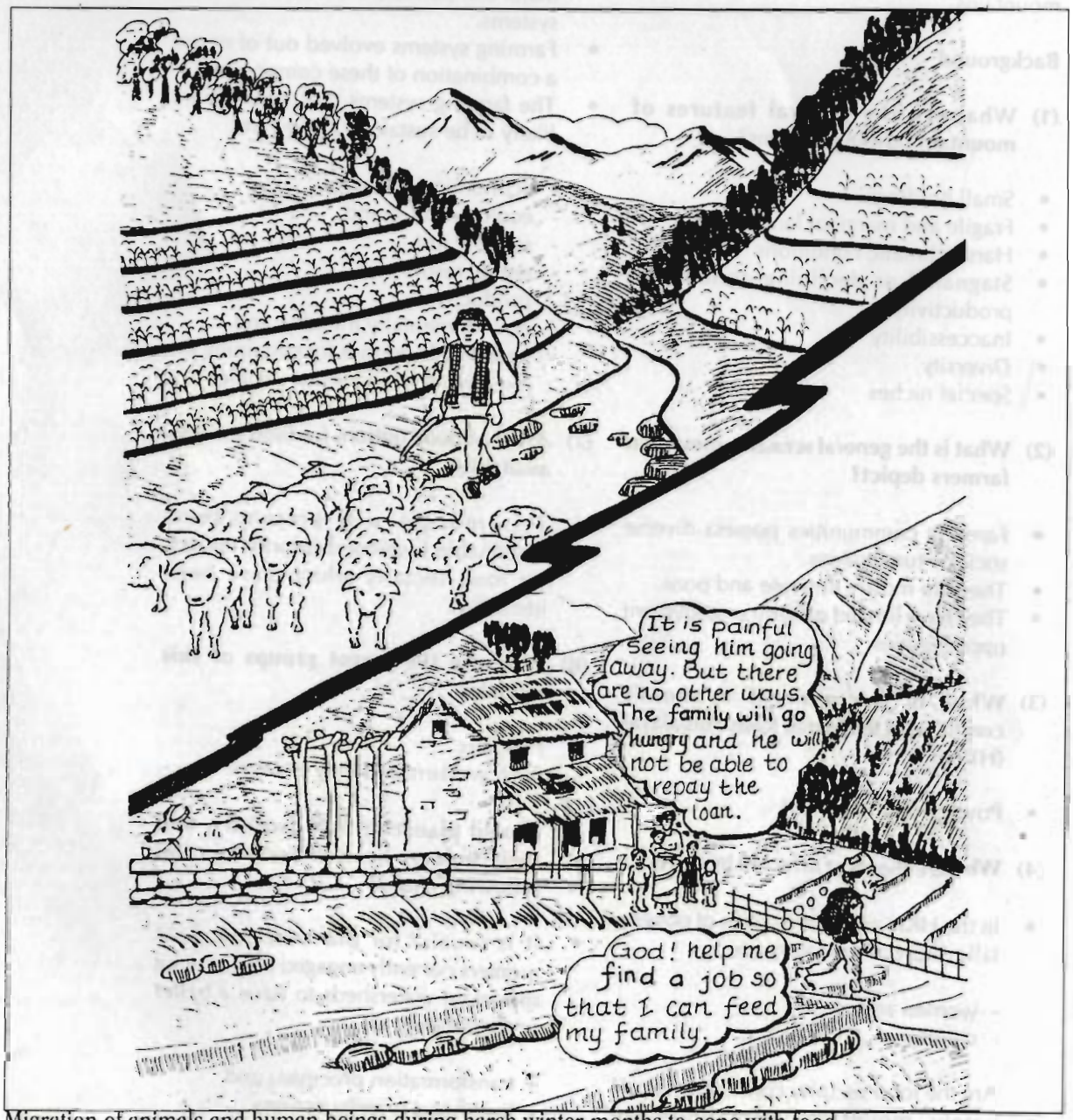
(10) What issues are the focus of this module?

- The final part contains the lessons learned from various examples of watershed management practices presented in this course.
- It contains pertinent issues which are based on discussions on the following aspects:

  - important policy and
  - institutional imperatives.

(11) Hence, against this background, the **objectives** of this module are delineated.

- To present an overview of environmental degradation-induced food security and livelihood option concerns in the HKH region and other mountain areas of the Asian developing countries
- To show how these concerns have led to agricultural transformation at household level in some parts of the HKH
- To educate the related planners and field workers in these critical issues



Migration of animals and human beings during harsh winter months to cope with food deficit problems

MODULE 5.1
LIVELIHOOD OPTIONS AND FOOD SECURITY CONCERNS

(12) Objectives of Module 5.1

- To explain the meaning of food security in the context of mountain communities
- To describe general food security situations in some parts of the HKH

(13) What is food security?

- Food security is hereby defined as: " a state of affairs in which people have access to sufficient nutritious food in order to maintain a healthy and active life throughout the year."
- Universally, food insecurity is a problem of

  - inadequate access to food and
  - inadequate purchasing power

(14) What is the general scenario of food security in mountain watersheds?

- The mountain watersheds are characterised by:

  - food deficit situations and
  - do not possess any livelihood options other than subsistence farming.

- Farming does not produce enough food to support the family throughout the year.
- Hence, mountain farmers do not have secure food availability.

(15) What is the present food production situation in some of the HKH countries?

Pakistan

- In the western dry mountain areas of Pakistan between the years from 1981/82 to 1991/92
- Crops

  - Maize: area increased by 4.7 per cent annually
    * production decreased by 1.2 per cent annually
    * yield declined by 5.9 per cent annually
  - Wheat yield was not encouraging either.
  - Potato yield decreased by 3 per cent owing to reduction in both area and yield.
  - The apple-growing area grew annually at a rate of 4.5 per cent but yield recorded a declining trend.
  - Onions : western mountains, the area increased by 4 per cent, yield increased by 2.1 per cent
    * In the northern mountains, the area increased by 5 per cent, but yield decreased by 0.2 per cent.
  - The total production of peaches, plums and pomegranates increased considerably but their productivity was insignificant.

(16) What do the above data indicate?

- In the mountains of Pakistan, agricultural productivity is increasingly becoming unsustainable and the yields are not matching the needs.
- Naturally, there is an adverse effect on livelihood options and on the food security of farming communities.

India

(17) As an example, agricultural production data from the Kumaon Himalayas are being considered in this context.

- Food-grain production has either stagnated or declined between 1983/84 and 1987/88.
- The yields of most of the cereal food-grain crops in the mountainous states of India are lower than the national average yields.

- There are only a few exceptions with higher yields than the national averages; for example,
  - rice in Jammu and Kashmir (JK) and Tripura,
  - wheat in Nagaland, and
  - maize in Himachal Pradesh and JK.

(18) What do these data imply?

- In the Kumaon Himalayan region, in general, crop productivity is not being maintained at the level desired.

Nepal

- Mountain areas of Nepal have always suffered from food deficit problems.
- In general
  - the mountains are deficient in food requirement by about 46 per cent, and
  - the hills are deficient in food requirements by about 19 per cent.
- Whereas, the *Terai* (lowlands) is generally surplus by about 25 per cent, though, the figures may vary from year to year.
- This emphasises the prevailing trend of food production in Nepal as a whole.

(19) What do the data suggest?

- The hill and mountain communities invariably unlike the *Terai* (lowlands) experience substantial food shortages.

MODULE 5.2
COPING WITH FOOD INSECURITY PROBLEMS

(20) Objective of Module 5.2

- To describe how mountain farmers in remote areas manage their food requirements by adopting diverse options

(21) What steps do farmers take to meet their food needs?

An example is presented here to show how the people living in inaccessible areas of the Rapti mountain region, Nepal, have developed their own particular systems of coping with food deficit problems.

- In the Rapti mountains (Nepal), except for a few fertile riverbed valleys,
  - the existing farming systems are incapable of meeting the food-grain requirements of the people who inhabit these mountains.
- Landholdings are:
  - small,
  - fragile,
  - marginal, and
  - vertical.
- The agroclimatic conditions during winter are harsh.
- For food security reasons, this results in the migration of a large number of family heads and young persons for:
  - a part of the year to the foothills, i.e., the *Terai* lowlands and northern India
  - for food insecurity reasons.
- Migration and the sale of animals (for which the barter system is mostly used) are household food security strategies.
- Thus, food security related strategies/ business takes place especially during the winter and spring seasons.

(22) How women and children end up with increased workloads?

- In these food deficit areas, women and children face greater hardships, and there is heavy pressure on forest resources.
- Farmers raise a large number of unproductive cattle to increase the amount of manure.
- This gives a considerable work burden to both women and children.
- Women and children are required to travel to distant forests to collect leaf litter and bedding material for
  - composting, and
  - grazing animals.

(23) How are migratory sheep used to alleviate the food deficit situation?

- Farming communities from the high hills bring their sheep to the foothills of the mountains for
  - grazing and
  - trading.
- Animals and wool are sold or exchanged for
  - food grains,
  - clothes, and
  - other non-food, essential household items.
- After five to six months, the animals are brought back to the summer grazing pastures.

MODULE 5.3
MAJOR FARM-LEVEL CONSTRAINTS AND RELATED ISSUES

(24) Objectives of Module 5.3

- To describe briefly the agro-ecological-based prevailing farming systems in general
- To indicate various constraints specific to each of these farming systems

(25) If poverty is the main issue, what are the contributing factors?

- Poverty is the main issue for the mountain farm families.
- The contributing factors for this are:

  - over population,
  - widespread soil erosion due to watershed mismanagement,
  - land degradation,
  - subsistence-oriented traditional agriculture,
  - low agricultural productivity,
  - low income, and
  - limited employment opportunities.

(26) What are the varied biophysical conditions specific to various farming systems?

- Different agro-ecological zones have different farming systems. They reflect:

  - varying mountain specific conditions,
  - differing biophysical conditions, and
  - complex socioeconomic circumstances of farming communities.

  These are briefly described below.

(27) What are the problems presently associated with the Pastoral Farming Systems?

- During the winter months, high altitude pasture lands experience chronic shortages of
  - animal feed and
  - fodder.
- These farming systems:
  - lack veterinary services,
  - have disorganised markets, and
  - lack accessibility to market information services.

(28) What are the major problems of Agropastoral Farming Systems?

- These are characterised by :
  - predominately livestock production systems that are
  - complemented through farming of arable crops.
- There are several farm-level constraints of which the more common are listed below.
  - Feed and fodder shortages during the winter
  - Small and fragmented landholdings
  - Fragile and marginal land for crop production
  - Low income
  - Food deficit
  - Poor farming practices are common farm-level constraints

(29) Which are the constraints associated with the Food-grain Crop-dominated Farming Systems (or Mixed Crop Systems)?

- These systems are characterised by:
  - small and fragmented landholdings,
  - fragile and marginal,
  - low income,
  - food deficit, and
  - poor farming practices.
- These systems experience production-oriented constraints. Removing the

following constraints is essential for raising production and productivity.

- Lack of suitable technologies
- Lack of good quality seeds
- Ineffective extension service
- Non-accessibility to market information services
- Insufficient supply of fertilizers
- Inadequate plant protection measures

(30) What are the problems prevalent in the Orchard and Vegetable Crop Farming Systems?

Under these systems, the general farm-level problems are the following.

- Technological problems
  - Poor orchard management practices
  - Inadequate access to suitable quality seeds and crop varieties
  - Adequate amounts of fertilizer not available at the right times
  - Inadequate technologies for
    - * harvesting,
    - * grading,
    - * packaging,
    - * storage, and
    - * transportation.
- Support service problems
  - Ineffective agricultural extension service
  - Lack of information on market and trade development

MODULE 5.4
AGRICULTURAL TRANSFORMATION AND FOOD SECURITY

(31) Objectives of Module 5.4

- To describe how government institutions and/or NGOs working in partnership with farmers bring about successful agricultural transformations in some parts of the HKH
- To outline how and what supports were provided to affect successful agricultural transformation

(32) Some Successful Cases

- This module deals with some successful cases of agricultural transformation that led to:

  - enhanced food security and
  - provided better livelihood options.

- Lessons drawn from these examples could prove helpful to those engaged in managing the Hindu Kush-Himalayan watersheds.

Himachal Pradesh (HP), India

(33) Where is it located?

- It is located in the heart of the western Himalayas.

(34) How successful has the transformation been ?

- It represents the most successful case of agricultural transformation in the entire HKH.
- The transformation was

  - from traditional subsistence arable farming
  - to cultivating highly profitable cash crops including vegetables and fruit crops.

- These enterprises transformed the HP as one of the most prosperous states in India.

(35) What impact it had on the economy?

During the last two decades

- the net state domestic product has increased by 200 times and
- the net per capita income has risen by 26 times.

(36) What effect has it had on the overall standard of living?

- The quality of life has improved dramatically.
- In 1971, **one** person in every **three** was below the poverty line.
- In 1991, there was only **one** in every **seven** below the poverty line .
- All villages have been provided with electricity.
- More than **95 per cent** of the people have access to safe drinking water.

(37) What effect has it had on the literacy?

- In 1971, only about **33 per cent** of the population was literate.
- Now, well over **66 per cent** of the population is literate.

(38) How was apple cultivation introduced?

To popularise and promote apple cultivation

- initially, farmers were provided with subsidies in the form of:

  - plant materials,
  - plant nurseries,
  - agricultural inputs,
  - agricultural implements, and
  - food grains.

- In many cases, forest departments established apple orchards on private lands.

(39) Which were the new institutions established?

- A strong network of institutions was created to support horticultural development activities covering:
  - technical,
  - training,
  - market, and
  - transport.
- A newly constructed highway in the area further facilitated the development.

(40) Was the University established to meet the local needs?

To meet the growing needs of the area the HP government established a fully fledged University of Horticulture and Forestry.

- This University is the only one of its kind in Asia.
- The University has a network of research stations in all the agroclimatic zones of the state.
- To strengthen R&D, the central government has also established a research station covering
  - mushrooms and
  - other vegetable crops.
- This institute is also providing technical know-how to farmers.

(41) How were the market interests of farmers taken care of?

- The government has introduced support prices for various fruit crops.
- To provide an ensured and a dependable market, prices are fixed for various fruits according to their
  - grades and
  - quality.
- If the price falls below this level, the produce is procured by the state government at a fixed price.
- This has insulated farmers from fluctuating market prices.

(42) What were the effects of the government's land reform policy?

- During the 1960s and 1970s, the government, through its land reform policies, made provision for a higher land ceiling for orchard farming.
  - This favoured fruit growing,
  - which in turn encouraged farmers to grow apples on marginal lands.
- This also helped to overcome the labour shortage problem.
- This sector has also received adequate attention from policy-makers.
- To preserve forests and its resources, the government introduced a restriction on tree-felling.

(43) Was the transformation process environmentally friendly?

- The following farming activities helped to stabilise the land in the watersheds.
  - Apple planting on marginal lands
  - Non-encroachment on common property resources
  - Controlled grazing

(44) What changes were there in livestock keeping?

- A sharp fall in animal population was observed.
- Fewer but better animals of improved breeds were raised.
- Improved livestock productivity was observed.
- This also minimised livestock-induced environmental degradation.

(45) How much fodder was available from fruit orchards?

- Orchards alone met 60 – 70 per cent of the total fodder requirements.
- This encouraged a complete stall-feeding system.

(46) Why was there fluctuation in apple production?

- Lately, there has been a decline in apple production owing to:
  - adverse climatic effects and
  - incidence of diseases.

(47) What are the other livelihood options that farmers are looking for?

- The farmers have now started exploring other livelihood options including:

- dairy development,
- vegetable growing,
- mushroom cultivation, and
- floriculture.

(48) Which were the transformation-induced negative side effects?

- The process of transformation has some negative sides also, e.g.,

  - decreasing biodiversity,
  - disruption of social values, and
  - emergence of plant diseases.

- Social values are also changing.

  - There is an increased level of materialistic preferences and
  - individualistic attitudes.

The Kapurkot Market Shed Area, Rapti Mountains, Nepal

(49) What condition was the community in before ?

- It is an upland community, now known as Kapurkot Market Shed Area.

  - It was among the poorest in the Rapti mountain region.
  - A farm household, with a landholding as small as 0.25 ha mostly terraced and marginal land

    * could barely sustain the family for four to six months,
    * with scant production of maize, millet, and wheat.

(50) How was the development programme started?

- A programme for cultivating off-season vegetables started in 1993.
- The programme started as a small-scale demonstration.
- The participant farmers earned a good amount of money through the sale of fresh vegetables.
- This encouraged other farmers to participate in the programme.
- Many more farmers took up vegetable growing.

(51) What economic benefits did the programme bring?

- In 1994, 225 MT of fresh vegetables were produced by about 450 households.
- The monetary value of these fresh vegetables was around NRs 1.8 million.
- There were 28 Production and Marketing Associations (PMAs) in this programme.
- In 1995, there were:

  - 93 PMAs,
  - 2,000 households, and
  - produced 2,000 MT of fresh vegetables
  - In monetary value, it was worth NRs 10.1 million.

- In 1996, there were:

  - 4,000 households,
  - which produced 3,200 MT of fresh vegetables.
  - In monetary value, it was worth of NRs 17.5 million.

- Marketing was mostly conducted by women farmers.

(52) What was the nature of technical backstopping?

- Technical know-how was provided to vegetable growers in the following aspects:

  - vegetable growing,
  - post-harvest technology, and
  - marketing.

(53) What was the impact of the programme in terms of food security?

- The off-season vegetable growing has increased
  - the per capita food availability by two to three times.
  - Previously, 0.25 ha of land under cereal crops had given a per capita food availability of about 72 kg
  - now, the same piece of land under vegetable crops (60%) gives 211kg of food per capita .

Battal Cluster Area, Mansera District, Pakistan

Off-season vegetable programme in the Battal Cluster Area

(54) How was the area before?

- This was one of the poorest areas in the Mansera district.
- The majority of land was marginal and rainfed.
  The landholdings ranged from 0.25 - 1 ha.
- The traditional crops grown under subsistence traditional farming were
  - maize and
  - wheat.

(55) What production programme was launched?

- Off-season tomatoe growing was introduced by the Sarad Rural Support Corporation (SRSC).
- The programme was introduced four years ago, through an innovative farmer.
- In the first year, there were only two-three farming families participating in tomatoe production and marketing.
- In the second year, about 20 per cent of the farmers took part.

(56) How were the inputs made available?

- All the necessary inputs, including plant protection measures, were made available by SRSC .
- It also facilitated the formation of a local farmers' marketing association.
- Collective marketing was introduced which reduced the transaction costs substantially.
- Off-season tomato cultivation enabled farmers to make a considerable profit.
- This resulted in tomatoe plantation on nearly 25ha of land by 90 per cent of the farming families.

(57) What was the impact of the programme?

- A total of 349 MT of tomatoes were produced and marketed.
- The gross income from the tomatoe sales was PRs 2,001,305.
- The total net income was PRs 1,472,420, for which:
  - the beneficiaries were 782 farm households
  - the total number of people was 7,820.

Replicability of the case studies

(58) Can these programmes be replicated?

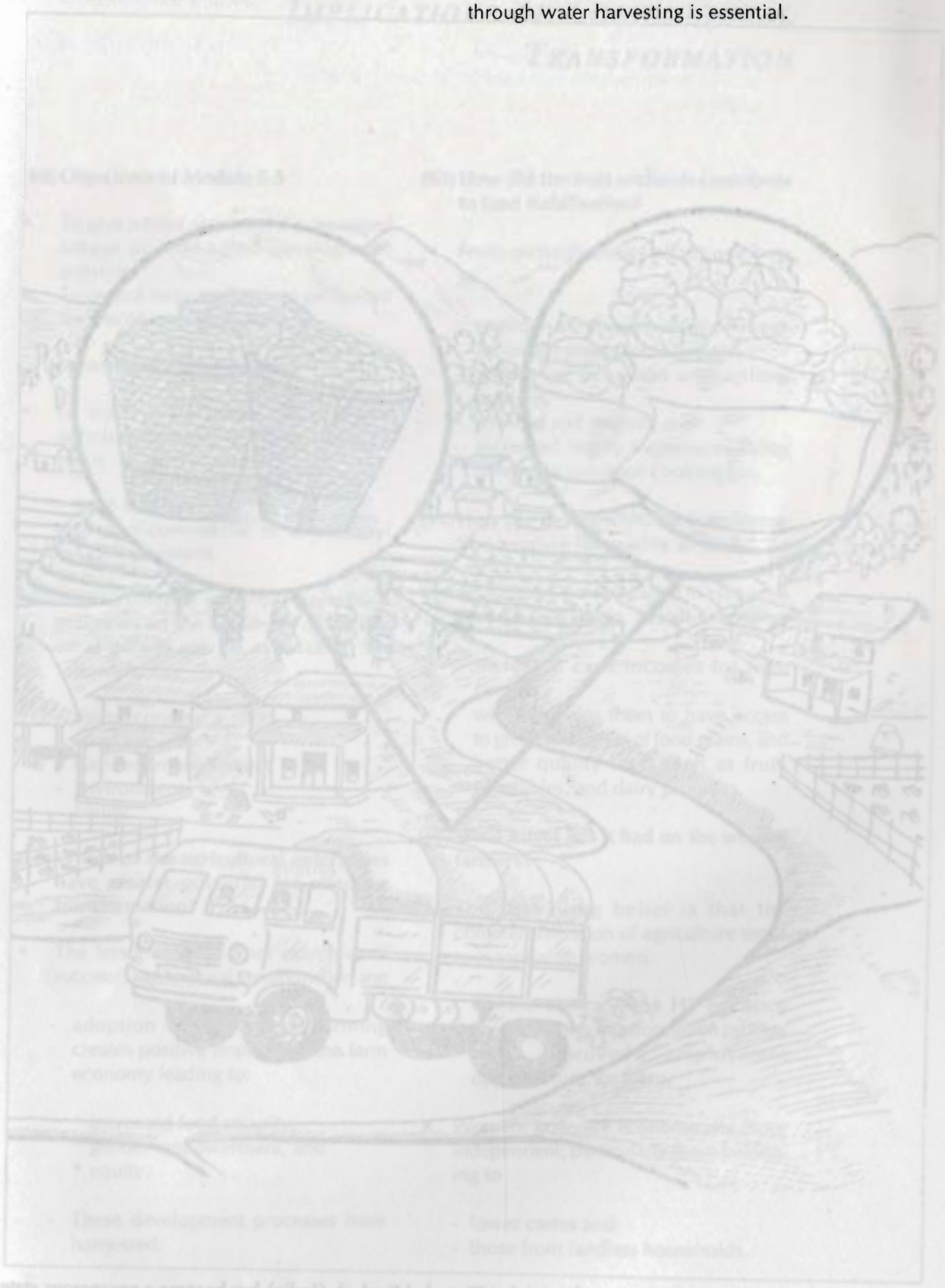
- The successful cases described above do not necessarily imply that
  - there should or would be indiscriminate commercialisation of high-value crops (HVC) in the mountains such as:
    * fruits,
    * vegetable seeds,
    * off-season or summer vegetables,
    * flowers and orchids, and
    * herbs and medicinal plants.
- Many areas are not suitable because of
  - inaccessibility and
  - unfavorable biophysical characteristics.
- Those dry and arid areas without irrigation facilities will not be suitable for growing off-season vegetables.
- Also, those areas that are prone to hailstones or receive heavy rainfall will not be suitable for off-season vegetables.

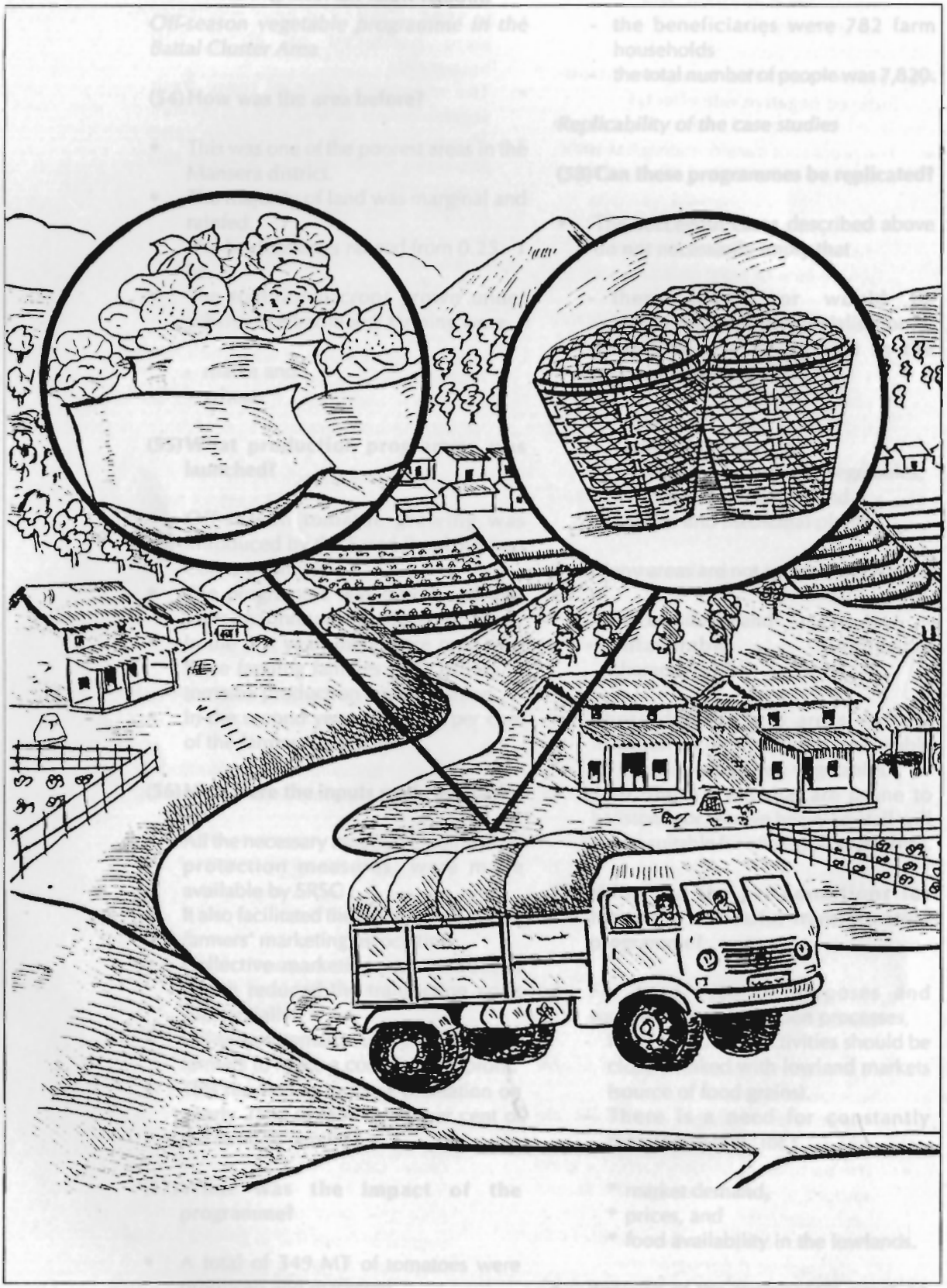
(59) What are the pre-conditions for running a successful transformation programme?

- For food security purposes and successful transformation processes,
  - HVC production activities should be closely linked with lowland markets (source of food grains).
  - There is a need for constantly monitoring HVC for :
    * market demand,
    * prices, and
    * food availability in the lowlands.
- Because of the detrimental effect on both environment and public health, there should be limited use of:

- pesticides and
- chemical fertilizers.

- Supplementing irrigation development to meet crop water requirements through water harvesting is essential.





Through exploitation of its 'niche' Himachal Pradesh (India) has become a prosperous state

MODULE 5.5
IMPLICATIONS OF AGRICULTURAL TRANSFORMATION

(60) Objectives of Module 5.5

- To give a brief acount of the increased output of land-based development activities
- To record its consequences on overall socioeconomic well-being

(61) What are the implications?

- In many watersheds of the HKH, agricultural transformation is taking place
  - from subsistence
  - to semi-commercial or commercial farming systems.
- Implications of such transformation processes on the livelihood options of local people can be assessed in the following.
  - Farm Economy
  - Food Security
  - Gender Empowerment
  - Environment
  - Equity

(62) Which of the agricultural enterprises have greater potential for effective transformation?

- The lessons gained from examples of successful agricultural transformation are:
  - adoption of niche-based farming creates positive impacts on the farm economy leading to:
    * increased food security,
    * gender empowerment, and
    * equity.
  - These development processes have harnessed:
    * the mountain niche,
    * biodiversity, and
    * favourable agroclimatic conditions.

(63) How did the fruit orchards contribute to land stabilisation?

- Fruits orchards are found to contribute to:
  - environmental improvement through increased vegetation coverage,
  - supply of firewood and animal fodder,
  - reduced soil erosion, and
  - increased family incomes enabling farmers to purchase cooking gas.

(64) How did the agricultural transformation improve the quality of life?

- Agricultural transformation in Himachal Pradesh (HP), India, has allowed for:
  - increased cash incomes for farm families,
  - which enables them to have access to greater amounts of food grains, and
  - better quality food such as fruit, vegetables, and dairy products.

(65) What effect has it had on the women farmers?

- The prevailing belief is that the commercialisation of agriculture tends to marginalise women.
  - On the contrary, the HP evidence shows that the transformation process has improved employment opportunities for them.
- Women, now, are economically more independent, particularly those belonging to
  - lower castes and
  - those from landless households.
- Women are enjoying a higher standard of living than their counterparts in non-transformed areas.

(66) What are the negative effects of agricultural transformation?

- The excessive use of pesticides has adversely affected the rich biodiversity of the area.
- Honeybees have been killed.
- Predators and useful insects have been destroyed.
- This has started affecting apple production.

MODULE 5.6
POLICY IMPERATIVES

(67) Objective of Module 5.6

- To outline those underlying factors needing action by the government and other related agencies for farmer-led watershed management

(68) Is there a need to address policy issues to improve food security and livelihood options?

- Based on successful cases presented in modules 5.4 and 5.5:
  - a number of policy imperatives has been identified.
  - These need to be addressed adequately by:
    * planners and field workers and
    * understood by their trainers.
  - This would facilitate the management of mountain watersheds.
  - This would improve livelihood options and food security.

  Hence, the identified imperatives are as given in the remaining paragraphs.

Local capacity building

(69) Are development agencies required to give adequate emphasis to:

- farmers' group formation in order to facilitate:
  - production and marketing of products,
  - technology adoption and dissemination,
  - agricultural inputs' supply,
  - credit and saving purposes, and
  - farmers' empowerment?

Market development and linkages

(70) How critical is it to develop markets and to establish linkages for:

- the promotion of food security through farm income and
- enhancement of knowledge on and skills required in post-harvest techniques such as:
  - harvesting,
  - grading,
  - packing,
  - processing,
  - storage, and
  - transport?

Important role of the Government as a facilitator

(71) Is it the role of the government to facilitate:

- appropriate technology generation and transfer,
- building physical infrastructure (roads),
- building local people's capacity through training,
- tax or duty exemption on mountain products and their packaging, and
- making favourable pricing policies to explain the comparative advantages of mountain areas?

Formulation of mountain-specific policies

(72) How would mountain-specific policies facilitate

- by enhancing economically-profitable farming systems' options
- by ensuring household food security for mountain dwellers?

MODULE 5.7
INSTITUTIONAL IMPERATIVES

(73) Objectives of Module 5.7

- To indicate the deficient domains of the institutions designed for agricultural development
- To suggest ways and means to overcome these institutional deficiencies for farmer-led watershed management

(74) What are the institutional improvements required to facilitate and improve food security and livelihood options?

- Institutions can effectively deliver their services if they are
  - efficient and
  - well managed.
- Planners and field workers engaged in watershed management are expected to know:
  - the areas in which the present institutions are deficient and
  - what remedial measures are needed to rectify them.
- This module attempts to bring out the present institutional gaps which need to be addressed for
  - improving livelihood options and
  - food security issues related to mountain farming communities.

Institutions

Agricultural Extension Services

(75) How is it functioning now?

- It is basically a production-oriented institution.
- It needs to be restructured to include a package of sectoral extension services, starting from production to post-harvest to processing to marketing and trade facilitation
  - for the priority mountain and upland watershed crops such as
    - * fruit,
    - * vegetables, and
    - * other niche-based farming.

(76) What needs to be done?

- There should be technological provisions for these crops including:
  - emphasis on the use of organic manure through composting,
  - integrated pest management,
  - post-harvest technology,
  - transport, and
  - markets and marketing information services.
- Along with these, beekeeping should be promoted for
  - pollination of mountain crops and as
  - an enterprise of comparative advantage.
- Integrated pest management (IPM) and Integrated Nutrient and Soil Management (INSM) should be emphasised.

Research and Development

(77) What needs to be done?

- A strong Research and Development (R & D) base should immediately be in place for:
  - fruit,
  - vegetables, and
  - vegetable seeds.
- Such an R&D base should lay emphasis on:

- local knowledge and
- local resources.

- A participatory plant breeding approach should be encouraged for

  - breeding crop varieties and
  - developing appropriate packages of technologies.

- Emphasis should be given to making use of available appropriate technologies.
- Selection and improvement of indigenous technologies should be emphasised.

Market Research and Development and Market Information Facilitation

(78) Why are these needed?

- To assist:

  - economic liberalisation,
  - privatisation, and
  - marketing skills and knowledge development.

- Information on the following aspects are valuable:

  - periodic analysis of domestic and export markets,
  - periodic monitoring of both domestic and international markets, and
  - review of export policies and regulations.

Post-Harvesting, Processing and Value-Adding Technology

(79) How will it facilitate?

- There is a need to develop knowledge and skills on post-harvest technologies, particularly on:

  - harvesting,
  - sorting and grading,
  - packing and storage,
  - transport, and
  - use of farmers' local knowledge.

- There is a need to develop technologies for processing and value-adding which can be used and managed at household level.

Storage, Transport and Marketing

(80) How will it effect?

- Need for household-level appropriate storage techniques to take advantage of seasonality.

  - There are low-cost storage facilities which can be propagated at household and community levels.
  - Appropriate technologies are needed to minimise the spoilage of highly perishable products such as fruits and vegetables.

Human Resource Development

(81) What are the present deficiencies?

- Well-trained teachers in mountain agriculture are in limited numbers.

  - Mountain agriculture is not adequately addressed in the course curricula of:

    * agricultural colleges and
    * agricultural universities

- Women's enrollment in agriculture, forestry sciences, and watershed management-related subjects is limited in number.
- The majority of the present extension workers are male and not trained in:

  - temperate and sub-temperate fruits and
  - temperate vegetables and vegetable seed production.

- This has adverse effects on the quality of the present agricultural extension programme.

Agricultural Farm Roads, Communication and Rural Credits

(82) How does communication enhance development?

- to provide accessibility for input delivery and marketing of products
  - priority should be given to building agricultural farm roads.
  - Farmers can get higher returns for their produce, if they are provided with:

* timely access to market information and
* a communication network.

- Easy access to credit needs to be facilitated through rural banking systems.

MODULE 5.8
PLANNING FOR SUSTAINABLE OPTIONS

(83) Objectives of Module 5.8

- To indicate the priority areas for participatory planning
- To suggest ways to mitigate the existing problems

(84) What are the priority areas?

In view of mountain watersheds' problems and prospects

- there are two distinct priority issues to be addressed in planning. They are:
  - improving livelihood options and food security for improved living standards and
  - conserving the environment.

(85) How to go about it?

- By planning and preparing a framework of action plans
- By giving emphasis to the mountain perspective
- By linking planning to mountain specificities
  - inaccessibility,
  - marginality,
  - fragility,
  - niche,
  - diversity, and
  - adaptation.

(86) What needs to be done to increase Livelihood Options for Food Security?

- To harness the niche and favourable agroclimatic conditions of the mountains
  - crops with comparative advantages need to be grown
  - Fruit orchards and vegetable farming are known to contribute to
    * stabilising soil,
    * supplying firewood,
    * providing animal fodder, and
    * increasing family income.
  - In the mountains, in horticultural crops, there has been
    * a quantitative increase (area and production),
    * but not much quality improvement, this needs to be addressed.
  - Efforts need to be directed to improving:
    * productivity,
    * plant materials,
    * post-harvest technology,
    * value-adding techniques, and
    * marketing.
  - The essential infrastructures for effective and sustained development in the mountains are:
    * farm roads,
    * communication facilities, and
    * rural banking systems.

(87) What are the areas that planners and field workers in partnership with local farmers should be addressing?

- The following are the emerging issues which need to be addressed by planners and field workers while formulating watershed management plans for the HKH.
  - Comprehensive land-use planning is needed with
    * identification of priority mountain crops that are
    * responsive to agro-ecological zones.
  - A complete package for promoting high-value agriculture is required in terms of:

* technology generation and transfer,
* post-harvest and value-adding technology,
* IPM and INM,
* storage,
* transport,
* marketing and trade, and
* export market analysis.

- The overall goal of the perspective plan should be

* to develop export-oriented
* high-quality and high-value horticultural crops,
* with emphasis on conservation of environment.

- Major problems in mountain areas are

- unsustainable use of the productive resource base and
- over-exploitation of common property resources such as:

* communal lands,
* forests,
* pastures,
* rangelands, and
* poor soil and land management practices.

- These lead to soil erosion and land degradation which is common in many parts of the HKH.
- Some problems are area specific and some are common to all mountains.

- Develop an integrated local peoples' conservation policy strategy involving:

- pastoralists,
- agro-pastoralists,
- wood cutters, and
- farmers on their terms with a watershed management approach.

- The strategic plan should include resource regenerative activities with:

- high pay-off conservation gains,
- management with an indigenous knowledge base
- where possible, blending with modern science to generate appropriate technologies, and
- linking with the imperatives of mountain specificities.

- This model exposed in the case studies of HP and Rapti, has been very successfully used in the wasteland and mountains of tropical and regions.
- The most important ingredients in the success of the cases cited here for IWM have been due to availability of the following to the farmers.

- Investments
- Ownership of resources
- Capacity building
- Support services, i.e., research, extension and infrastructure

(88) Conclusions

- Poverty is widespread in the HKH and its burden falls disproportionately on women and children. The major contributing factors for this are:

- over population,
- watershed mismanagement,
- widespread soil erosion,
- land degradation,
- subsistence-oriented traditional agriculture,
- low agricultural productivity, and
- low income and limited employment opportunities.

- Farming systems in these areas are characterised by small holdings on fragile and marginal lands under harsh climatic conditions.
- Lately, for mountain communities, livelihood options and food security issues are emerging as critical concerns, posing problems to the existing farming systems.
- This module has depicted how these concerns have led to agricultural transformation at household level together with environmental improvement in some parts of the HKH.
- The module has also presented some examples of farmers' efforts in coping with food insecurity problems through non-agricultural activities.
- This model has also stressed the need for better understanding of the transformation processes and livelihood

priority options which would be crucial for planners and field workers currently engaged in managing watersheds in the HKH.

Further Reading

ADB, 1996. 'Project Completion Report on the Fruit and Vegetable Marketing Project in Pakistan, PCR:PAK 17150.

ADB Field Report, 1996. Chitral Area Development Project (CADP), Field Office, Chitral, Pakistan.

Alam, Z., 1990. *Development of Horticulture in the Mountain Regions of Pakistan: Progress, Potential, and Constraints*. MFS Series No. 19. Kathmandu, Nepal: ICIMOD.

Alam, Z. and Arif, M.A., 1996. *The Horticulture Sector in Baluchistan: Constraints and Potential*. Quetta, Islamabad, June 1996.

Altaf, Z., 1993. *Strengthening Institutions for Sustainable Development of Mountain Agriculture in Pakistan*. Kathmandu, Nepal: ICIMOD.

Anonymous: Case Study from the Northern Areas of Pakistan.

Arambawela, W.J., 1996. Second Report of the Livestock Production Extension Expert.

ARI, 1995. *Diagnosis of Crops, Livestock and Forestry: Production Constraints and Potential Research Opportunities in Kanak Valley, Baluchistan. A Farming System Perspective*. AURU, Quetta Staff Paper No. 90-1. Quetta, Pakistan: Agricultural Research Institute.

Banskota, M. and Partap, T., 1996. *Education, Research and Sustainable Mountain Agriculture: Priorities for the Hindu Kush-Himalayas*. Discussion Paper, Series No. NFS 96/1. Kathmandu, Nepal: ICIMOD.

EHMD, 1992. *Extension, Horticulture and Malakand Division. Malakand Fruit and Vegetable Project*. Swat, Pakistan: EHMD.

FAO, 1996. *FAO Participation in Sustainable Agriculture and Rural Development in Pakistan*. Rome: FAO.

Ghaffer, A., 1996. 'Methodologies for Documentation of Appropriate Farm Technologies of Different Agro-Ecological Zones of the HKH Region'. Paper presented at the Farmer Technologies Workshop, 1996, ICIMOD, Kathmandu.

IUCN, 1996. *Natural Resource and Environmental Survey, December 1996. Azad Jammu and Kashmir (AJK)*. Islamabad: IUCN, Pakistan Programme.

Jehangiri, G. K. and Khattak, A. R., 1990. *Technical Progress Report of Farming Systems Research in Mansehra District of NWFP*. Peshawar: PARC/ MART. NWFP Agricultural University.

Jodha, N.S. and Partap, T., 1993. 'Folk Agronomy in the Himalayas: Implications for Agriculture Research and Extension'. In *Rural People's Knowledge, Agricultural Research and Extension Practice*. Research Series. No. 3, Vol. I. London: International Institute for Environment and Development (IIED).

Jodha, N.S. and Shrestha, S., 1993. 'Towards Sustainable and More Productive Mountain Farming'. Paper Presented at the ICIMOD 10th Anniversary Symposium on Mountain Environment and Development: Constraints and Opportunities, ICIMOD, Kathmandu, Nepal, December 1-2, 1993.

Kalam Integrated Development Project, 1995. *Phase IV-Extension (1995-1998) Agriculture Extension*. Pakistan: Government of NWFP, Department of Agriculture.

KIDP, 1992. *Pak-Swiss: Kalam Integrated Development Project – Highlights 1992-93*. Pakistan: KIDP, NWFP.

LDP, 1996. *Livestock Development Project, Dept. of Livestock and Dairy Development*. Pakistan: Government of Baluchistan.

MFVDP, 1992. *Internal Evaluation of Phase II of MFVDP, Swat, Pakistan*. Pakistan: MFVDP.

NTRS, 1994. *A View of the National Tea Research Station. The National Tea Research Station, Shinkiari, District Mansehra*. Islamabad: PARC.

PARC, 1995. *Progressive Farming, No.2, Vol. 15, March/April 1995*. Islamabad: Pakistan Agricultural Research Council.

PARC/ESCAP/UNEP, 1994. *Combating Desertification in Pakistan (An Action Plan)*. Islamabad: PARC, UNEP, and ESCAP.

Partap, T. and Watson, H. R., 1994. *Sloping Land Technology (SALT): A Regenerative Option for Sustainable Mountain Farming*. ICIMOD Occasional Paper No. 23. Kathmandu, Nepal: ICIMOD.

John Mellor and Associates Inc., 1995. *Raising Cash Income in High Population Density Remote Areas of Rapti Zone. A Project: Macro Impact, Women's Orientation*. Washington D.C.: JM&A Inc.

Reid, P., 1995. *Agriculture Research Project Phase-II: Diagnostic Surveys of NWFP Agriculture*. Lahore, Pakistan: OPCV, Australia and NESPAK.

Schild, A. and et al., 1995. *A Report on the Fact Finding Mission: Community-Based Eco-Rehabilitation Programme*. Kathmandu: SDC.

SDC, 1996. *SDC Support Concept for Sustainable Land Use in the Uplands and Foothills of Northern Pakistan*. Islamabad: SDC.

Sharma, P.N. and Wagley, M.P., 1996. *Case Studies on People's Participation in Watershed Management in Asia: Nepal, China and India*. Kathmandu: UNDP/ FAO.

Shah, S. and Ali, B., 1995. *Needs and Priorities in Strengthening of Research and Education for Sustainable Mountain Agriculture in North-West Pakistan*. Peshawar: NWFP Agriculture University.

Smillie, I. Bushra, G. and Rowe, B., 1996. *The Sarhad Rural Support Corporation: A Mid. Term Review*.

Southgate, D. and Pearce, D., 1988. *Agricultural Colonization and Environmental Degradation in Frontier Developing Economics*. Environmental Department Working Paper No. 9. Washington DC: The World Bank.

Streefland, P.H.; Khan. S. H. and Oliver, V. L., 1995. *Aga Khan Rural Support programme: Contextual Study of the NorthernAreas and Chitral, Gilgit*. Pakistan.

UNDP, 1996. *Northern Areas Participatory Agriculture Development – Pilot Project*. United Nations Development Programme, Project Document. Islamabad, Pakistan: UNDP.

World Bank, 1996. 'Pakistan Economic Policies, Institutions and the Environment', Draft Confidential. Report No. 15781 PAK. Agriculture and Natural Resources Division, South Asia Region.