CONSERVATION & MANAGEMENT OF RESOURCES FOR DEVELOPMENT
Chapter 13

Managing Fragile Ecosystems: Sustainable Mountain Development

INTRODUCTION

13.1. Mountain regions are an important source of human, spiritual, cultural and biological diversity. Furthermore, they are a source of such key resources such as water, minerals, forest and agricultural products and recreational services. As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem. Mountain ecosystems are, however, rapidly changing. They are susceptible to accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity. On the human side, there is widespread poverty among mountain inhabitants and loss of indigenous knowledge and know-how. As a result, most global mountain areas are experiencing environmental degradation. Hence, the proper management of mountain resources and socio-economic development of the people deserves immediate action.

13.2. About 10 per cent of the world's population lives in mountain areas and the half of Humanity depend on mountain resources, water in particular, especially for energy, irrigation and consume.

13.3. Two programme areas are included in this chapter to further elaborate the problem of fragile ecosystems with regard to all mountain regions of the world. These are:

(a) Generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems;

(b) Promoting integrated mountain areas development and new revenue resources.

PROGRAMME AREAS

13A. GENERATING AND STRENGTHENING KNOWLEDGE ABOUT THE ECOLOGY AND SUSTAINABLE DEVELOPMENT OF MOUNTAIN ECOSYSTEMS

Basis for action

13.4. Mountain regions are highly vulnerable to human and natural ecological imbalance. Mountain regions are the most sensitive areas to all climate changes in the atmosphere. Specific information on ecology, natural resource potential and socio-economic activities is essential. Mountain and hillside areas hold a rich variety of ecological systems. Because of their vertical dimensions, mountains create gradients of temperature, precipitation and insolation. A given mountain slope may include several climatic systems - such as tropical, subtropical, temperate and alpine - each of which represents a microcosm of a larger habitat diversity. Mountain people have used this level by developing agro-silvopastoral production systems that are balanced and tailored to each of these stages complementing each other. They have built thousand-of-years cultures that are especially respectful with their territories and very attentive not only to perpetuate but also to increase their wealth and diversity. Demographic changes and local climate changes as well as the economical and technical evolution of plains and globalization have increased the pressure on the environment at a rate sometimes higher than that of technical the innovations that could have allowed the necessary adaptation and the balanced functioning of the management capacity of these populations. The current evolution and expected climates will only increase such imbalance.

There is, however, a lack of knowledge of mountain societies and their production and territory management techniques, of their production systems and their complementary natures, and of their mountain territories and ecosystems. The creation of a global mountain database is therefore vital to launch programmes that would contribute to the sustainable development of mountain regions.

Objectives

13.5. The objectives of this programme area are:

(a) To undertake a survey of the different forms of soils, forest, water use, crop, plant and animal resources of mountain ecosystems, taking into account the work of existing international and regional organizations;

(b) To maintain and generate database and information systems to facilitate the integrated management and environmental assessment of mountain ecosystems, taking into account the work of existing international and regional organizations;

(c) To improve and build the existing ecological knowledge base regarding technologies and agricultural and conservation practices in the mountain regions of the world, with the participation of local communities;

(d) To create and strengthen the communications network and information clearing-house for existing organizations concerned with mountain issues;

(e) To improve coordination of regional efforts to protect fragile mountain ecosystems through the consideration of appropriate mechanisms, including regional legal and other instruments;

(f) To generate information to establish databases and information systems to facilitate an evaluation of environmental risks and natural disasters in mountain ecosystems.

A) Management-related activities

13.6. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Strengthen existing institutions or establish new ones at local, national and regional levels to generate a multidisciplinary knowledge base on mountain ecosystems, their resources and population;

(b) Promote national policies that would provide incentives to local people for the use and transfer of their traditional sustainable practices and environment-friendly technologies and farming and conservation practices that come from other mountain regions of the world or from innovation

(c) Build up the knowledge base and understanding by creating mechanisms for cooperation and information exchange among national and regional institutions working on fragile ecosystems;

(d) Diversify mountain economies, inter alia, by creating and/or strengthening tourism, in accordance with integrated management of mountain areas;

(e) Integrate all forest, rangeland and wildlife activities in such a way that specific mountain ecosystems are maintained;

(f) Establish appropriate natural reserves in representative species-rich sites and areas. Accompany the creation of appropriate reserves allowing populations to continue living in their territories.

B) Data and information

13.7. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Maintain and establish meteorological, hydrological and physical monitoring analysis and capabilities that would encompass the climatic diversity as well as water distribution of various mountain regions of the world; to identify the nature and consequences of climate change both on the mountains and downstream areas.

(b) Build an inventory of different systems of agro-forestry production and the local systems of territorial management in the course of history, to identify those practices that are proven and known to not only maintain but also increase biodiversity as well as the reasons why some others have lost their effectiveness and adaptability and those actions to be undertaken in order to adapt and recover them.

(c) Build an inventory of different forms of soils, forests, water use, and crop, plant and animal genetic resources, giving priority to those under threat of extinction. Genetic resources should be protected in situ by maintaining and establishing protected areas and improving traditional farming and animal husbandry activities and establishing programmes for evaluating the potential value of the resources;

(d) Identify hazardous areas that are most vulnerable to erosion, floods, landslides, earthquakes, snow avalanches, braking of glacial lakes, glaciers withdrawals and other natural hazards of natural or anthropogenic nature.

(e) Identify mountain areas threatened by air pollution from neighbouring industrial and urban areas.

(f) Identify, map and predict as much as possible the consequences of climate changes on the terracing of the environments and the distribution of plant and animal species.

C) International and regional cooperation

13.8. National Governments and governmental organizations including the International Mountain Partnership, should:

(a) Coordinate regional and international cooperation and facilitate an exchange of information and experiences among the specialized agencies, the United Nations the World Bank, IFAD and other international and regional organizations, national Governments, research institutions and non-governmental organizations working on mountain development;

(b) Encourage regional, national and international networking of people's initiatives and the activities of international, regional and local non-governmental organizations working on mountain development such as the United Nations University (UNU), the Woodland Mountain Institutes (WMI), the International Center for Integrated Mountain Development (ICIMOD), the International Mountain Society (IMS), the African Mountain Association and the Andean Mountain Association, besides supporting those organizations in exchange of information and experience;

(c) Protect Fragile Mountain Ecosystem through the consideration of appropriate mechanisms including regional and legal instruments, and others.

Means of implementation

A) Financing and cost evaluation

13.9. The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $50 million from the international community on grant or concessional terms. These are indicative and order-of-magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms,

including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation.

Now, the tools developed by the "green economy" are used to estimate the value of "ecological services" provided by mountain areas and the ecological deficit regions of lowland areas and the North. The taxes to be collected within this framework should be used in an integrated and subsidiary way to allow a regional, national and local fair and sustainable development.

B) Scientific and technological means

13.10. Governments at the appropriate level, with the support of the relevant international and regional organizations, should strengthen scientific research and technological development programmes, including diffusion through national and regional institutions, particularly in meteorology, hydrology, ethnology, geography, agronomy, forestry, soil sciences and plant sciences.

C) Human resource development

13.11. Governments at the appropriate level, and with the support of the relevant international and regional organizations, should:

(a) Launch training and extension programmes in environmentally appropriate technologies and practices that would be suitable to mountain ecosystems;

(b) Support higher education through fellowships and research grants for environmental studies in mountains and hill areas, particularly for candidates from indigenous mountain populations;

(c) Undertake environmental education for farmers, in particular for women, to help the rural population better understand the ecological issues regarding the sustainable development of mountain ecosystems in order to improve their own practices.

(d) Strengthen the managerial capacities of local communities and local officials.

13.12. Governments at the appropriate level, with the support of the relevant international and regional organizations, should build up national and regional institutional bases that could carry out research, training and dissemination of information on the sustainable development of the economies of fragile ecosystems.

13B. PROMOTION OF INTEGRATED DEVELOPMENT OF MOUNTAIN TERRITORIES AND NEW SOURCES OF INCOME

BASIS FOR ACTION

13.13. Nearly half of the world's population is affected in various ways by mountain ecology and the degradation of watershed areas. About 10 per cent of the Earth's population lives in mountain areas with higher slopes, while about 40 per cent occupies adjacent areas of middle and lower altitude basins. There are serious problems of ecological deterioration in these basins. For example, in the hillside areas of the Andean countries of South America a large portion of the farming population is now faced with a rapid deterioration of land resources. Similarly, the mountain and upland areas of the Himalayas, South-East Asia and East and Central Africa, which make vital contributions to agricultural production, are threatened by cultivation of marginal lands due to expanding population and lack of access to services and techniques. In many areas this is accompanied by excessive livestock grazing, deforestation and loss of biomass cover.

13.14. Soil erosion can have a devastating impact on the vast numbers of rural people who depend on rainfed agriculture in the mountain and hillside areas. Poverty, unemployment, poor health and bad sanitation are widespread. Promoting integrated watershed development programmes through effective participation of local people is a key to preventing further ecological imbalance. An integrated approach is needed for conserving, upgrading and using the natural and human resource base of land, water, plant and animal resources. In addition, improving educational, health, communication, clean energy and transport services (including cable) and the promotion of new revenue in particular through the organization of employment

plans increasing the production base will contribute significantly to improving the living standards of many rural populations living in mountain ecosystems and their ability to manage their territories.

Objectives

13.15. The objectives of this programme are:

(a) By the year 2021, to develop appropriate land-use planning and management for both arable and non-arable land in mountain-fed watershed areas to prevent soil erosion, increase biomass production and maintain the ecological balance;

(b) To strengthen and modernize the capacity and skills of local authorities to enable mountain people to manage their lands again in a sustainable way, and to enable all sections of such societies to have fair access to land resources.

(c) To promote income-generating activities, such as sustainable tourism, fisheries and environmentally sound mining, and to improve infrastructure and social services, in particular to protect the livelihoods of local communities and indigenous people;

(d) To develop technical and institutional arrangements for affected countries to mitigate the effects of natural disasters through hazard-prevention measures, risk zoning, early-warning systems, evacuation plans and emergency supplies.

Management-related activities

13.16. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Undertake measures to prevent soil erosion and promote erosion-control activities in all sectors;

(b) Establish task forces or watershed development committees, complementing existing institutions, to coordinate integrated services to support local initiatives in animal husbandry, forestry, horticulture and rural development at all administrative levels;

(c) Enhance popular participation in the management of local resources through appropriate legislation;

(d) Support non-governmental organizations and other private groups assisting local organizations and communities in the preparation of projects that would enhance participatory development of local people;

(e) Provide mechanisms to preserve threatened areas that could protect wildlife, conserve biological diversity or serve as national parks;

(f) Develop national policies that would provide incentives to farmers and local people to undertake conservation measures and to use environment-friendly technologies that respect the future of local population;

(g) Undertake income-generating activities in cottage and agro-processing industries, such as the cultivation and processing of medicinal and aromatic plants;

(h) Undertake the above activities, taking into account the need for full participation of women, including indigenous people and local communities, in development.

B) Data and information

13.17. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Create or improve structures for consultation and decision-making with the local people.

(b) Develop health services and education, in particular by adapting teaching to the specific crop and production systems of the mountain populations.

(c) Create and maintain systematic monitoring and assessment capacity at national and regional level for the production of information for daily operations and to assess the impact of projects on environment and the socio-economic situation;

(d) Generate data on alternative livelihoods and diversified production systems at the village level on annual and tree crops, livestock, poultry, beekeeping, fisheries, village industries, markets, transport and income-earning opportunities, taking fully into account the role of women and integrating them into the planning and implementation process.

C) International and regional cooperation

13.18. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Strengthen the role of appropriate international research and training institutes such as the Consultative Group on International Agricultural Research Centers (CGIAR) and the International Board for Soil Research and Management (IBSRAM), as well as regional research centres, such as the Woodland Mountain Institutes and the International Center for Integrated Mountain Development, in undertaking applied research relevant to watershed development;

(b) Promote regional cooperation and exchange of data and information among countries sharing the same mountain ranges and river basins, particularly those affected by mountain disasters and floods; on the other hand, the various mountain ranges of the world in more or less structured forms (for example, twinning, networks, joint research and development programmes…)

(c) Establish a Mountain Partnerships by giving it real means not only to coordinate action in the context of this agenda or to identify and network NGOs and associations involved in the development of watershed basins but also to assist in the creation of joint research and development programmes and funding research, particularly in the context of actions and programmes of the United Nations.

MEANS OF IMPLEMENTATION

A) Financial and cost evaluation

13.19. The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this programme to be about $13 billion, including about $1.9 billion from the international community on grant or concessional terms. These are indicative and order-of-magnitude estimates only and have not been reviewed by Governments. Actual costs and financial terms, including any that are non-concessional, will depend upon, inter alia, the specific strategies and programmes Governments decide upon for implementation.

13.20. Financing for the promotion of alternative livelihoods in mountain ecosystems should be viewed as part of a country's anti-poverty or alternative livelihoods programme. This promotion should also be funded by the processes of valuation of ecosystem services.

B) Scientific and technical means

13.21. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Consider undertaking pilot projects that combine environmental protection and development functions with particular emphasis on some of the traditional environmental management practices or systems that have a good impact on the environment;

(b) Generate technologies for specific watershed and farm conditions through a participatory approach involving local men and women, researchers and extension agents who will carry out experiments and trials on farm conditions;

(c) Promote technologies of vegetative conservation measures for erosion prevention, in situ moisture management, improved cropping technology, fodder production and agroforestry that are low-cost, simple and easily adopted by local people.

C) Human resource development

13.22. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Promote a multidisciplinary and cross-sectoral approach in training and the dissemination of knowledge to local people on a wide range of issues, such as household production systems, conservation and utilization of arable and non-arable land, treatment of drainage lines and recharging of groundwater, livestock management, fisheries, agroforestry and horticulture;

(b) Develop human resources by providing access to education, health, energy and infrastructure;

(c) Promote local awareness and preparedness for disaster prevention and mitigation, combined with the latest available technology for early warning and forecasting.

D) Capacity-building

13.23. Governments at the appropriate level, with the support of the relevant international and regional organizations, including the International Mountain Partnership, should develop and strengthen national centres for watershed management to encourage a comprehensive approach to the environmental, socio-economic, technological, legislative, financial and administrative aspects and provide support to policy makers, administrators, field staff and farmers for watershed basins development and for guiding the use of capital from green economy.

13.24. The private sector and local communities, in cooperation with national Governments, should promote local infrastructure development, including communication networks, mini- or micro-hydro development to support cottage industries, and access to markets.