

Fostering sustainable mountain development: from Rio to the International Year of Mountains and beyond¹

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Mountains occupy 24 percent of the Earth's land surface (Kapos *et al.*, 2000) and are home to a large part of the world's people. It is difficult to say exactly how large a part, because there is no widely accepted definition of mountains. For many years, it has been estimated that one-tenth of the world's population – about half a billion people – lives in mountain areas. Yet a recent study estimates that 26 percent of the world's population live within or very close to mountain areas. This figure includes not only remote, poor and disadvantaged people and communities, but also urban centres inside and immediately outside mountain valleys, including even such mega-cities as Mexico City, Mexico and Santiago, Chile (Meybeck, Green and Vörösmarty, 2001).

However the mountains and their populations are defined, there is no doubt that mountains influence the lives of billions – not only those living there, but those in the lowlands as well (Messerli and Ives, 1997). In particular, as the source of much of the world's water supply (for example, 80 to 100 percent of freshwater in the arid and semi-arid regions of the tropics and subtropics), mountains have a fundamental role for global food security. In some areas of the world as much as 95 percent of available freshwater is used for irrigation and food production; most of this water originates in the mountains. Thus mountains are vital to a large part of the global population.

Yet until a decade ago, mountains played but little part in global discussion on environment and development. The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil in 1992, presented a unique opportunity for mountains to emerge from the wings (Price, 1998). The inclusion of a specific chapter on mountains in Agenda 21, the plan for action endorsed at UNCED by the Heads of State or Government of most of the world's nations, placed sustainable mountain development on a comparable footing with other major issues such as climate change, tropical deforestation and desertification. In the decade that followed UNCED, international momentum for support of mountain areas has gathered steadily, culminating in the declaration of 2002 as the International Year of Mountains (IYM).

This article considers the evolution of the inclusion of mountains in the global agenda, the emergence of sustainable mountain development as a development priority, and the primary mountain issues, considered in five basic categories of environment, culture and gender, risk, economics, and policies and legislation.

MOUNTAINS IN THE GLOBAL AGENDA: FROM UNCED TO IYM

At the global level, formal implementation of Chapter 13 of Agenda 21, entitled "Managing fragile ecosystems: sustainable mountain development", began in 1993, when the UN Inter-Agency Committee on Sustainable Development appointed FAO as Task Manager for Chapter 13. In this role, FAO has convened seven meetings of an ad hoc Inter-Agency Group on Mountains (IAGM), which in spite of its name does not involve only UN agencies, but also includes bilateral donors, non-governmental organizations (NGOs) and research institutions.

Among the recommendations made by the first meeting of the IAGM was that national governments should become directly involved in the implementation of Chapter 13. A key means to this end was a series of regional intergovernmental consultations, bringing together governments (from a total of 62 countries, plus the European Union) within the regions of Africa, Asia and the Pacific, Europe and Latin America and the Caribbean between 1994 and 1996 (Price, 1999a).

¹ Published in *Unasylva* 208: 6-17 (2002)

The IAGM also underlined the importance of non-governmental involvement, recognizing that the process that led to Chapter 13 – in contrast with many other chapters of Agenda 21 – was driven by a relatively small number of academics and development experts, mainly from industrialized countries. In 1995, a global NGO consultation was held in Lima, Peru, bringing together 110 participants from 40 countries. This meeting led to the establishment of the Mountain Forum, “a global network for information exchange, mutual support, and advocacy for equitable and ecologically sustainable mountain development and conservation”. Organized through both global and regional structures, by the end of 2001 the Mountain Forum had over 2 700 individual and 170 organizational members in more than 100 countries. Key means of information sharing include 15 discussion lists, electronic conferences and an interactive Web site (www.mtnforum.org) with membership services, a calendar of events, an on-line library and links to other networks (Taylor, 2000).

Work in the years following UNCED has been critical in successfully transmitting the message of the global importance of mountain area resources, for example in terms of freshwater resources, biological diversity, importance for recreational activities and sensitivity to climate change. In the first five years after UNCED, a number of nations established national-level or subnational institutions concerned with the sustainable development of their mountain areas. Others, particularly in Europe, developed laws and policies to this end (Price, 1999a).

It was in this context of gathering momentum that the participants in the international conference “Mountain Research – Challenges for the 21st Century”, held in Bishkek, Kyrgyzstan in 1996, proposed that sustainable mountain development should be the theme of an International Year. The proposal of this idea to the UN Economic and Social Council (ECOSOC) by the Kyrgyz Ambassador to the UN in 1997 resulted in a resolution, co-sponsored by 44 member countries, requesting the Secretary-General to undertake an exploratory process. At its following session ECOSOC adopted a resolution, co-sponsored by 105 member countries, that recommended to the General Assembly that 2002 should be declared the International Year of Mountains. The UN General Assembly proclaimed the IYM at its fifty-third session in 1998, in a resolution sponsored by 130 countries.

THE PROCESS OF SUSTAINABLE MOUNTAIN DEVELOPMENT

The term “sustainable mountain development” appeared first in the title of Chapter 13 of Agenda 21. However, it has never been specifically defined, in spite of many documents and meetings identifying it as an objective. Indeed, there is no single definition for either of the two concepts that it unites, mountains and sustainable development.

The concept of sustainable development was introduced in the World Conservation Strategy (IUCN, 1980) and became fashionable in the 1980s, notably through the report of the World Commission on Environment and Development (WCED) (the Brundtland Report), *Our common future*, which provided the most frequently cited definition: “development that meets the needs of, and aspirations of, the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Another commonly used definition, agreed by three major international organizations working in the field, is “development which improves the quality of life, within the carrying capacity of the earth’s life support system” (IUCN/UNEP/WWF, 1991). Sustainable development was a key concept of UNCED and led to the establishment of the UN Commission on Sustainable Development. Yet debates about its meaning(s) continue, resulting inevitably from its appropriation by a wide range of authors and organizations in diverse cultures. However, most would agree that sustainable development is a process of ensuring that current needs are satisfied while maintaining long-term perspectives regarding the use and availability of natural (and often other) resources into the long-term future and the equitable well-being of future generations.

Given the very different characteristics of the world’s diverse mountain regions, even on one continent, it is probably best not to propose a precise definition of sustainable mountain development, but to recognize it as “a regionally specific process of sustainable development that concerns both mountain regions and populations living downstream or otherwise dependent on these regions in various ways” (Price and Kim, 1999).

Despite the lack of an accepted definition, Sène and McGuire (1997), representing FAO in the role of Task Manager for Chapter 13, state that “the concept of sustainable mountain development has taken on new meaning” since UNCED. They also state that the time has come for a multisectoral, more comprehensive approach to addressing the problems and

needs of mountain areas. The various regional intergovernmental consultations on sustainable mountain development have identified long lists of areas that are intended to contribute, or in some way are related, to sustainable mountain development (summarized by Price, 1999a). Yet it is probably appropriate that there is no attempt to prioritize them, again because of the vast differences among mountain regions.

Indicators of progress in sustainable mountain development

The objectives of sustainable mountain development vary at different spatial scales and are likely to shift over time. However, to assist in project development and wider planning, and to evaluate success, indicators are needed. Various indicators have been proposed. At the global level, FAO (1996) has proposed pressure and state indicators, to be used in a pressure-state-response framework (OECD, 1993). Such a framework starts from the basis that human activities exert pressures (e.g., pollution emissions or land use changes) on the environment, which can induce changes in the state of the environment (e.g., changes in ambient pollutant levels, habitat diversity, water flows). Society then responds to changes in pressures or state with environmental and economic policies and programmes intended to prevent, reduce or mitigate pressures and/or environmental damage. For such a framework, FAO suggested that the key pressure indicator is the population of mountain areas, to be measured in terms of population density, growth and migration. The proposed state indicators were, first, the welfare of mountain populations – to be measured in terms of nutritional anthropometry – and, second, the condition and sustainable use of natural resources in mountain areas. The latter was to be assessed qualitatively based on a composite of four subindices used to describe the state of the natural resource base of a watershed: the status of soil protection; the area of hazard zones; the extent of degraded land; and productivity. Other proposals have been made by Rieder and Wyder (1997), who, like many authors, suggest that sustainability should be measured in terms of three sets of indicators: ecological, economic and social. These indicators need to be tailored to specific circumstances.

Agreement on priorities for sustainable mountain development, and how it should be measured, will not be simple. Price and Kim (1999) surveyed workers in government, NGOs and scientific organizations in 30 European countries on a set of 36 possible indicators derived from meetings on sustainable mountain development in Europe. They found that, for all respondents, ecological priorities ranked higher than socio-political or economic priorities. However, two socio-political variables were rated highly important: the empowerment of mountain communities and the need for education and training in conservation and development.

Comparable research has not been done in other parts of the world. Yet it is widely felt that indicators for sustainable mountain development have to be appropriate to the region of concern and based on data that are measurable, available, easily understood and meaningful (Rieder and Wyder, 1997). It is in this context that the articles in this issue should be read, focusing on the five “pillars” for sustainable mountain development used as a framework for many IYM discussions: environment, culture and gender, risk, economics, and policies and legislation.

FIVE “PILLARS” FOR SUSTAINABLE MOUNTAIN DEVELOPMENT

The approach of the five pillars expands the more traditional three-legged approach to sustainable development based on environmental, economic and social dimensions. The best global overview of the issues relating to sustainable mountain development is provided by Messerli and Ives (1997); a recent summary of key issues and priorities for action may be found in the Abisko document (Royal Swedish Academy of Sciences, 2002). The following sections indicate some of the key attributes; they should be read with a view to recognizing the complex links among all elements of the mountain world – and thus among the pillars.

Environment

At the global scale, two aspects of the mountain environment are of great significance, not only to highland populations but also downstream: water and biodiversity. Mountains are the source of all of the world’s major rivers and many smaller ones. These “water towers” capture moisture from passing air masses and redistribute it downhill (Mountain Agenda, 1998a). When this moisture falls as snow, it is stored until it melts in the spring, providing water which is vital for agriculture, settlements and industries downstream, often in the period of lowest rainfall. In semi-arid and arid regions, over 90 percent of river flow comes from the mountains.

Mountain water is also a source of hydro-electricity, most of which is used in nearby lowland areas. However, small-scale renewable hydro-energy is also a catalyst for economic development in mountain areas, and the availability of water (e.g. along irrigation channels) typically defines the upper limit of settlement and economic activities.

Mountains are global centres of biodiversity for a variety of reasons including their isolation (they are often surrounded by a “sea” of highly modified lowland ecosystems); evolution and migration over time; and contrasting conditions at different altitudes, on different slopes and in diverse microhabitats. Apart from the intrinsic value of such diversity, it is of significant livelihood and economic value to both mountain and other people. Mountain species include many that can be eaten, including the precursors of many of the world’s major food crops, as well as many medicinal plants and non-wood forest products that have a great range of uses. The diversity of mountain ecosystems is also one of the reasons for their disproportionately high representation among the world’s protected areas, and a reason for their having been chosen as a focus of the 2002 meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (see <http://www.unibas.ch/gmba/>).

Culture and gender

Biological and cultural diversity are often closely linked; and mountain areas provide many excellent examples. It is difficult to quantify mountain populations, since many statistical reporting districts include both mountain and lowland areas. However two general trends can be recognized. In the mountains of developing countries, most populations are growing. In most mountain areas of industrialized countries, populations are typically static or shrinking, except where tourism or “amenity migration” – the movement of people into mountains because of a perceived high incidence of attractive environmental and/or cultural resources - has become important (Price, Moss and Williams, 1997). In mountains around the world, emigration (especially of men) from rural areas is a key phenomenon, decreasing the total rate of population growth in the mountains of developing countries, and leading to depopulation in those of industrialized nations.

Mountain areas are home to a large proportion of the world’s minority populations. While most of these consist of small numbers of people, some large groups exist, such as the Quechua in the Andes, the Amhars in Ethiopia, and the Tibetans and Yi in China. Unfortunately, the diversity of mountain populations, each with different values and belief systems, has been one of the primary causes of the disproportionate number of conflicts that take place in mountain regions (Libiszewski and Bächler, 1997). Mountain areas include many sites that are sacred not only to mountain people but to billions living elsewhere (Bernbaum, 1998). Yet the rich cultural heritage of many mountain areas is often also threatened by the influences of globalization. This is linked to the emigration of young people and the arrival of new ideas and values, often brought by tourists. At the same time, tourism can bring new awareness of this cultural heritage which, when supported by new sources of income (often brought by tourism), can lead to its renewal.

In many mountain societies, there are very clear distinctions with respect to the roles and responsibilities of men and women. The majority of the world’s mountain areas have subsistence economies, and women are the primary agricultural workers, especially when a significant proportion of men emigrate seasonally or for the long term. Women have a dominant role in transmitting local cultural knowledge and behaviour to their children. Yet they are also highly disadvantaged in comparison with both lowland women and mountain men, in terms of education, health, access to information and financial services.

Risk

Although opinions diverge on how mountains should be defined in relation to altitude, there is general consensus that they are areas with steep slopes and marked topographic relief. This means that they are high-energy environments, facing many challenges with regard to minimizing the impacts on human populations of a great range of natural hazards. Interactions of high rainfall and snowfall, great variations in temperature, steep slopes and, in many regions, tectonic movement and volcanic activity result in natural hazards such as floods, avalanches, landslides and rockfalls. Mountain people who have long experience of a particular area generally understand the locations and likelihoods of moderate natural hazards and take measures to control or avoid them or minimize their impacts. However,

some hazards, such as glacial lake outbursts, avalanches and volcanic eruptions, are difficult to predict, let alone control.

The importance of understanding and managing all of these risks is increasing for four reasons. First, the total number of people living in, visiting, and travelling through mountain areas is growing. Second, the density of transport and other infrastructure within mountain areas and linking mountain and lowland areas is increasing. Third, climate change is likely to be linked to a greater frequency of extreme events, higher instability of slopes and general uncertainty regarding trends. Fourth, many of these risks can have significant downstream consequences. Sophisticated technologies for predicting, minimizing and mitigating the impacts of the various risks have been developed and are increasingly applied, in combination with targeted planning measures, in industrialized parts of the world. However, such approaches are often very costly and therefore not available for the mountains of developing countries, which include the most densely settled mountain areas and the upper watersheds of most of the world's major rivers, and are traversed by infrastructure which is vital for hundreds of millions of people.

Economics

Subsistence formed the basis of the economic system of most people living in the mountains of industrialized countries well into the twentieth century, and still does for most people living in the mountains of developing countries. Fields, grazing land and forests at different altitudes have been used in complementary ways, using infrastructure and facilitated by ownership and management patterns that have evolved over generations. External influences in such economies occurred through the discovery of minerals or the arrival of roads and railways that permitted the exploitation of natural resources, bringing benefits to some but often negative impacts to most local people. Such externally driven economic forces often led to economies that were based on only a few activities or resources, rather than multisectoral economies whose diversity could provide reliable livelihoods in uncertain circumstances.

The world's mountains are now inextricably linked to regional and global economies, and many mountain economies have become even more uncertain or risky. Mountains are second only to coasts as destinations for tourism, the world's largest industry; perhaps 15 to 20 percent of the global tourism industry is linked to mountain tourism (Mountain Agenda, 1999b). Among the attractions of mountains to tourists are their wilderness properties. Conservation of these unmanaged landscapes also has significant downstream benefits, for instance in terms of water quality and quantity and the conservation of biodiversity. Yet in many regions, conservation efforts bring little direct financial reward.

Placing economic values on the goods and services provided by mountain people through their stewardship of mountain ecosystems and landscapes is a major challenge. Yet there are growing numbers of efforts around the world to estimate these values as a basis for compensation to mountain people in the form of payments and other resource transfers through government agencies, water and energy companies, and tourism and conservation organizations. Equally, there are strong needs for financial instruments to promote the development of appropriate enterprises that build on the special characteristics of mountain environments and cultures and add value locally to products based on mountain resources. Such instruments are necessary to ensure that mountain people can compete equitably in regional and global markets. In addition, financial means are essential to minimize the competitive disadvantage that results from distance and difficulties of transport to markets.

Policies and legislation

Mountain environments require a different approach to development compared with lowland areas. However, most mountain legislation and policies have a bias to lowland priorities and do not adequately consider and directly address the special conditions and problems of mountain regions and their inhabitants. Therefore the development of new legal and policy frameworks at all levels, but especially at national and decentralized levels, is an urgent necessity.

As mentioned above, a number of countries, mainly in Europe, have already passed laws and implemented policies that may be regarded as contributing to sustainable mountain development (Price, 1999a). Some of these are quite wide-ranging in their scope; others focus particularly on specific sectors. A key preliminary need for such instruments is to define the mountain area concerned. In most countries, this has been done by setting a minimum

altitude for mountains; in some cases, slope angle is used as an additional criterion. Both altitude and slope are used by the European Union (EU) for various instruments aimed at decreasing the challenges faced by mountain people and mountain areas in its member countries. However, legislation and policies targeted specifically at mountain areas are not the only ones that affect them; before designing new instruments to foster sustainable mountain development, it is critical to assess the direct and indirect influences of other national-level sectoral policies.

Only one regional legal instrument for mountains currently exists: the Convention on the Protection of the Alps (Alpine Convention), signed by the majority of Alpine states in 1991, and subsequently by all other Alpine states and the EU. As the IYM begins, it is noteworthy that, while the convention has been ratified by all of its signatories, none of the many thematic protocols has yet been ratified. It is hoped that the IYM will be a catalyst to ensuring the effective implementation of the convention through the ratification and application of its protocols. Discussions are under way in many other ranges, including the Altai, Andes, Carpathians, Caucasus and Himalaya, with regard to developing other regional conventions. It is to be hoped that such processes will take into account the experience from the Alpine Convention (Price, 1999b).

MOVING FORWARD IN IYM AND BEYOND

The mission statement of the IYM, developed by FAO in its role as lead agency for the international year, is to “promote the conservation and sustainable development of mountain regions, thereby ensuring the well-being of mountain and lowland communities”. As stated in the concept paper for the IYM, observation of the year “should provide an opportunity to initiate processes that eventually advance the development of mountain communities, and act as a ‘springboard’ or catalyst for long-term, sustained and concrete action” (FAO, 2000). As much as possible, such processes should take place “on the ground”, with full involvement of mountain people. However, the IYM should also be used as an opportunity to raise awareness, across society as a whole, of the diverse values of mountain regions to a large proportion of the global population. National committees for IYM have consequently been established in around 50 countries, to ensure that IYM events and activities are well coordinated and effective. It is to be hoped that these committees will ensure that sustainable mountain development remains high on political agendas after 2002.

Among the IYM events will be a large number of meetings. Some of these would have happened anyway; but a significant number of major meetings will take place specifically because the year has been proclaimed by the UN General Assembly. It is also planned that the mountain issues will be raised at the World Summit for Sustainable Development, or Rio+10, to be held in Johannesburg, South Africa in September, through the actions of interested governments and the publication of targeted documents. The final global event of the IYM will be the Bishkek Global Mountain Summit, to take place in Bishkek, Kyrgyzstan, at the end of October, bringing together participants from previous meetings and other activities designed to celebrate and raise public and political awareness of the diversity of the world's mountains and their key values to vast numbers of people.

Cooperation is one of the distinguishing characteristics of mountain societies; in such uncertain environments, it has long been recognized that sharing resources and working together is essential for long-term survival. The integration of mountain areas into regional and global economies has often decreased the effectiveness of such cooperative structures, as outside private interests come to dominate. In many ways, mountain regions magnify the uncertainties of the modern world, of which two manifestations are effects of globalization of economies and climate change. A key indicator of the success of the IYM would be the development of successful mechanisms for reducing conflicts and increasing cooperation, both among mountain people and between them and other stakeholders concerned with the long-term security of mountain environments and the people who depend on them. A key basis for cooperation is sharing of knowledge. An important goal of the IYM is to disseminate the global knowledge of mountains, so that people around the world will understand the truth of the IYM slogan “We are all mountain people”. For the good of all, let us work together to ensure the wise management of mountain environments and the sustainable future of all those who depend on them, in 2002 and beyond.

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