

A stylized graphic of a mountain range with several peaks of varying heights, rendered in shades of green and white against a dark green background.

KEY ISSUES FOR
MOUNTAIN
AREAS

Edited by
Martin F. Price,
Libor Jansky,
and Andrei A. Iatsenia

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Introduction: Sustainable mountain development from Rio to Bishkek and beyond

Martin F. Price

Introduction

Mountains occupy 24 per cent of the global land surface (Kapos et al. 2000) and host 12 per cent of the global population (Huddleston et al. 2003). A further 14 per cent of the global population lives adjacent to mountain areas (Meybeck, Green, and Vörösmarty 2001); mountain people include not only remote, poor, and disadvantaged people and communities but also wealthy tourist communities and also urban centres within and close to the mountains – including megacities such as Mexico City and Jakarta. As sources of water, energy, and agricultural and forest products, and as centres of biological and cultural diversity, religion, recreation, and tourism, mountains are important for at least half of humanity (Messerli and Ives 1997).

These statistics show the global importance of mountains. Yet, just over a decade ago, the world's mountains were a topic of interest to a relatively small number of scientists, development experts, and decision makers, as well as mountaineers. The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, presented a unique opportunity to move mountains onto the global stage, through the inclusion of a specific chapter in Agenda 21, the plan for action endorsed at UNCED by the Heads of State or Government of most of the world's nations (Price 1998; Stone 2002). Chapter 13 of

Agenda 21 is entitled “Managing fragile ecosystems: sustainable mountain development,” and includes two “programme areas”:

- generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems;
- promoting integrated watershed development and alternative livelihood opportunities.

That chapter meant that, for the first time, mountains were accorded comparable priority in the global debate about environment and development with issues such as global climate change, desertification, and deforestation. In 1998, the UN General Assembly re-emphasized the importance of the world’s mountains by declaring the year 2002 the International Year of Mountains (IYM).

At the global level, formal implementation of Chapter 13 began in 1993, when the UN Inter-Agency Committee on Sustainable Development appointed the Food and Agriculture Organization of the United Nations (FAO) as Task Manager for Chapter 13. In this role, FAO has convened an ad hoc Inter-Agency Group on Mountains (IAGM) which, in spite of its name, involves more than UN agencies. From the beginning, FAO recognized that diverse actors are involved in processes relating to the sustainable development of mountain areas. Consequently, FAO invited a number of non-governmental organizations (NGOs) to join the group, and they have participated in all seven meetings to date. Among the recommendations made by the IAGM at its first meeting was that national governments and NGOs 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 within the African, Asia-Pacific, European, and Latin America/Caribbean regions in 1994–1996. In total, representatives of 62 countries and the European Union attended these meetings (Price 1999).

Parallel to this intergovernmental process, a non-governmental process took place. Its importance was underlined by the IAGM, recognizing that the process that had led to Chapter 13 – in contrast to many other chapters of Agenda 21 – had been driven by a relatively small number of academics and development experts, mainly from industrialized countries. In 1995, a global NGO consultation in Lima, Peru, brought together 110 participants from 40 countries. This meeting led to the establishment of the Mountain Forum – “a global network for mountain communities, environments, and sustainable development.” The Mountain Forum has subsequently been organized through both global and regional structures and, at the end of 2003, comprised over 4,000 individual and 350 organizational members in more than 100 countries. Key means of information sharing include 15 discussion lists, electronic conferences, and an inter-

active website (www.mtnforum.org) with membership services, calendar of events, on-line library, and links to other networks (Taylor 2000).

In the five years following Rio, a number of countries established national-level or sub-national institutions concerned with the sustainable development of their mountain areas. Others, particularly in Europe, developed laws and policies effectively to this end (Price 1999; Villeneuve, Castelein, and Mekouar 2002; Villeneuve, Hofer, and McGuire, ch. 9, this volume). Many other related activities took place in various nations around the world, organized both at national and sub-national level and also by international organizations, particularly the FAO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the United Nations University (UNU), all of which had long-standing activities in mountain areas. In 1995, the Global Environment Facility (GEF) identified mountain ecosystems as the subject of one of its ten operational programmes; by 2002, it had committed over US\$620 million and leveraged about \$1.4 billion of additional funding for at least 107 mountain-related projects in 64 countries (Walsh 2002).

It was in this context of a gathering international momentum of support for mountain areas 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 a forthcoming international year. This idea was proposed to the UN Economic and Social Council (ECOSOC) by the Kyrgyz Ambassador to the United Nations in 1997, resulting in a resolution, co-sponsored by 44 member countries, requesting the Secretary-General to undertake an exploratory process. At its subsequent session, ECOSOC adopted a resolution, co-sponsored by 105 member countries, recommending to the General Assembly that 2002 should be declared the International Year of Mountains (IYM). The outcome was that the UN General Assembly proclaimed, at its fifty-third session in 1998, in a resolution sponsored by 130 countries, that 2002 would be the IYM.

Sustainable (mountain) development: Definition and indicators

The term “sustainable mountain development” (SMD) appeared first in the title of Chapter 13 of Agenda 21. It includes two elements – (a) the concept of sustainable development and (b) mountains. The concept of sustainable development was introduced in the *World Conservation Strategy* (IUCN 1980). It became fashionable in the 1980s, particularly

through the report of the World Commission on Environment and Development (WCED), or Brundtland Report, *Our Common Future*, which defined it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987). This is probably the most cited of a very large number of definitions: over a decade ago, Pezzey (1989) had identified 190, and the number has continued to increase (Murcott 1997). Another commonly used definition, agreed on by three of the 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 keyword 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 that aims at 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 considering the well-being of future generations.

Citing the title of Chapter 13, many meetings since UNCED, the documents deriving from them, and many projects started in the 1990s identified SMD as an objective. However, no attempt was made to define it until the end of the decade. If it is to be more than a vague goal, agreement on its meaning, and then on priorities and means for its implementation, is essential. In 1997, Sène and McGuire (1997) noted that “the concept of sustainable mountain development has taken on new meaning” since UNCED and stated that “[a] multi-sectoral, more comprehensive approach to addressing mountain development issues is a relatively new concept, but one whose time has come.” They contrasted this multi-sectoral approach with past approaches to the problems and needs of mountain areas, which had largely been implemented within a sectoral context. They also noted the large number of themes addressed at the various regional intergovernmental consultations on SMD (Backmeroff, Chemini, and La Spada 1997; Banskota and Karki 1995; ILRI 1997; Mujica and Rueda 1996) and summarized by Price (1999). Although all of these documents provide long lists of issues that are intended to contribute (or in some way are related) to SMD, they are not prioritized – which is appropriate, given the very different characteristics of the world’s diverse mountain regions, even on one continent.

Another key issue is the scale at which SMD should be implemented. For instance, one village may be able to develop a strategy for its own future that appears to be viable in the long term, yet this may have side-

effects that are unsustainable for neighbouring or downstream communities. Along the many mountain ranges that form boundaries between countries and regions, there are particular needs for transboundary cooperation in SMD, given that ecological and societal processes and structures span these boundaries. The development of cooperative regional approaches is also important within the mountain massifs that are now divided between two or more nation-states but have long-established cultural and economic identities, distinct from adjacent lowlands in these states (Burhenne, ch. 10, this volume). In conclusion, it is probably best not to propose a precise definition of sustainable mountain development but to recognize that it is “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).

The objectives of this process vary according to the size of the area concerned 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 a global level, as part of an exercise using the pressure-state-response framework (OECD 1993), FAO (1996) proposed that the key pressure indicator is the population of mountain areas, to be measured in terms of population density, growth, and migration. Proposed key state indicators were, first, the welfare of mountain populations (to be measured in terms of nutritional anthropology) and, second, qualitative assessment of the condition and sustainable use of natural resources in mountain areas. The latter indicator is a composite of four sub-indices used to describe the state of the natural-resource base of a watershed – namely, extent of protection of soil, area of “hazard” zones, extent of degraded land, and an indication of 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. Recognizing that indicators need to be tailored to specific circumstances, they discuss issues relating to economic, ecological, and social indicators for five mountain study areas – namely Bhutan, Encañada (Peru), Pays d’Enhaut (Switzerland), North Ossetia (Russia), and Puka (Albania). Finally, five European countries (Bulgaria, Hungary, Romania, Slovenia, Switzerland) suggested indicators of SMD in documents submitted to the second session of the European intergovernmental consultation in 1996.

Even at a regional or continental scale, agreement on priorities for SMD and how they should be measured will not be simple, as shown by a survey of key respondents working in governmental, non-governmental, and scientific organizations in 30 European countries (Price and Kim

1999). Using a set of 36 possible indicators derived from meetings on SMD in Europe, those authors found that, for all respondents, ecological priorities ranked higher than socio-political or economic priorities. However, there were two highly ranked socio-political variables: these were the empowerment of mountain communities and the need for education and training in conservation and development. Comparing respondents from “western” Europe with those from central/eastern Europe, they found that those in the latter region placed greater emphasis on ecological indicators. The greatest similarities were with regard to socio-political variables, implying a common interest in the more equitable provision of benefits to people in mountain areas, in order to reduce marginality and ensure the long-term survival of populations in these areas. Finally, comparing employees of government with those of NGOs and independent scientific organizations, the most significant differences were found: generally, the latter group ranked ecological issues more highly than socio-political or economic issues. Two of the most significant differences were with regard to (a) compensation for sustainable management of mountain ecosystems by downstream populations and (b) the creation of new livelihood opportunities. Interestingly, these two issues were seen as more important by the government employees, perhaps implying that they are more radical than suggested by the priorities of the organizations for which they work. Similarly, workshops of “specialists” and local stakeholders in the Cairngorms of Scotland found greater agreement between the two groups with regard to indicators of “natural capital” than for those relating to economic and social and political factors (Bayfield, McGowan, and Fillat 2000). Although there has been no comparable research in other parts of the world, it appears desirable that indicators for SMD should be appropriate to the region of concern and based on data that are measurable, available, easily understood, and meaningful (Rieder and Wyder 1997). However, as shown by Parvez and Rasmussen (ch. 5, this volume), such data are often not available at a fine enough scale.

The International Year of Mountains: Objectives and activities

The mission statement of the IYM, developed by FAO in its role as Lead Agency for the Year, was 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, it “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).

The IYM represented a unique opportunity to raise awareness, across society as a whole, of the manifold values of mountain regions and the fragility of their resources, building on the IYM motto “We are all mountain people.” Around the world, diverse media – postage stamps, newspapers, magazines, radio, television, the Internet – featured mountain issues. Many reports and books on mountain issues were published (e.g. Blyth et al. 2002; Körner and Spehn 2002; Royal Swedish Academy of Sciences 2002). All these means raised the awareness of innumerable people with regard to the diverse values of mountains at all scales – an investment in their future, as the IYM must not be regarded as a “one-off” but as a unique year in the process of fostering SMD.

National committees

During the planning of the IYM, it was recognized that one measure of success would be the extent to which it contributed to establishing effective programmes, projects, and policies. Although this requires participation at all levels, from individual villages and NGOs to international organizations, the greatest efforts need to come from those working at the national level to achieve SMD. Thus, as for other International Years, great emphasis was given to the establishment of national committees for the IYM. By the end of 2002, with the support of FAO, 78 countries had established such national committees or similar mechanisms. Although most of these were led by a government agency, many included representatives of mountain people, grass-roots organizations, NGOs, the private sector, research institutions, UN agencies, national government agencies, and decentralized authorities. In some countries, the national IYM committee was the first national mechanism for the sustainable development of mountains and the first opportunity to implement a holistic approach to mountains.

During the IYM, new mountain laws were passed in Kyrgyzstan and drafted in Morocco and Romania; in Korea, the Korea Forest Service (which took the lead for the IYM) prepared a Forest Management Law that was passed at the end of December. National mountain strategies and plans were developed in Madagascar, Spain, and Turkey (Ville-neuve, Castelein, and Mekouar 2002; Villeneuve, Hofer, and McGuire, ch. 9, this volume). A number of national committees may disappear; nevertheless, all provided opportunities for dialogue. All have been encouraged to continue to operate – and it is anticipated that many will do so in order to help develop and implement sustainable development strategies, policies, and laws designed to respond to the specific

needs, priorities, and conditions of the mountain areas of their respective countries.

Meetings

As with any International Year, the IYM was marked by numerous meetings and other events, on almost every possible theme relating to mountains – mountain women, children, water, mining, war, forests, biodiversity, arts.... All were important because they brought together many people who would otherwise never have met, leading to increased understanding both of issues and of others' viewpoints, and raising awareness in various ways. Key regional meetings included the Seventh Alpine Conference, at which the vital decision on the location of the Secretariat of the Alpine Convention was made (see Burhenne, ch. 10, this volume); two meetings that accelerated the process towards a Carpathian Convention (Angelini, Egerer, and Tommasini 2002), leading to its signature in May 2003; and the ninth session of the African Ministerial Conference on the Environment in Uganda in July 2002, which produced the Kampala Declaration on the Environment for Development.

Eight major global meetings were associated specifically with the IYM (table 1.1). Four of these (in India, Bhutan, Peru, and Ecuador) specifically addressed the needs and interests of mountain people – respectively, children, women, indigenous people, and mountain populations. Two (both in Switzerland) addressed various aspects of development, particularly with regard to communities and agriculture, the latter linking Chapter 13 of Agenda 21 with Chapter 14 on sustainable agriculture and rural development. The “High Summit” was a truly global event, with simultaneous events on four continents bringing together mountain people, scientists, and representatives of NGOs, UN agencies, and the media through internet and videoconference technology.

All of these meetings produced final documents (see www.mtnforum.org) which fed into the final global event of the IYM, the Bishkek Global Mountain Summit held in Kyrgyzstan, which produced the Bishkek Mountain Platform (BMP) (Appendix A). This formulates recommendations for concrete action towards sustainable mountain development, providing guidance to governments and others on how to improve the livelihoods of mountain people, protect mountain ecosystems, and use mountain resources more wisely. The BMP was circulated at the fifty-seventh session of the UN General Assembly later in 2002, leading to the adoption of a resolution which, *inter alia*, designated 11 December as International Mountain Day and encouraged the international community to organize, on this day, events at all levels to highlight the importance of sustainable mountain development (Appendix B).

The Mountain Partnership

One key outcome of the IYM was the International Partnership for Sustainable Development in Mountain Regions, or “Mountain Partnership.” Its outline was developed by the Swiss Government, FAO, and the United Nations Environment Programme (UNEP) during the fourth Preparatory Meeting for the World Summit on Sustainable Development (WSSD) in Bali. The Partnership was launched at the WSSD in Johannesburg; as at UNCED, ten years before, the meeting’s final document specifically refers to mountains – this time, in paragraph 42 of the Plan of Implementation. The primary purpose of the Partnership is to address the second of the two goals of Chapter 13 of Agenda 21 – to improve livelihoods, conservation, and stewardship across the world’s mountains. It is conceived as a mechanism for improving, strengthening, and promoting greater cooperation between all mountain stakeholders. It will be aimed at clearly agreed goals, its operations will be based on commitments made by partners, and its implementation will be supported through better linkages between institutions and improved monitoring systems.

The Partnership was one of the main topics of discussion at the Bishkek Global Mountain Summit. In the BMP, the participants welcomed the offer of the FAO to host its secretariat and to bring the IAGM to its service. They also called on UNEP to ensure environmentally sound management in mountain regions – in particular, in developing countries – by strengthening environmental networking and assessments, facilitating regional agreements, and encouraging public–private-sector cooperation. In addition, other UN agencies, multilateral development banks, and other international organizations and states were recognized as key players. Both the actual structure and function of the Partnership were developed during 2003, through a process including an electronic consultation organized by Mountain Forum, discussion at the annual meeting of the UN Commission on Sustainable Development, and a meeting in Merano, Italy. By December 2003, 40 countries, 15 intergovernmental organizations, and 38 other organizations (“major groups”) had expressed their interest in actively taking part.

Introduction to this volume

During the preparation of the Bishkek Global Mountain Summit (BGMS), the International Advisory Board for the BGMS recognized the need for a series of background papers around which the meeting would be structured. Following the identification of the themes from

Table 1.1 Global meetings associated with the International Year of Mountains (IYM)

Title	Dates; location	Participants	Organizers	Outcome
World Mountain Symposium 2001: Community Development between Subsidiarity and Sustainability	30 September–4 October 2001; Interlaken, Switzerland	150 participants from 56 countries	Swiss Agency for Development and Cooperation, Centre for Development and Environment, University of Berne	Proceedings, CD
High Summit 2002: International Conference around the Continents' Highest Mountains	6–10 May 2002; Mendoza, Argentina; Nairobi, Kenya; Kathmandu, Nepal; Milan and Trento, Italy	Mountain people, scientists, representatives of NGOs, UN agencies, and the media	Italian National Committee for the IYM	Recommendations for action on five cornerstones of mountain development: water, culture, economy, risk, and policy
International Conference of Mountain Children	15–23 May 2002; Uttaranchal, India	Children from 13 to 18 years of age from over 50 countries	Research Advocacy and Communication in Himalayan Areas	Recommendations for the Bishkek Mountain Platform, Internet-based Mountain Children's Forum
2nd International Meeting of Mountain Ecosystems, "Peru, country of mountains towards 2020: water, life and production"	12–14 June 2002; Huaraz, Peru	300 participants from 16 countries, especially indigenous people from Peru, Ecuador, and the Himalayas	National Committee of Peru for the IYM	Huaraz Declaration

International Conference on Sustainable Agriculture and Rural Development in Mountain Regions	16–20 June 2002; Adelboden, Switzerland	200 people from 50 countries	Swiss Federal Office for Agriculture	Adelboden Declaration
Second World Meeting of Mountain Populations	17–22 September 2002; Quito, Ecuador	Representatives of 115 countries	World Mountain Peoples Association, El Centro de Investigación de los Movimientos Sociales del Ecuador	Quito Declaration: Draft Charter for World Mountain People
Celebrating Mountain Women	1–4 October 2002; Thimphu, Bhutan	250 participants from 35 countries: civil society, NGOs, media, academia, development agencies, donors	International Centre for Integrated Mountain Development and Mountain Forum	Thimphu Declaration
Bishkek Global Mountain Summit	28 October–1 November 2002; Bishkek, Kyrgyzstan	Over 600 people from 60 countries	Government of Kyrgyzstan, with assistance from UNEP	Bishkek Mountain Platform

among the great variety relevant to SMD, and recognizing the existence of key syntheses, such as those by Messerli and Ives (1997) and Funnell and Parish (2001), the first drafts of the papers were prepared by international experts and then considered in an electronic consultation (e-consultation) organized by the Mountain Forum. During this process, over a period of two weeks, each paper was posted on the Mountain Forum website. Participants in the e-consultation were invited to comment by email on the papers – with some comments leading to further discussion – and to contribute case studies for possible incorporation in the papers. Following the e-consultation, the papers were revised and submitted to peer review by other international experts. The final versions were presented at the BGMS. Subsequently, they were again revised and updated to form the chapters of the present volume.

Chapter 2, by Iyngararasan and colleagues, addresses the diverse challenges of mountain environments and their relevance for the global population. Attention is given to issues including the key values of mountains as “water towers” (Bandyopadhyay et al. 1997; Liniger and Weingartner 1998), the high frequency of natural hazards (Hewitt 1997), the potential impacts of climate change (Price and Barry 1997), and regional issues such as regional haze and desertification. A number of existing initiatives and best practices are described, and future needs discussed. Chapter 3, by Kohler and colleagues, addresses access, communications, and energy (Schweizer and Preiser 1997) – three sets of key issues for the development of mountain regions and their integration in wider economies. They recognize that the development of access, communications, and energy has often been driven by the needs of lowland populations; they propose that, in future, mountain people should be directly involved in such development, bringing shared benefits and using appropriate technologies, which often build on the long-term experience and institutions of mountain people.

The links between mountain and lowland regions are explicitly considered in chapter 4 by Koch-Weser and Kahlenborn, in the context of economic and policy instruments. They critically review a number of environmental services agreements, designed to ensure that mountain people are fairly compensated for services they provide to downstream communities and enterprises. The development of such market-based mechanisms is a key element of SMD; this chapter addresses such mechanisms specifically in the mountain context, building on other work such as that focussing on the environmental services provided by forest ecosystems (Pagiola, Bishop, and Landell-Mills 2002). The criteria for developing effective mechanisms and agreements will be of use in many mountain regions.

Chapter 5, by Parvez and Rasmussen, addresses questions of disparities

between mountain and non-mountain countries, and between mountain and lowland regions. The chapter shows that, despite the extensive literature describing poverty in mountain regions (Ives 1997), national and sub-national statistics – the latter principally from South Asia and China – do not show that mountain regions necessarily have a weaker development performance: performance appears to be more closely related to national trends, and strong national economies are important in supporting the development of mountain regions through policy and financial means. They conclude that a “sustainable livelihoods” approach may be more appropriate for understanding mountain development issues and suggesting appropriate policies. In this context, the issues addressed by Brewer Lama and Sattar in chapter 6 are highly relevant. Mountain regions are centres of biological and cultural diversity (Bernbaum 1997; Grötzbach and Stadel 1997; Jeník 1997) and these are fundamental bases for tourism, which has become the economic mainstay of many mountain communities (Price, Moss, and Williams 1997); however, tourism can be only one element of SMD. A number of principles and necessary actions for sustainable mountain tourism are presented, complemented by brief descriptions of best practices from around the world.

Chapter 7, by Pratt, continues the discussion on sustainability, recognizing two general approaches – local, drawing from traditional cultures, and linked, in which mountain and downstream populations are linked in various ways, as described by previous authors. A number of types of institutional arrangements are described; their appropriateness in any particular region depends on the interactions of two sets of criteria – local/linked economies and the values of natural resources and environmental services. In all cases, democratic and decentralized institutions are important, but their development and application depend on the existence of appropriate incentives. In this vein, Starr addresses issues relating to conflict and peace in mountain societies in chapter 8. A significant proportion of conflicts around the world occur in mountain areas (Libiszewski and Bächler 1997). These conflicts typically derive from problems of social and economic breakdown whose roots are largely outside the mountain areas themselves. Returning to themes addressed by many of the previous authors, particularly Parvez and Rasmussen, the conclusion is that the resolution of conflict requires attention to people, especially their security and economic development.

Laws and policies are essential elements of SMD, although it must be recognized that their existence is only the prelude to their effective implementation. Chapter 9, by Villeneuve and colleagues, describes the diversity of laws, policies, and institutions that explicitly address mountain issues in countries around the world. As mentioned above, their number has increased during and since the IYM. However, many issues relat-

ing to mountain regions are transnational: ecosystems straddle national boundaries; water, air, fires, animals, diseases, and people – among others – cross them. Consequently, international agreements for mountain regions are important. In chapter 10, Burhenne provides the principles for such agreements, and briefly describes their application, especially with regard to the Alpine Convention.

The concluding chapter, by Messerli and Bernbaum, addresses the roles of culture, education, and science for SMD. All have key roles to play. Most mountain cultures have long traditions, deeply rooted in the places where they have developed; however, there are significant needs to find ways to draw on long-standing strengths in adapting to a rapidly changing world. Traditional knowledge can be of considerable benefit in this context and should be explicitly considered in the development and implementation of education, at all levels, which provides the tools necessary for mountain people to move towards SMD during the twenty-first century and beyond. Modern technologies may be of particular benefit: as Kohler and colleagues point out in chapter 3, many mountain people have better access to the wider world through information and communications technologies (ICT), such as mobile telephones and internet connections, than through traditional means, such as roads and railways. In this and many other ways, the diverse branches of science have vital roles to play in SMD. Informed science is essential for policy-making and, in an increasingly complex world, interdisciplinary and transdisciplinary approaches are essential.

Considered together, and particularly in conjunction with the chapters in Messerli and Ives (1997), the chapters in this book underline the fact that the world's mountain regions are inextricably woven into a global fabric of interlinked markets, institutions, and policies within a biosphere that is experiencing rapid change. In other words, mountain environments (and the billions of people who depend on them) are affected by all the ecological and societal processes of global change. This has been recognized through the development of the Mountain Research Initiative (MRI) (Becker and Bugmann 2001) which, within the major global research programmes on global change, attempts to develop a coherent understanding of all these processes in order to contribute to SMD both regionally and globally. The MRI is one example of a partnership and will contribute to the Mountain Partnership. The strengthening of existing partnerships (and the development of new ones) is particularly appropriate in mountain regions, as 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 reduced the effectiveness

of such cooperative structures as external interests come to dominate. The chapters in this volume show not only many of the challenges but also that partnerships, both within mountain regions and between stakeholders in mountain regions and those outside, are essential for sustainable mountain development.

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Edited by **Martin F. Price, Libor Jansky, and Andrei A. Iatsenia**

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The world's mountains are vital regions for all of humanity, providing a wide range of goods and services to their inhabitants, to those living nearby or downstream, and to the hundreds of millions who visit them or for whom they have spiritual significance. How to preserve fragile mountain ecosystems that provide critical goods and services while improving the lives of those who live in the mountains? This and other key issues of sustainable mountain development are examined in a series of papers prepared by globally-recognised experts.

While mountain areas have long been on the periphery of national and global policy debates, their importance is underlined by the fact that they cover 24% of the Earth's land surface and 26% of the global population lives in them or very close by. They are sources of water, food, timber, minerals and other natural resources; they provide many opportunities for recreation and tourism; and they are centres of biological and cultural diversity and religious significance. At the same time, mountain people and mountain environments are particularly threatened by global environmental change and global economic and political forces. Unfortunately, a disproportionate number of conflicts occur in mountain regions, and their inhabitants include many of the poorest and most vulnerable in the world.

This book explores many of these issues, with particular emphases on appropriate institutions and policies for sustainable mountain development. It includes updated papers from the Bishkek Global Mountain Summit which was the concluding global event of the International Year of Mountains 2002. It is thus a key reference for scholars, policymakers and others interested in the future of the world's mountain areas.

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