Special Issue: Methodologies and Tools for the Management of Mountain Protected Areas: Mount Everest (Nepal, China) and K2 (Pakistan) Regions

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Special Issue

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Dear Readers,

Since the adoption of Chapter 13 of Agenda 21 at the United Nations Conference on Environment and Development in 1992, notable progress in sustainable mountain development has been made worldwide. Although we are still far from the goal of ensuring a decent quality of life for all mountain populations and worldwide protection of fragile mountain environments, awareness of the importance of mountains has increased, in particular regarding certain issues such as climate change. Today, thanks to initiatives such as the UN-declared 2002 International Year of Mountains, institutional arrangements favoring mountain sustainable development at national, regional, and international levels have been strengthened and a large number of international collaborative actions addressing the specific issues of mountain areas are underway. One important challenge that remains is to improve the ability of decision-makers at all levels to sustainably manage their mountain areas. The findings of the Millennium Ecosystem Assessment (MA) published in 2005 further corroborated the need for contributions to improve decision-making concerning ecosystem management and human welfare and to build capacity for the related scientific assessments.

Amongst the over 300 "partnership initiatives" for sustainable development registered as official "Type II" outcomes of the Johannesburg World Summit on Sustainable Development (WSSD, September 2002), 7% aim to benefit mountain regions specifically, many of them operating within the umbrella framework of a "Global Mountain Partnership." This issue of Mountain Research and Development (MRD) *is dedicated to presenting the major findings of one WSSD partnership, entitled: "Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush–Karakoram–Himalaya Mountain Complex." This multiscale international project, which ran from 2004–2009, was funded by the Italian Cooperation and implemented by the International Union for Conservation of Nature (IUCN), Ev-K2-CNR, the International Centre for Integrated Mountain Development (ICIMOD), and the Italian NGO CESVI (Cooperazione e Sviluppo). Familiarly known as the "HKKH Partnership Project," it focused on creating decision support tools in the Hindu Kush–Karakoram–Himalaya (HKKH) region.*

The present Special Issue contains a limited number of papers presenting some key results of the HKKH Partnership, at times in a more expanded format than MRD *normally accepts. The Introductory Essay summarizes what management approaches the project suggested adopting in complex social-ecological ecosystems (SESs) in high mountain areas, based on the experience garnered in the HKKH region, in 3 protected areas in Nepal (Sagarmatha National Park and Buffer Zone, SNPBZ), Pakistan (Central Karakoram National Park, CKNP), and China (Qomolongma National Nature Preserve, QNNP). This article points out how both environmental issues and the needs of local populations must be taken fully into account when developing methodologies and tools for systemic planning and management. Representative stakeholder participation, effective inter-stakeholder communication, management-oriented research, and a final institutionalization phase are described as the ingredients for creating successful decision support products.*

The MountainDevelopment section begins with an article by Salerno et al that presents a 5-module participatory modeling framework based on local stakeholder needs and combining hard and soft methodology in 2 case studies (SNPBZ and CKNP). A management-oriented research module was created to generate knowledge that is both stakeholder relevant and evidence based. The application of the first of these 5 modules is described in detail by Daconto and Sherpa for one of the case studies, where the participatory process was initiated using a Scenario Planning tool to identify major issues and elicit information on the major drivers of change. The paper by Bajracharya et al presents a Decision Support System Toolbox (DST) for assisting stakeholders in modeling phases. Integrating the outputs of the participatory modeling process, the DST includes both hard and soft system components, Scenario Planning, and qualitative and quantitative system dynamics models, and contains multiple functions such as a knowledge base and Geographic Information Systems (GIS).

In the MountainResearch section, Salerno et al and Manfredi et al present the results of management-oriented research conducted in the SNPBZ on energy, forests, and human health issues, and on solid waste and water pollution. Social-ecological models were developed using a design that allows for user-friendly adaptation to other contexts (available for download at www.hkkhpartnership.org). The simulated management scenarios were developed in collaboration with stakeholders, so as to build consensus and support decision-makers in their ability to not only respond to changes but also to anticipate them. On a regional level, Bajracharya et al highlight the importance of adopting international standards in remote mountain contexts, proposing a standardization of land cover legends using the FAO/UNEP Land Cover Classification System (LCCS) to harmonize different nomenclatures and legends used in the region. Other papers in the MountainResearch section describe the results of transboundary scientific cooperation—a crucial step toward sustainable

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environmental practices. The HKKH Partnership transboundary studies were conducted between Nepal and China, thanks to a Memorandum of Understanding signed with the Institute of Geographic Sciences and Natural Resources Research of the Chinese Academy of Science (IGSNRR/CAS). Giardino et al present findings of a comparative analysis of limnological conditions on the North and South sides of Mount Everest, with a view to assessing glacial lake water quality. The MountainResearch section concludes with a presentation of management-oriented research conducted in CKNP, Pakistan, to analyze meltwater from the Hinarche Glacier, from which the agriculture of an entire valley is dependent through irrigation channels and watercourses.

We hope readers of this issue will gain new insights into the complexities of developing methodologies and tools for the management of mountain protected areas, as well as into the potential of applying these methodologies and tools for sustainable development. Apart from the innovative products produced within the HKKH Partnership, a lasting outcome should be the awareness that all research performed in mountain protected areas must be as management oriented as possible, taking into consideration the needs of decision-makers and stakeholders. This is a departure from historical tendencies in science to provide technical solutions to problems abstracted from their context; it is a crucial element for ensuring sustainable management of fragile mountain ecosystems.

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HKKH Partnership
for ecosystem management

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