The Mountain Research Initiative Reaches Outward and Climbs Upward

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Source: Mountain Research and Development, 31(1) : 58-60

Published By: International Mountain Society

URL: https://doi.org/10.1659/MRD-JOURNAL-D-11-00002.1

Mountain Research and Development (MRD)
An international, peer-reviewed open access journal
published by the International Mountain Society (IMS)
www.mrd-journal.org

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Mountain regions provide a multitude of goods and services for much of humanity (Price and Butt 2000; Becker and Bugmann 2001), especially in the realms of water supply, biodiversity, and other ecosystem services (Schimel et al 2002; Körner et al 2005; Viviroli et al 2007; Viviroli et al 2011). However, the future ability of mountain regions to provide goods and services to both highland and lowland residents is seriously threatened by climatic changes, environmental pollution, unsustainable management of natural resources, and serious gaps in understanding of mountain systems (Huber et al 2005). Disciplinary, interdisciplinary, and transdisciplinary research is required to maintain these goods and services in the face of these forces. The global mountain research community, however, has historically operated at a suboptimal level because of insufficient communication across geographic and linguistic barriers, less than desirable coordination of research frameworks, and a lack of funding.

A research agenda for mountains and global change

To overcome these constraints, mountain scientists within the global change research community designed a mountain-oriented global change research program in the 1990s, which culminated in the 2001 publication of the Implementation Plan of the Mountain Research Initiative (MRI) (Becker and Bugmann 2001). This plan specified MRI's goals as detection of global change signals in mountain regions, analysis of the expected impacts of global change on mountain regions, and provision of advice for the sustainable management of mountain regions (Figure 1). MRI pursues these goals through 4 modes of action, **initiation**, **implementation**, **integration**, and **information**:

- Initiating formation of networks of researchers, engagement of organizations with the issues, and development of research activities;
- Implementing actions that enhance the profile and the execution of global change research in mountain regions;
- Integrating and synthesizing the results of research; and
- Informing stakeholders of the nature and implications of those results.

Swiss funding for the MRI office

With the support of several Swiss funding agencies, a small MRI project office was established at the Swiss Academy of Sciences (SCNAT) in Bern in July 2001. Under the leadership of Prof Dr Harald Bugmann, the MRI was funded at a more significant level by the Swiss National Science Foundation (SNF) in 2004 and was hosted by the Swiss Federal Institute of Technology Zurich until 2007. In 2007, Prof Dr Rolf Weingartner of the Institute of Geography, University of Bern, assumed the role of chairperson of MRI and integrated the MRI into the Institute. Since 2007, Prof Dr Weingartner has submitted 2 successful grant proposals to SNSF, which will keep MRI funded through 2013.

Current activities and extension of funding

The 2010–2013 proposal to SNF laid out a program (Figure 2) that pursues the 4 modes mentioned above at both the regional and global scales, and draws on a variety of funding sources. MRI nonetheless relies on SNF funding for global activities and communication activities that support all focused projects and include the following:

- Key Contacts Workshops held in conjunction with major scientific

FIGURE 1 Overall framework of the MRI.

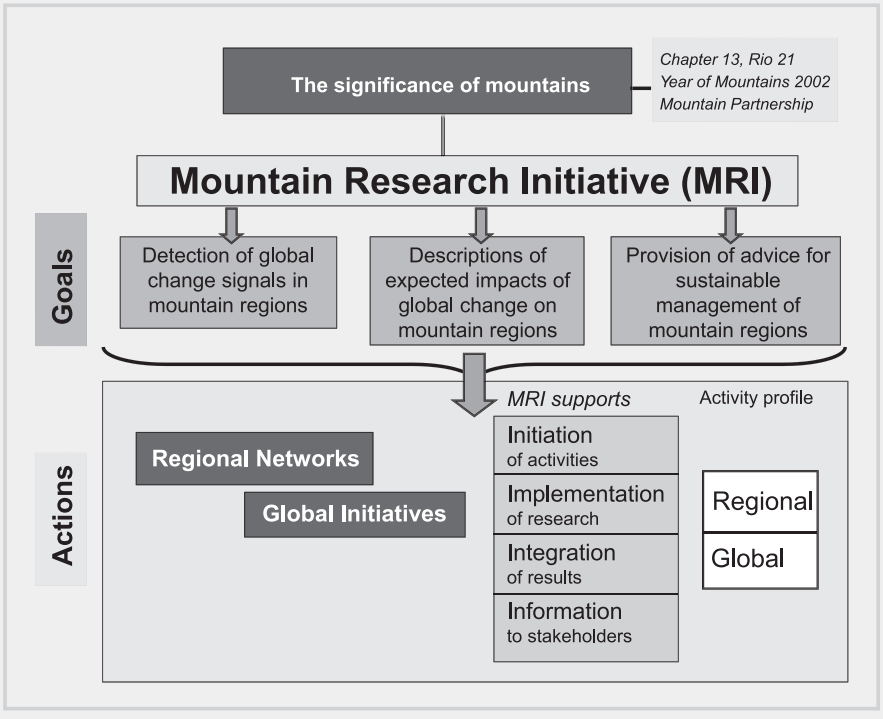
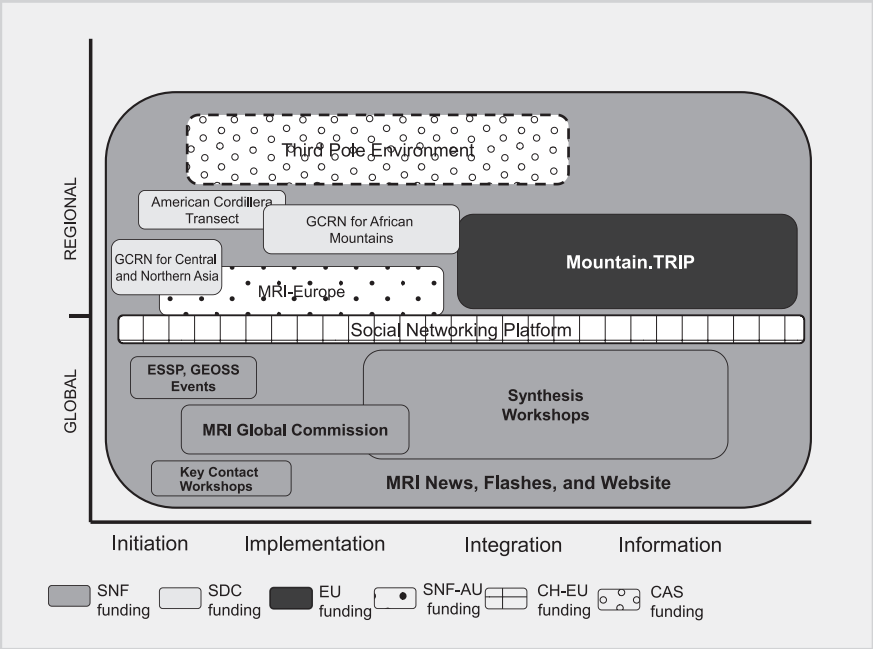


FIGURE 2 MRI activities for 2010–2013.



meetings such as the American Geophysical Union and the European Geosciences Union. MRI Key Contact Workshops bring together researchers in a novel format to describe their research programs to their colleagues and to forge new collaborations between researchers, fostering interdisciplinarity and exchange within the community.

- Synthesis Workshops integrate results in the form of peer-review journal articles on key topics. These workshops required MRI and subject-matter specialists to refine the topic, identify the most appropriate participants, promote the engagement of young researchers, negotiate arrangements with journal editors, develop preworkshop materials, manage the workshop to arrive at new insights, and follow up with participants for the production of manuscripts.
- The MRI Global Commission combines its existing science advisory board with a group of active and senior researchers from all mountain regions of the world. The Global Commission provides strategic oversight for the coordination office and, more importantly, advances the global change research agenda for mountains through the contacts of Commission members with national and international research programs.
- With the advent of the Rio+20 Conference in 2012 and ongoing events associated with international conventions, MRI will contribute to Earth System Science Partnership activities that develop the scientific content of these events.
- The MRI communications program produces short email alerts that contain timely information (the Flashes), a twice-annual newsletter with longer articles (the MRI News), and a rich website with presentations, recordings, photographs, and maps in an evolving social network format.

Within Europe, MRI partners with the Institut fur Gebirgsforschung of the Austrian Academy of Sciences on 2 projects:

- MRI–Europe organizes regional networks of researchers within Europe's mountain regions, supports the efforts of researchers to develop new research programs (eg CC.AWARE, Figure 2), and promotes the visibility of global change research within European forums.
- Mountain.TRIP (Transforming Research Into Practice) is an European Union (EU) funded support activity that will translate results from EU-funded research projects into messages and formats more easily used by development practitioners in European mountains.

Outside of Europe, the MRI is working with the Institute of Tibetan Plateau Research Chinese Academy of Science (CAS) on a framework for interdisciplinary research for the Third Pole Environment project (http://www.tpe.ac.cn/), a CAS-sponsored international project focused on the Tibetan Plateau and the mountain ranges that surround it in China and neighboring countries.

MRI is pursuing the development of other regional networks of researchers through its role as a founding member of the Mountain Partnership Consortium (MPC), a group of 8 members of the Mountain Partnership that has coalesced to provide more strategic direction to the Mountain Partnership. The MPC provides a mechanism by which members hope to develop synergy between research and development activities funded principally by Switzerland and Italy in mountain regions around the world.

After the recent Perth Conference MRI invited about 40 researchers to stay on for another day to provide guidance on MRI activities mentioned in Figure 2 as well as new activities that the community of researchers should undertake. The participants agreed that, although Key Contacts Workshops were helpful, mountain-focused sessions within the major meetings themselves were essential.

http://dx.doi.org/10.1659/MRD-JOURNAL-D-11-00002.1

As for Synthesis Workshops, participants stressed that topics should be of global importance, even if they manifest themselves acutely in certain regions. The workshops should produce true synthesis papers that can stand as reference works in the literature rather than invited features or editorial pieces. The topics themselves must allow the assembly of a sufficiently deep pool of talent and should help young scientists generate these key synthesis papers.

Participants thought that the MRI must work to ensure that mountain regions are included in the United Nations convention processes over the next several years. The most immediate target is the International Geosphere and Biosphere Programme Planet Under Pressure Conference (http://www.igbp.kva.se/page.php?pid=531) scheduled for March 2012 in London, which is meant to channel scientific information to the Rio+20 conference.

Finally, as part of the Mountain Partnership Consortium, the MRI intends to push for a more coordinated communication strategy for the entire mountain community, minimizing the number of products that compete for the limited time of members and maximizing the synergies between peer-reviewed journals, newsletters, libraries, and other channels of communication.

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http://dx.doi.org/10.1659/MRD-JOURNAL-D-11-00002.1