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Alpine knowledge gardening – research networks for the advancement of science and development

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Senior Amchi (traditional healer) discussing the medicinal use of alpine plants with his younger peer in Upper Mustang, Nepal. Photograph by Prem B. Gurung.

Introduction

“My mother works in the office”, would be the simplified answer of my youngest son when you ask him about his mother’s profession. “She does something with mountain research in Europe, and that’s about all I can tell”, would be the evasive response of my mother, although for years she has been trying relentlessly to comprehend the nature of her daughter’s occupation. And I feel a little bit at a loss when filling in my pro-

fession in the hotel’s registration form. What to write? Environmental scientist? Research coordinator? Programme manager? Networker? “Somebody who knows a little bit about a lot of things”?

Explaining the highly dynamic field of European research coordination on global change in mountains is indeed a challenging task. The following pages describe the activities of the European Programme of the Mountain Research Initiative (MRI) and aim to render the intangible more tangible, giving an overview on:

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- (1) the main objectives and history of the MRI;
- (2) the anticipated benefits gained through coordinated research;
- (3) the emergence of MRI Europe and its regional networks;
- (4) the added value of networking for research; and
- (5) the nature of scientific knowledge management.

From the base camp towards the peak: the Mountain Research Initiative

The first milestone for the MRI was set in the 1990s while preparing for the International Year of Mountains in 2002. The International Geosphere Biosphere Programme (IGBP), together with the International Human Dimensions Programme (IHDP) and the Global Terrestrial Observation System (GTOS), proposed a joint initiative to “achieve an integrated approach for observing, modelling and investigating Global Change phenomena and processes in mountain regions, including the impacts of these changes and of human activities on mountain ecosystems” (UN Assembly 2000: 8). Through the commitment of a small group of devoted scientists, these objectives were further specified and embedded in an integrated interdisciplinary approach (Becker & Bugmann 2001) spanning a range of activities: monitoring, detection of change, process studies, modelling as well as policy and management applications. Based on this methodological approach, the two-year Global Change and Mountain Regions (GLOCHAMORE) project, a joint FP6 initiative of the MRI, the UNESCO Man and the Biosphere Programme and the University of Vienna (Georg Grabherr), facilitated the formulation of an integrated state-of-the-art research strategy for mountain regions (Bjørnsen 2005), which included the expertise of more than 250 scientists and managers of mountain biosphere reserves worldwide.

The launch of project activities such as GLOCHAMORE was only possible thanks to the continuous funding of the MRI Coordination Office by the Swiss National Science Foundation since 2001. In

2006, after the completion of the GLOCHAMORE project, the MRI moved from strategy development to implementation through the initiation of regional networks of global change researchers. As MRI is a promotion and coordination effort, it cannot simply “do” the research necessary in a region, but must induce research groups and individual scientists to fill the scientific gaps defined by the GLOCHAMORE strategy. Steps taken to achieve this aim include: enlisting key scientists who promote inter- and transdisciplinary research; forming new research partnerships and acting as catalyst for groups and individuals to develop project proposals; facilitating the development of peer-reviewed papers; and distributing relevant information to researchers to create additional interaction.

MRI Europe received an additional impetus in 2008, when the MRI and the Institute of Mountain Research: Man and Environment (IGF) started a joint implementation programme. This step not only enhanced the cooperation between the MRI and the IGF, primarily through information exchange on ongoing and planned activities, but also through joint initiatives generating added value for both institutions and the larger global change community (Fig. 1). The mountain.TRIP project (see Braun 2010 in this volume), for instance, is a product of the closer interaction between



Fig. 1: Participants of the 3rd Global Change Research Networking Workshop organized by the MRI and IGF in October 2007. Photograph by Kati Heinrich.

the IGF and the MRI office in Berne. Similarly, the support of the Austrian and Swiss Academies of Sciences in the institutional development of the regional network Science for the Carpathians (S4C) can be viewed as a product from this institutional development. Last but not least, the takeover of the MRI Europe Programme stimulated better strategic planning, new scientific activities and the development of project proposals that would not have happened otherwise.

Grasping the intangible: a rationale for coordinated global change research

Many mountain ranges, particularly the higher-altitude parts, are not immediately affected by human activities. Their global distribution allows us to perform comparative regional studies and to analyse the regional variations of environmental change processes. Ecological and hydrological field studies and experiments along altitudinal gradients, for instance, can provide invaluable information on potential responses of mountain ecosystems to anthropogenically induced environmen-

tal change. It also enhances our understanding of the biotic feedbacks and mountain ecosystem functioning.

In stark contrast, mountain regions are still inappropriately represented in current global and regional models, partly because of their complex topography. Therefore, special efforts are required to generate science-based knowledge, which is again used to devise strategies for sustainable management (Becker & Bugmann 2001: 23).

Documenting process dynamics requires a diversity of methods and archives. In order to understand the full interplay of processes, insights from all these methods need to be used in conjunction. Long-term monitoring, for instance, one of the key activities of the MRI, can be accomplished through the coordination of ongoing research and, where required, the initiation of new projects. Table 1 shows different tools and approaches that can be used to enhance global change research at European level. The impact thus generated, however, depends to a large degree on other factors such as European and national science policies and the ability to mobilize motivated mountain researchers.

Table 1: Rationales underlining the importance of international research coordination.

Rationale	Description
Joint research strategy	Prioritized research areas at regional or European level.
Resource concentration	Human and financial resources concentrated on regionally relevant themes.
Monitoring network	Mountain observation network as an early warning system for detecting global change impacts. Connecting stations, sites or case studies contributes to the investigation of overarching questions. This entails common protocols and concepts for data collection and for sharing at global, European or regional level.
Cross-border issues	For climate phenomena, but also plants and animals, national borders are artificial concepts. Many phenomena need investigation on an international scale.
Comparative studies	The agents of global change vary in importance in different mountain ranges. Therefore, comparative studies in different regions and on different spatial scales are required to put results into a larger context and identify spatial and temporal patterns.
System understanding	Adding bits and pieces to overarching research objectives contributes to a larger picture of the past, present and future state of the environment and the consequences for people and ecosystems.
Interdisciplinarity	For system understanding, various disciplines need to be involved in data interpretation.

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Mobilizing human capital: the European global change research networks

Science networks are not an end in themselves but a means to achieve a better system understanding of global environmental change in mountain regions. While MRI Europe network members contribute their knowledge and expertise to achieve this overarching objective, they in turn draw benefits in terms of innovation, identification of research partners and access to funding.

A science network is by no means a static and tangible congregation of experts. Rather, it is composed of constantly changing working groups, some newly forming, others adjusting to altered goals, and again others dissolving after completing a task. Developing and maintaining science networks is comparable to a mountaineering expedition with independent teams heading for the highest peak. While the network coordinator provides advice concerning suitable routes and favourable “weather conditions”, the teams need to climb with their own forces, draw on their own supplies and rely on their own experience and expertise as several climbing routes are possible. The following paragraphs illustrate this diversity, describing the emergence of the MRI Europe network and the regional initiatives: Science for the Carpathians (S4C) and the South Eastern European Mountain Research (SEEmore) network.

MRI Europe

In 2006, right after GLOCHAMORE, the MRI undertook a first attempt to initiate the Global Change Research Network in European Mountains using *place* rather than *discipline* as an organizing paradigm. It invited scientists and managers associated with the European mountain biosphere reserves that had participated in the GLOCHAMORE project to attend a meeting in Zurich, Switzerland, to translate the GLOCHAMORE strategy into a programme appropriate for Europe. The underlying assumption was that those managers were more closely involved with issues related to global change than disciplinary scientists might be. However,

for a variety of reasons, the hoped-for launch of a global change research network in European mountains did not ensue from this meeting.

Thereafter, MRI took another approach: focusing on scientists, regardless of their affiliation with place, and funding. MRI announced another meeting for February 2007, but this time with a subtitle emphasizing funding through the European Commission’s FP7. Furthermore, it made no assumptions about an ideal structure for implementation but asked researchers how they wished to proceed. This meeting drew ten times as many participants as the earlier meeting, who then launched the MRI Europe science network. To cut a long story short: we found mountain research to be driven mainly by scientists whose motivation is closely connected to potential funding opportunities.

Science for the Carpathians

Within the European network, the Science for the Carpathians (S4C) initiative developed at an unprecedented speed. In spring 2008, a group of researchers with a mandate from the Interim Secretariat for the Carpathian Convention requested the MRI’s assistance in organizing science in the Carpathian region. MRI Europe worked with the Jagiellonian University and other institutions to organize the first S4C meeting in May 2008 in Kraków, Poland. It should set the stage for a regional science network for global change research in the Carpathian mountains, i. e. to define the current status and to draft a research agenda (Björnsen et al. 2009); and to establish an active science network (Ostapowicz & Sitko 2009).

Shortly after its launch, the S4C initiative received the support of the Conference of Parties of the Carpathian Convention at their meeting in Bucharest, Romania, in June 2008. To sustain the science initiative in the longer term, a second meeting was held in June 2009 at the Slovak Academy of Sciences in Bratislava, Slovakia, where a S4C Steering Committee was nominated and the long-term establishment of S4C discussed with representatives of national science academies. The organi-

zation of the first Forum Carpathicum 2010 in Kraków, Poland, testifies to the strong interest and lively spirit of the Carpathian research community.

South Eastern European Mountain Research network

The evolution of the S4C network provides an encouraging example for another region that has undergone severe political, historical and environmental changes in recent decades: South Eastern Europe (SEE). Although this region has abundant mountains hosting diverse cultures and habitats, global change researchers working there are hardly visible within the European science community. With the emerging European funding opportunities and new options to establish research partnerships within Europe, it is high time to give mountain science in the Balkans a profile.

On request from the Bulgarian Academy of Sciences, the MRI Europe Programme supported the initiation of a second regional science network, the South Eastern European Mountain Research network (SEEmore). In a first workshop on “Identifying the research basis

for sustainable development of the mountain regions in South-eastern Europe” in Borovets, Bulgaria (April 2009), representatives from the Balkan countries plus Greece and Turkey made a first attempt to set specific research priorities, to define structures and operational modes. This led the foundation for a larger SEEmore conference scheduled for August 2010 in Timisoara, Romania. Hosted by the West University, the meeting aims at setting the stage for future international research collaborations in the field of global environmental change in the mountains of SEE.

The above science networks have proven their usefulness in terms of enhanced communication and collaboration. Some of the specific benefits are compiled in Table 2.

The virtual kitchenette: the role of networks for advancing science

The above paragraphs exemplify the added value that can accrue from action-oriented networking and targeted communication. Networking that reaches beyond

Table 2: Benefits arising from improved networking and communication within the European mountain research community.

Benefits	Description
Identifying research gaps	Strategic research planning in consultation and agreement with the whole mountain research community.
Acting in concert	Working towards the same vision and objectives makes individual activities more meaningful. Regional science networks can evolve into consultative groups for peers, policy, and decision-makers.
Resource concentration	Target-oriented working groups created for the accomplishment of a specific task (e.g. project proposal writing).
Common protocols	Joint cross-border projects lead to common research protocols and the development of comparative databases.
Closing publication gaps	Regional research results are often published in regional journals (e.g. Körner 2009). Through international research collaborations results become accessible to an English speaking readership.
Research partners	Efficient identification of international research project partners.
Funding	Enhanced access to international funding schemes through better information channels and networking.
Triggering innovation	The interdisciplinary dialogue encourages network members to go beyond their own perspective, which in turn facilitates innovation.

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one's own discipline will surely advance the progress of mountain research in Europe. How can effective networking be promoted further?

Normally, networking and communication takes place spontaneously in settings such as shared printers or the office kitchenette. It also occurs during workshops or conferences, where again the coffee breaks offer a most conducive platform for interaction. As investigated by the Massachusetts Institute of Technology, 80% of the ideas emerge from the direct contact with a discussion partner and two thirds of the communication between employees working on a similar task takes place within a 30 m radius (in Vollmar 2007: 122).

In modern times, communication does not limit itself to the physical office kitchenette and research partners are often miles away. For financial but also environmental reasons, it is impossible to create face-to-face meetings frequently enough to create a coffee-break-like environment. Nevertheless, and because of that, the MRI Europe Programme places highest importance on the individual researcher and personal interaction using modern communication tools to create "virtual kitchenettes". To stimulate knowledge-creation processes, it

also explores innovative technologies offered through Web 2.0 (social software) (Fig. 2).

Networking and communication are also crucial to enhancing the visibility of researchers and their findings. Informing others about one's expertise is an effective promotion channel. The MRI Europe Programme aims to render both the knowledge and carriers of knowledge more visible, to make better use of existing knowledge and expertise and to foster the exchange and creation of new knowledge.

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Never before has knowledge and information been so ample, accessible but also dynamic. And yet, the wealth of detailed information does not necessarily lead to better understanding of the whole. Indeed, we might even be more in danger of not seeing the wood for the trees. As a consequence, the distinction between relevant and irrelevant knowledge is very important not only to sharpen our perceptions but also to steer activities in the desired direction. Hence, the task of MRI Europe



Fig. 2: MRI Europe Programme Manager Astrid Björnsen Gurung recording a webcast of the first SEEmore meeting in Borovets, Bulgaria in April 2009. Photograph by Mehmet Somuncu.



Fig. 3: MRI Workshop on "Interdisciplinarity in mountain research" in Brig, Switzerland, September 2008. Astrid Björnsen and Jill Baron analysing potentials and challenges of interdisciplinary research projects. Photograph by Claudia Drexler.

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is not only the generation of new knowledge, but also the screening and compilation of information for future research planning and implementation (Fig. 3).

Today, researchers can compete with their peers only through an increasing degree of specialization. In response, the MRI puts an emphasis on creating platforms and opportunities to reflect those specialized views with a systemic approach. The integration of different disciplines in turn stimulates new ideas and generates project ideas and hypotheses.

As a typical feature of knowledge management, it is often not clear what the next activity will be or what the consequence of such action will be. The quality of MRI Europe's strategic planning thus depends on its flexibility, its ability to respond to the evolving demands and equally on the arising opportunities from the regional networks. There might not be a single right decision but multiple alternatives with similarly unpredictable impact or success.

As a common truth, as in mountaineering, mountaineers not only rely on good planning and appropriate equipment, but in the first instance on reliable, trustworthy team members with whom they are roped together and like to spend their time. This is true for both the personal and institutional level. In that sense, the MRI Europe Programme will continue its efforts to prepare a fertile ground for "alpine knowledge gardening", maintaining individual contacts while fostering the dialogue at the institutional level. As mountains do not observe national borders, mountain research in a world of global change must also take on an international dimension. Accordingly, the MRI Europe Programme should become an initiative supported by governments of several countries. Austria and Switzerland have made a promising start.

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