

MRI Newsletter 5: GLOCHAMORE Update



GLOCHAMORE (GLObal CHAnge in MOUNTain REgions) is an EU-funded project to create an integrative research strategy for the detection, impacts, and potential responses to global change in UNESCO Mountain Biosphere Reserves (MBRs; see Figure 1). GLOCHAMORE is a market place in which future research projects can be negotiated. Managers of Mountain Biosphere Reserves offer sites, natural resource systems, and specific interests for study, while global change researchers offer knowledge, capacity, and a global perspective. The MRI and the UNESCO Man and the Biosphere (MAB) program act as brokers in the development of research partnerships between MBR managers and research institutions.

The GLOCHAMORE market takes place in 4 thematic workshops and an Open Science Conference. The themes of the workshops arise from the MRI's research strategy, which defines 4 key global change research activities: monitoring, process studies, modelling, and the design of sustainable land use and natural resource management. For more information on GLOCHAMORE origin and management see MRD Vol 23(4), Nov 2003, and <http://mri.scnatweb.ch/content/category/3/10/31/>

The launch of GLOCHAMORE

The initial GLOCHAMORE workshop at Entlebuch Biosphere Reserve, Switzerland, in November 2003 brought together global change researchers and MBR managers from around the globe. MBR managers provided first-hand knowledge on their reserves, on existing global change research activities in their regions and on current research needs. In response, the researchers outlined their potential contributions and interests. Go to <http://www.unesco.org/mab/mountains/publications.htm> for the proceedings of the Entlebuch Work-

shop. The workshop announcement and report are available on the MRI web site (mri.scnatweb.ch).

Monitoring

The first thematic workshop on "Global Environmental and Social Monitoring" held in May 2004 in Vienna, Austria, outlined the monitoring component of the research strategy under 4 headings: cryosphere, mountain waters, terrestrial ecosystems, and socioeconomic systems. Participants proposed the following indicators as the minimum under each heading:

- **Cryosphere:** snow depth, glacier extent, spatial extent of permafrost distribution.
- **Terrestrial ecosystems:** vascular plant species cover/abundance.
- **Mountain waters:** precipitation, discharge at the catchment outlet, water temperature, pH, conductivity, and epilithic diatoms in lakes and water courses.
- **Society and economy:** population, literacy, food security, health, land use/cover change, safe water, participation level in MBR management.

Discussions led to two institutional insights. First implementation of a monitoring program requires capacity building at the level of the MBR. Beyond that, the sustainability of a monitoring program depends greatly on its relevance to the issues important within each MBR. While MBR managers presented information on their MBRs in both Entlebuch and Vienna, GLOCHAMORE had not as yet any systematic information on such issues. Consequently, MRI and UNESCO MAB decided soon after the workshop to query the MBRs using a structured questionnaire. Results of the questionnaire will be presented in a subsequent newsletter. Go to the aforementioned UNESCO web site for the proceedings of the Vienna Workshop, and to the MRI web site

for further details (announcements, presentations, and reports) of this and the following workshops.

Modelling

The second thematic workshop, "Projecting Global Change Impacts in Mountain Biosphere Reserves," held in Gran Sasso National Park, Italy, in November/December 2004 identified modelling approaches to develop projections of global change and global change impacts relevant to MBR managers. It also identified the needs for capacity building, funding, and infrastructure development that will allow the use of modelling techniques that are currently unfeasible in some of the MBRs.

The workshop addressed 5 themes:

1. **Regional climate change:** The global climate projections of the IPCC (2001) could be used to drive impact models. Such scenarios would not be realistic in that regional impact models would be driven by global averages. However they would elucidate the sensitivity of certain ecosystem goods and services to climatic changes.
2. **Snow and ice:** Simple modelling could simulate snowmelt based on a few global change scenarios. All MBRs containing glaciers could observe and model their evolution based on energy balance. Each MBR with permafrost could model permafrost distribution using empirical/statistical steady-state models calibrated with field measurements.
3. **Ecosystem structure and biodiversity:** Modelling should focus on charismatic species, turnover of common species (biodiversity), and invasive species. A cross-comparison study of all MBRs based on model projections for many species would promote standardized modelling procedures.

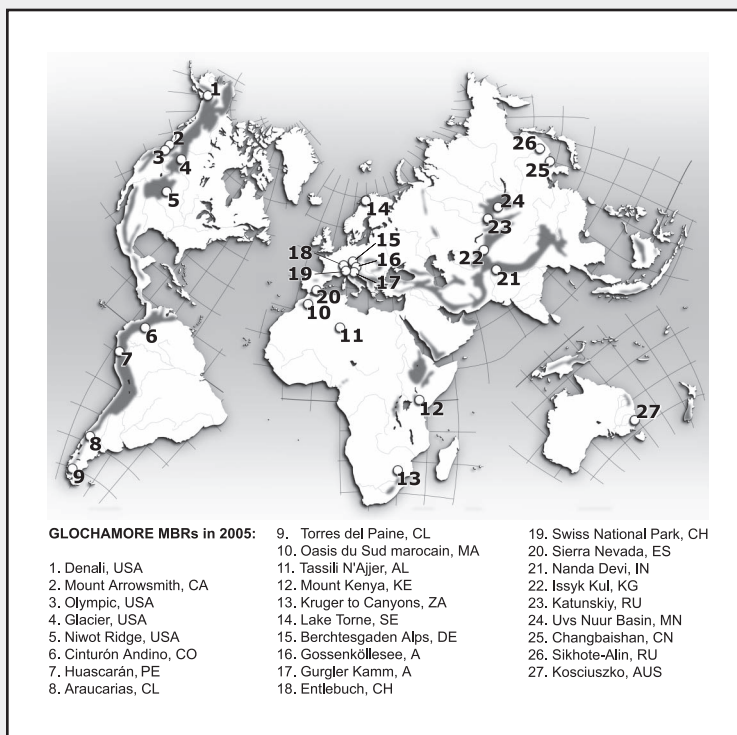


FIGURE 1 The Mountain Biosphere Reserves (MBRs) participating in the GLOCHAMORE project. (Map courtesy of UNESCO)

4. **Ecosystem function:** Implementing the Regional HydroEcological Simulation System (RHESSys) in multiple MBRs would provide a first assessment of hydrological discharge, primary productivity and carbon storage that would facilitate inter-site comparisons. Climate scenarios could then drive the various RHESSys implementations to estimate climate change impacts in different sites.
5. **Land use change:** While excellent land use change models exist, few of the MBRs have the GIS technology needed to run them. A minimum strategy would consist of implementing GIS, obtaining basic spatial data, and assessing current land cover condition and trends.

It became clear that modelling, process studies, and monitoring are inextricably entwined. Models are built on process studies. They are calibrated with monitoring data, and modelling results can inform decisions on monitoring programs. Beyond that, modelling results, as portrayal of potential futures, provide entry into management and policy debates.

GIS data and systems also emerged as key technological prerequisites. It will be hard for MBRs to address most ecological issues, especially land use and land cover change, without minimum compe-

tence in GIS. Fortunately, enormous quantities of GIS data are already available at low or no cost.

Towards sustainability in mountain regions

The third thematic workshop on “Sustainable Land Use and Natural Resource Management in Mountain Regions,” held in Granada, Spain, in March 2005 addressed two main issues: 1) how to ensure that scientists provide policy-relevant information to the managers of MBRs, and 2) are MBRs equipped with governance institutions that can address the challenges of global environmental change?

The workshop addressed 3 regions: Central Asia/Himalaya, Latin America, and Western Europe. The great diversity of situations between MBRs, and indeed between regions, required that proposals for providing scientific advice for management consider regional and local specificities. Institutions for MBR governance also vary, depending especially on when a MBR was established. Many MBRs belong to the ‘first generation’ of MBRs, with only a core area—usually a national park or nature reserve. The more recent MBRs with buffer zones and transition area have more complicated governance structures.

The regional working groups reviewed and revised the indicators

proposed at Vienna, recognising that indicators are important for defining and monitoring both policies and local management practices. The diverse situations across the regions led to considerable differences in the priorities given to the various indicators (see the MRI web site).

Process studies

The fourth thematic workshop on “Process Studies Along Altitudinal Gradients to Serve Conservation and Sustainable Development” was held in Samedan, Switzerland, 27–30 July 2005. The workshop addressed altitudinal gradients and their influence on hazards, soils, ecological processes and biodiversity, land use and management, society and economy (see the MRI web site).

Towards a synthesis: the Open Science Conference

The Open Science Conference (OSC) on Global Change in Mountain Regions is the final EU-funded activity of the GLOCHAMORE project. It will be held in Perth, Scotland, UK, 2–6 October 2005. The conference will—as one would expect—communicate new research results from the mountains of both industrialized and developing countries. In addition the conference will finalize the framework for long-term research on global change that can be implemented in Mountain Biosphere Reserves and other mountain locations. (Conference web site: www.mountain.conf.uhi.ac.uk)

Greg Greenwood, Astrid Björnsen, and Claudia Drexler

The Mountain Research Initiative, Schwarztörstrasse 9, CH-3007 Berne, Switzerland.
Tel: +41 31 328 23 30
E-mail: mri@scnat.ch
Web site: <http://mri.scnatweb.ch/>

Martin Price

Director, Centre for Mountain Studies, Perth College, UHI Millennium Institute, Crieff Road, Perth PH1 2NX, UK.
E-mail: Martin.Price@perth.uhi.ac.uk
Web site: www.cms.uhi.ac.uk