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News [letter]

Alpin forum: moving towards worldwide cooperation in mountain resarch

Tage Michaelson
FAO, session moderator

For the first time in the history of the Alpine Forum, space in the 2000 edition was dedicated to an inter-regional discussion on the topic: "Moving towards worldwide cooperation in mountain research". Experts from international institutions analyzed present and future research in terms of priorities for sustainable mountain development. This session, held in Bergamo and Castione della Presolana, Italy, was held in preparation for the "2002 – International Year of Mountains" celebration.

Each member of the expert panel was invited to briefly illustrate their region's specific priorities, identifying opportunities and needs for international exchange within the framework of cooperation in mountain research; the basic text of each presentation can be found in this special edition of the Ev-K^2-CNR Newsletter.

Each presentation concentrated on identification of three mountain research priorities for regions in Asia, North America, Africa, Europe and South America, according to the following three themes: economic/political; environmental/biophysical; social/cultural. Each speaker then identified local and regional strengths and weaknesses in terms of what's been achieved so far.

Session moderator, Tage Michaelsen, *Chief of the Forest Conservation, Research and Education Service*, FAO, underlined in conclusion the great potential for exchange of research agendas and results between mountain regions of the world, while pointing out that mountain issues are different in industrialized areas and in developing regions. Sustainable mountain development should not however be seen as a North-South issue - while there are serious problems to be faced, important experiences and lessons learned are available to be shared in both. A worldwide mountain research agenda needs to be broadly focussed, taking as a basis the right to development of mountain areas, respect for mountain communities and their cultural diversity and values and recognizing the need for fair compensation for goods and services produced in mountain areas as a basis for a balanced national development agenda.

Other interventions from those not on the panel include: Anna Ferro-Luzzi, *Director WHO-CC for Nutrition and Head, Unit of Human Nutrition – National Institute of Nutrition;* Dayananda Bajracharya, *Vice Chancellor, Royal Nepal Academy of Science and Technology;* Talim Hossain, *Anthropologist, Doctoral Candidate - Agricultural Development in Bangladesh, University of Bern.*

A worldwide analysis

Bruno Messerli
Univesity of Bern

The mountain chapter in the Agenda 21 (1992) and the UN-International Year of the Mountains stimulated research and development in the mountains of the world in an unexpected way. As a result of this dynamic process we have to think carefully how we can keep and improve the necessary co-operation and the North-South partnership.

On the global level we need a close co-operation between FAO, UNU, UNESCO, and others on the governmental side and the Mountain Forum and others on the non-governmental side.
On the regional level we need active information and co-ordination centres like ICIMOD, CIP, the Alpine Forum, and others. In this system there are still a lot of gaps, e.g. Mountains of Central Asia, Africa, Middle East, Pacific Rim, etc.
The most concrete projects are formulated and financed on the national level, but the urgently needed North-South partnership has not always been integrated in a satisfactory way.
Activities on the national level, the example of Switzerland: the Swiss Science Foundation, the Swiss Development Cooperation, the Interacademic Commission for Alpine Studies in co-operation with several Universities are planning new mountain programmes in the Alps, in East Africa, in Central Asia, etc.
On a cross-cutting level we have to see the new emerging international programmes like the "Global Mountain Biodiversity Assessment" (GMBA) of DIVERSITAS and UNU, and the "Mountain Initiative" of IGBP, IHDP and GTOS.
Most important is information and publication! The journal "Mountain Research and Development", which exists since 20 years (Jack Ives), has now a new concept to serve the mountain community both with contributions to research and to development (Hans Hurni, Ted Wachs).

The FAO Perspective

Thomas Hofer - FAO

The statements made in this draft reflect the views of FAO as International Organisation and are based on the following specific roles of FAO related to sustainable mountain development:

- Task Manager for Chapter 13 of Agenda 21;
- Lead Agency for the International Year of Mountains 2002 (IYM);
- Normative and field activities related to watershed management and sustainable mountain development.

Importance of mountain research: Programme area A of Chapter 13 of Agenda 21 asks for "generating and strengthening knowledge about the ecology and sustainable development of mountain ecosystems" (UNITED NATIONS, 1992).

One principal objective of the International Year of Mountains is "increase awareness of, and knowledge on, mountain ecosystems, their dynamics and functioning, and their overriding importance in providing a number of strategic goods and services essential to the well being of both rural and urban, highland and lowland people, particularly water supply and food security" (FAO, 2000).
There is a need to develop new or strengthen existing mountain-specific policies at the national, regional and even global level. The formulation of

such policies requires a solid knowledge base. The development of national strategies for sustainable mountain development is particularly important and potentially has the most important practical impact on the ground. Accordingly, mountain research needs to place itself within and contribute to the framework of a national programme for sustainable mountain development.

Global mountain research issues:
Mountain areas form highly complex ecosystems. Accordingly, integrated, inter-disciplinary and applied research is required, of course supported by basic and specialised research whenever needed.
In order to significantly contribute to the implementation of Chapter 13 and the success of the International Year of Mountains, regional synthesis and overviews of mountain-related information are required.
In the global perspective, the following topics are important mountain research issues:
- Water
- Climate change
- Biodiversity
- Tourism/recreation
- Economy
- Cultural heritage
- Highland-lowland linkages

Presentation of research results:
In order for mountain research to have impact, human resources, time and money need to be invested into the "translation" of research results into operational and practical products and into the "selling" of research results to users.

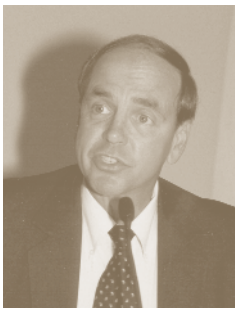
Partnership issues in mountain research:
The statements made above make it very clear that the regional and global exchange of research results /methods /approaches as well as the reinforcement of research partnership across the continents / mountain regions of the world are essential and need to be intensified.
It is of particular importance that successful research projects which have substantially contributed to sustainable mountain development are documented and communicated. Such examples provide ideas for researchers in other areas of the world, make "users" and funding agencies aware of the importance of mountain research and strongly enhance research partnership.

The journal "Mountain Research and Development", edited at the CDE, Department of Geography in Berne is an important platform to exchange research results / approaches / experiences. The Global Mountain Forum with its regional nodes is another very important tool to exchange information. This electronic network could be used more intensively to inform, with short communications, mountain scholars in the different mountain areas of the world about ongoing or completed mountain research activities. This Forum is also an excellent platform to initiate research partnerships.

Research partnership north<->south is particularly important to expose stakeholders from both the north and the south to different situations and approaches.
There is a need to trigger and reinforce more research partnership programs by applying or modifying successful models of already existing mechanisms. The Forum Alpin could play a key role in this and the context of the International Year of Mountains could facilitate this challenging task.

Close collaboration of research teams with politicians / decision makers is also an important partnership issue related to mountain research, in the north as well as in the south.
Researchers need to listen to information needs expressed by politicians / decision makers and as much as possible try to respond to such requests.
Politicians / decision makers need to listen to emerging mountain research issues and priorities raised by researchers and as much as possible assist researchers to work on such issues. This in turn is a challenge for researchers: they need to present and "sell" their ideas and concerns in such a way that politicians / decision makers are motivated to listen.

The Appalachians



Alton C. Byers
The Mountain Institute

Background: Prior to the 19th century, the Appalachian old growth forests were relatively undisturbed, pristine, and continuous in their coverage of the entire 2,600 km SW-NE striking range paralleling the eastern coast of the North American continent. Between 1890 and 1910, however, more than 90 percent of these same forests were clearcut by lowland commercial interests with little regard for environmental and social impacts or for the future.

Fire and accelerated soil loss soon followed, and in the words of one ecologist "the Appalachian forests have been convalescing ever since". However, by the year 2000 a secondary, mixed hardwood formation again covers more than 75 percent of the range thanks to the resiliency of the eastern U.S. landscapes. Although greatly modified from their pre-logging, old-growth ecologies, today's Appalachian forests appear to be in relatively good condition.

However, the future of these forests is uncertain: a highly valuable timber resource is once again approaching commercial maturity, and timber companies are poised to escalate regional timber extraction. Additionally, most forest land is privately owned (>75 percent in WV), and clearcutting is an attractive harvesting alternative to the landowner desiring rapid, short-term profits. The prospective impacts on the aesthetic, water quality, and biodiversity value of these forests is thus of great concern . The potential for replicating the mistakes of the turn of the century is substantial. The economics of alternative harvesting methods are poorly understood, community forestry is in its infancy compared to other countries, and little has been done to determine the real economic potential of non-timber forest products (e.g., ginseng, mushrooms, medicinal herbs).

A. Shared Information and Research Experiences of Value:

Information and experiences from the global mountain research community that would benefit the Appalachians include:

- Models of alternative income generation among private landowners;
- The economics of differing timber harvesting methods (horse logging, selective, clearcutting);
- Non-timber forest products;
- Ecotourism and conservation-linked enterprise initiatives;
- Local capture of economic resources;
- Participatory methods of multiple-stakeholder conflict resolution and natural resource management.

B. Invasive Species (biophysical/environmental)

Appalachian vegetation was relatively isolated and most species were to the range prior to the 1500s. European settlement of the region was accompanied by the introduction of hundreds of non-native species: a typical mountain pasture today can exhibit a community where more than 75 percent of the species are exotic.

Global economic trade and road construction are accelerating the introduction of invasive species at unprecedented rates. Each year, approximately $23 billion nationwide is lost to invasive plant impacts to agriculture, industry, recreation, and the environment. As estimated 4600 acres of land are invaded daily by invasive plants. In response to these impacts and to those of invasive animal species, President Clinton signed Executive Order 13122 (E.O.) On Februrary 2, 1999. The Invasive Species E.O. directs Federal agencies to expand and coordinate their efforts to combat the introduction and spread of plants and animals not native to the United States (U.S. Department of Transportation memo, 18 August, 1999). Invasive species have been called one of the three main environmental problems interfering with the successional recovery of Appalachian ecosystems (Constanz 1995:197), the other two priority problems being (a) haphazard land use and (b) acid rain. Exotic species often have a competitive advantage over native species and can easily overrun natural defenses. Examples in the Appalachians include the gypsy moth (first imported in 1868) that is devastating oak forests; and the Balsam wooly adelgid, an exotic insect first noticed some 20 years ago in the northeastern states, now destroying balsam fir and hemlock groves throughout the range.

Shared Information and Research Experiences of Value:
Research and information exchange is needed to develop methods to:
• Prevent and/or control key invasive plant and animal introduction and impacts,
• Improve native plant restoration techniques (e.g., TMI's Blister Swamp Conservation and Restoration Project that is both protecting globally rare plants while restoring the native balsam fir forest, one of the only projects of its kind known to exist at present),
• Increase public awareness about non-native invasive and native vegetation

C. Haphazard Land Use (socio/cultural)
The Appalachians are a mountain range with a 200 year plus history of wholesale resource (renewable and non-renewable) extraction. Most of the profits from this resource extraction were removed from the mountain communities and little was replaced in the way of physical and social infrastructure. Nevertheless, both environments and cultures have displayed a remarkable resiliency, only to be challenged by new threats and impacts that point to an uncertain future.
One of the most serious threats is a lack of land use planning. This has resulted in the building of homes and sewage treatment plants in flood plains, clearcutting without regard to slope, uncontrolled and unattractive development, loss of cultural landscapes, and loss of biodiversity because of forest fragmentation. An historical emphasis on private property rights, and widespread distrust of government and big business, has often led private landowners to view zoning as a threat instead of a collective strategy of protection.

Shared Information and Research Experiences of Value:
• Case studies of potential income from planned economic development versus totally unregulated land use;
• Conservation-linked enterprise and diversification of landowner income sources;
• Increase of public awareness for better land use planning through education;
• Experiences in the preservation of cultural landscapes in mountain regions.

D. Suggestions for Enhancing Global Mountain Research and Communications
Creation of an *International Organization of Mountain Research Stations* (similar to the Organization of Biological Field Stations in the U.S., but with a specific focus on the biophysical/social/economic aspects of mountain research). Such an organization could actively promote networking, the exchange of research information, and provide assistance in the establishment of mountain field stations,
Creation of a *Mountain Forum special interest group* (e.g., "mf-research") that promotes networking and information exchange between interested researchers and field practitioners; or increased use of the mountain geography (mf-geography) list (an "mf-research" list can be created if a volunteer moderator is found who is responsible for eliciting content; and if there is a significant, active target group of mountain researchers interested in its establishment).

E. TMI Himal Program Research Priorities (Nepal, India, Tibet):
In addition to the topics below, we would also stress the need to be more participatory in the way research agendas are set, and activities are conducted. We need to move the agenda and activities into the real "field" of farmers, practitioners, policy-makers, as well as traditional field research stations.

1. Mountain Markets:
A better understanding of economic and information flows in markets and players is needed, a topic that is critical for mountain economies. Generally, there has been little in the way of economic research into market and related activities in mountain areas, particularly in ways that allow participatory market interventions to be developed.

2. Indigenous knowledge and related intellectual property rights:
This is under-researched, and little is in place in countries to provide legal support. More and better research would provide the basis for the legal framework for developing a strong system of developing and implementing intellectual property rights. The topic is important to mountain ranges, which are generally high biodiversity areas with strong traditions of local medicine (e.g. Tibetan, ayurvedic), and there can be good opportunities to cooperate and build critical mass in terms of lobbying, plus learn from others who are further along.

3. Climate change:
Better understanding is needed of climate change impacts on mountains and

related landscapes, given the important implications in terms of glacial melt, formation of new glacial and outburst threats, floods, impacts on tourism, water supply, etc.

4. Polylepis forests: We need to better understand how people-ecosystem interactions have historically affected the spatial distribution of these forests and how compatible are human uses with a forest ecosystem structure which is highly diverse. We need to combine basic research with participatory research to understand the multiple, gendered dimensions of forest uses in order to arrive at practical alternative uses that improve biodiversity and livelihoods. Results of this research should inform the design of conservation strategies is mountain landscapes that have evolved over centuries of by human use.

5. Socio-Ecological Studies of Montane Grasslands:
Large portions of the Andes are affected by erosion problems related to overgrazing. A program to study the social dimensions of grassland land use patterns, property rights, and traditional technical knowledge is essential because any solution will basically require changes in the social organization of grazing. Social studies must be complemented with genetic assessments, selection of high-quality native grasses, and testing of alternative range management technologies that use new selected higher yielding native varieties (e.g., developing native seed banks, range remediation technologies, low cost irrigation technologies, etc.) Studies should place emphasis on upland - lowland interactions, particularly economic tradeoffs (e.g. studying the economic value of montane grassland ecological services, such as water "production" or carbon sequestration potential by grassland organic soils, etc.).

References:

Constanz, G.1994. *Hollows, Peepers, and Highlanders: An Appalachian_Mountain Ecology*. Missoula: Mountain Press Publishing Company.
Bolgiano, C. 1995. *The Appalachian Forest*. Mechanicsburg: Stackpole Books.
Schelling, D., Nash, C., Underwood, J., Taylor-Ide, D., Underwood, J. 1992. The Appalachians of North America: marginal in the midst of plenty. *In*: Stone, P. (ed.) 1992. *The State of the World's Mountains: A Global Report*. Pp.299-326.
Osha, J. 2000. Recommendations for sustainable forestry initiatives for Appalachian Programs, The Mountain Institute, West Virginia. Report. The Mountain Institute: Spruce Knob Mountain Center.

The African Mountains and Highlands

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Present and future researchable issues for african mountains and highlands

Literature is replete with shocking statistics of the state of natural resources degradations in mountain ecosystems. Studies on Ethiopian highlands reported that soil losses as high as 282 t/ha/yr was measured on a 22% slope on a Nitisol cropped with tef and with an annual rainfall of 1,556 mm and 1 t/ha/yr on 21% slope on a pellic Vertisol with mixed cropping of sorghum and beans and with an annual rainfall of 888 mm (Grunder, 1990). The water catchment of Wedza mountain in Zimbabwe was reported to be experiencing serious soil, water and vegetation resource degradation following over-utilization by herders and cultivators leading to devastating impacts on water resources availability and siltation of water reservoirs (Gumbo, 1990). Drought conditions being experienced in the lowlands surrounding mount Kenya are partly attributed to the wanton destruction of the water catchment. It is therefore important to undertake research to improve our understanding of the nature and extent of resource degradations and strategies to reverse the trends.

The importance of mountains as water towers has been acknowledged (Liniger, 1995; Liniger et al., 1998, Bisaz et. al., 1997). While site specific research has been undertaken is several mountain regions of Africa, no attempt has been made to assess spatial and temporal extrapolation of the research findings to other regions and different human interaction scenarios. A collaborative research of the University of Nairobi and Berne on aggregated models as management tools has demonstrated how long-term monitoring data sets could be used to develop computer models for use in spatial and temporal extrapolation and in decision support (Gichuki et al., 1998). Regional economic groups such as SADC, ECOWAS, EGADD can be used to solve trans-boundary water catchment management issues (Adeyoju, 1990).

Information or experience in other regions the region could benefit from: this research priority would benefit from information and experiences gained in other areas on issues such as:

1. methodologies for data gathering and utilization (particularly remote sensing data);
2. Strategies for moving from research to action plans;
3. Conservation of trans-boundary water catchments;
4. What is the optimal balance between water catchment conservation and utilization to ensure a sustainable water yield and resource use for human needs?
5. Transferability of research findings considering the high diversity of mountain ecosystem in Africa;
6. Appropriate land use and management of water catchment areas;
7. Socio-economic, institutional and policy requirements for water catchment protection.

Population pressure on mountain resources in increasing. Ezaza (1990) reported that due to favourable factors Usambara mountains regions in Tanzania has experienced a high population increase (from 1,500 persons in 1900 to 286,067 in 1978). Some of the highest population densities in Africa are in mountain areas. This has resulted in conflicts among different stakeholders (conservationists, loggers, cultivators, herders, miners, downstream water users, etc.) of mountain areas. Some of the major causes of conflicts are destruction of mountain wildlife, deforestation for cultivation, overgrazing, and overexploitation of forest products. Wildlife ecosystems are being encroached for human use. Grazing is expanding in the subapine and alpine grassland of Lesotho highlands while agriculture is extending higher up to 2,400-2,600 m (Wiese, 1990). This has resulted in conflicts between conservationists, cultivators and herders and lead to soil, water and vegetation resources degradation. In Burundi, land use changes in favour of human utilization of mountain ecosystems has resulted in loss of biodiversity (Ndabaneze, 1990).
While laws and regulations on land use and management, Gumbo, 1990 noted that procrastination and absence of law enforcement systems has led to intensification of conflicts over resource use and management. An inventory of the potential hotspots, the driving forces and possible intervention are urgently required.
Conflict resolution strategies have been developed and successfully utilized in other areas and on other issues. Some effort has been devoted to conflict resolution between conservationists and agriculturalists. Unfortunately most conflict resolution strategies are reactive and there is need for pro-active strategies particularly in mountain areas under threat.

Information or experience in other regions the region could benefit from: this research priority would benefit from information and experiences gained in other areas on issues such as:

1. What are the most appropriate legal, institutional and policy frameworks to reduce conflicts?
2. Methodologies for rapid appraisal of conflict hotspots and conflict resolution;
3. Identification of soil, water, plant and animal resources that need urgent conservation measures either because of their fragility, uniqueness and rarity, danger of extinction, or economic, social, religious and cultural values;
4. Methodologies for impact assessment of alternative resource use strategies.

Poverty has been identified as one of the major factors contributing to unsustainable development in Africa. Food security remains an elusive goal as more and more people experience

drought and famine.
According to FAO food emergency report in May 2000, the food supply situation in Africa has deteriorated sharply due to an extended drought and civil conflict. Over the last four months, the number of people in urgent need of food assistance has risen by 3 million, bringing the total number to over 20 million. In Kenya, pastoralists in search of grazing resources for their livestock following 2 years of below normal rainfall invaded the Mount Kenya forest ecosystem in search of pasture. Cultivators have also moved into these areas due to the favourable soil moisture regime for crop production. A poor man is mainly concerned about his survival in the near future and therefore consciously or unconsciously degrades the resource base.

Increasing population can be transformed into valuable human resources for sustainable development (Tiffen et. al., 1994). Approaches and technologies for increasing productivity of the natural resources are available and if adopted under the right conditions, productivity and profitability of smallholder farming systems in mountain areas can be enhanced thereby contributing to poverty alleviation and sustainable development.

Information or experience in other regions the region could benefit from: this research priority would benefit from information and experiences gained in other areas on issues such as:

1. The mountain region of Asia is supporting a high population density than mountains of Africa hence the need to learn from their experiences.

2. Under what conditions do farmers adopt sustainable development practices.

3. How can the productivity and profitability of smallholder farmers be increased?

The Latin American Mountains

Fausto O. Sarmiento - University of Athens, GA (USA)

The Latin American mountains continue to provide an important scenario for mountain research. In the past, the Andes were sites for studies that developed notions of modern science. The work of La Condamine started the Western interest for the mountains of South America that let to Humboldt's description of the variation of vegetation with altitude and the way organisms reacted to the landscape, creating "geoecology" and defining the "character" of Neotropical mountainous landscapes. Many European and American scientists found in South America fertile grounds for field studies, collections, and bioprospecting, that those became groundbreaking options for scientific inquiry and advancement, such as those of Charles Darwin, Bates, Whimper, Festa, and many more, including Troll and Ellenberg. As the longest cordillera across the continent, the Andes hold a huge variation of ecosystems and societies adapted to cope with the mountain lifestyle. Sustainable communities are found in places where traditional knowledge is maintained and revitalized. However, threats from the globalization process and ethnicity due to the encroachment of market forces in less competitive rural communities, prompted to a reconsideration of research needs in the context of rapid socioeconomic and ecological change.
Forces in the development spectrum are present in countries along the latitudinal cline; however, basic tenants required to be including in an overall international cooperation in mountain research are, as follows:

Recognition of worldwide drivers of threats, such as global climate change, the freeing of economies, elimination of territorial boundaries or customs, unifying markets in regional scale, and biodiversity, linguistic and cultural heritage loses.

Long term monitoring and assessment of factors indicating such change, from the biological (inventories, catalogs and museum), physical (charts, maps, imagery) and cultural (ethnographies, language, handcrafts and knowledge transfer) arenas.

Update of relevant information and monitoring, assessment and restocking of the processes and elements of mountain ecosystems. Inclusion of novel conservation approaches, such as the "protected cultural landscape" or landscape stewardship.

Development of alternatives of changing scenarios with options ranging from no intervention to a highly mechanized and planned intervention. Update of technological and methodological means to sustain mountain lifestyles in the working living landscapes of neotropical mountains.

Support of an academic network, independent of political and economical influences, that safeguards the goals of equitable, participatory, democratic and scientifically-based mountain sustainable development. This core group of scholars should guide the training of researchers and practitioners of mountain development work.

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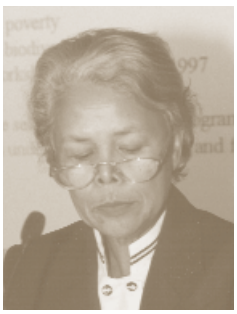
University of Georgia, Athens, GA. 30602-1778, USA.

Source: Sarmiento, F. & J. Hidalgo (Eds). 1998. *Desarrollo Sustentable de Montañas: Entendiendo las interfaces ecológicas para la gestión de paisajes culturales en los Andes.* Asociación de Montañas Andinas (AMA) Corporación Editora Nacional: Ecuador. (Quito Declaration on Sustainable Mountain Development).

South West Indian Ocean



Joselyne Ramamonjisoa - Amma

Some setting of priorities up to present
National Environment Office : état de l'environnement à Madagascar 1999
Strategy of Fight against poverty
Strategy of conservation biodiversity
Antananarivo AMA's workshop : proceedings 1997
The priorities presented here are selected among other programs but they are representative of most of national programs undertaken up to present and for the next 3 years in Madagascar

Priority 1 (economical/political/social/cultural): quantification of the benefits provided by outisde investments to mountain regions and vice-versa
Why important : to inform about inhabitants, big cities, rural people their capacity production regarding for means for sustaining livelihood (e .g, protection against landslide risks, flood, pollution, deforestation, conservation of urban patrimony, sacred sites, landscape for recreation and tourism).
What has been learnt: many isolated examples involving local population, some NGO, but research must be continued and a synthesis is necessary, about what lessons, implications...
value of research from other areas: need for synthesis and critical evaluation of experiences in other regions.
May the example be transfered in another country?

Priority 2 (biophysical/environmental): better knowledge of the dynamics and threatens in land use/cover and water use
Why important/ Mountains are water towers of humankind. They are supplying water, not only for men but also for agriculture, industry and urban centres in adjacent lowlands. On one side, traditional practices, bushfire endanger land use and provocate huge loss of soil. On the other side, surrounding lowlands, urbanisation, tourism... need more and more water.
These major changes may affecting moutain livelihoods, downstream resources, conversation of biodiversity. Scarcity of water begins to be felt in lowland zone.
For the time being better coordination of social, cultural, economic, political forces is needed but in long term (climate change especially), the role of ocean currents, winds, cyclone must strenghten linkages between mountains ans lowlands (storage in lake, reservoirs, regulation of rivers flow...)
What has been learnt: For land resources, agroforestry, many cases studies at local and regional levels. Study on malagasy rivers; on irrigation in La Reunion, highlights about water resources. Nethertheless, a global overview must be done for the South West Indian Ocean region in regard to growing population, tourism (especially ecotourism), in the frame of Indian Ocean University.
Value of Research from other regions: in the aim of comparison exchanges of experiences (c.g National Parks, Protected Areas)

Priority 3 (social-cultural): Mountains sustainable development by reinforcing social and cultural strategies
Why important: For a long time, mountain people has been marginalized. But They became the best keepers of their traditions and cultures which are today a real richness of biological and original diversity. Moutain people, in rural and urban areas use more and more medecinal plants. Sacredness helps maintenance of these products.
What has been learnt : Listing of fauna and flora had been done and scientist work with local practicians about their usefulness. Some medecinal plants are cultivated and exported to other countries.
Value of research from other regions : exchanges of experiences and sharing informations.

(Ms. Ramamonjisoa's presentation is reported here in note form).

The Hindu kush-Himalaya

Binayak Bhadra-Icimod

Theme 1: Economical/political priorities

• AGRICULTURAL INTENSIFICATION
is it ecologically sustainable?

- FOOD SECURITY & LIVELIHOOD
- NEW AGRICULTURAL TECHNOLOGY
- WATER HARVESTING

- COMMERCIAL AGRICULTURE
is agricultural diversification possible? can you take the mountain farmers out of the subsistence trap?

- ECONOMICALLY LINK AGRO-ECOLOGICALLY COMPLEMENTARY AREAS
- ROAD ROPEWAY LINKS
- MARKETING
- LOCAL SERVICES INSTITUTIONS
- COOPERATIVES
RESEARCH NETWORKS AND BIO- TECHNOLOGY PARKS
- EXTENSION NETWORKS

• LIBERALIZATION & GLOBALIZATION
what are the implications to mountain economies?
- LOSS OF BIO-DIVERSITY
PROTECTION OF INTELECTUAL PROPERTY RIGHTS OF TRADITIONAL KNOWLEDGE BASE/ TRADITIONAL MEDICINAL SYSTEMS MEDICINAL PLANTS AND OTHER RESOURCES

• GOVERNANCE
the mountain areas have become equally affected by many types of instl-tutional dysfunctionality as elsewhere perhaps more so?

- CREATING BASIC GOVERNANCE
- STRUCTURES AND PLANNING INSTITUTIONS
- STRENGHTENING OF INDIGENOUS INSTITUTIONS

Theme 2: SOCIAL/CULTURAL priorities

• URBANIZATION IN THE MOUNTAINS
how do you face the demands of urban poor ?

• MOUNTAIN INDUSTRIES (EG INFORMATION TECH)
- TOURISM AND ECO-TOURISM
- URBAN INFRASTRUCTURES/PLANNING NETWORKS

• ETHNICITY
what are tne implications of growing a wareness of the ethnic minorities about their own situation?

• CONFLICTS IN THE MOUNTAINS

Theme 3: BIOPHYSICAL /ENVIRONMENTAL
priorities

•GLOBAL WARMING AND CLIMATE CHANGE
what are the impacts in mountain ecosystems ?

- MOUNTAINS CAN HELP COUNTER GLOBAL WARMING
- SEQUESTRATION OF GHG HYDRO POWER
- CARBON DIOXIDE SINK AFFORESTRATION

• POPULATION GROWTH
is it posslble to contain the growth?

- COMBINATION OF DIRECT AND INDIRECT APPROACHES
- THE DEMAND FOR LABOUR
- SKILL DEVELOPMENT
- WOMEN EMPOWERMENT
- ALTERNATIVE LIVELIHOOD SUPPORTS

(Mr. Bhadra's presentation in reported here in note farm.)

The European Mountains

Martin Price - University of Highlands and Islands, UK

Very broad diversity of European situations:
- biophysical
- social / economic / political
- past research / data availability
- research capacity

Priority 1 (economic/political): quantification of the benefits provided by mountain regions to lowland populations.

Why important: to provide a sound basis for policy formulation and implementation for support to be provided to mountain regions for provision of key societal benefits (e.g., watershed protection, protection against natural hazards, landscapes for recreation and tourism) and implicitly to sustain livelihoods of mountain communities.
What has been learned: many isolated examples involving companies, local and larger regions; but what is needed is a synthesis of what is known and the general lessons and implications
value of research from other areas: again, need for synthesis and critical evaluation of experiences in other regions (e.g., Latin America).

Priority 2 (biophysical/environmental): better understanding of the dynamics and potential trajectories of changes in land use/cover and water use.
Why important: major changes are taking place in the uses of mountain land and water resources, affecting mountain livelihoods, downstream resources, and conservation of biological diversity. To a large extent, these changes are driven by forces external to the mountains (national and European policies, urbanisation, migration, new economic activities). In the long-term, climate change (especially increasing frequencies of extreme events) may be an increasing force of change, but for the time being, the social, economic, and political forces are more critical. As Europe becomes increasingly integrated, a coherent understanding of the drivers of change,

and acceptable limits, are required to define European and regional policies (which are often inconsistent) to support multi-functional resource use/economies in mountain areas.
What has been learned: for land resources, there are many case studies at community/small watershed to regional levels; for water resources, there are some integrated studies (often driven by climate change concerns). However, in an increasingly integrated Europe, we need better overviews at the regional scale. Such research would also be valuable for other mountain regions in countries with industrialised economies, and stable (but with changing economic structure) or decreasing human populations (cf. North America, parts of East Asia).
value of research from other regions: only from temperate mountain regions with similar demographic and economic trends.

Priority 3 (biophysical/environmental): Long-term monitoring of environmental indicators.
Why important: monitoring of carefully-chosen environmental indicators can be crucial for providing information about processes of change driven by both global forces (e.g., climate change) and regional forces (e.g., policies, population changes, land use practices). Mountains are critical locations for monitoring particularly because of the strong altitudinal gradients. Thus the results of monitoring can provide data for validating the results of models and be used to measure key feedbacks to identify trends (and possibly thresholds) and evaluate the implementation of policies.
What has been learned: Such monitoring must be standardised at the European (and even up to the global) scale and be long-term; past programmes have often been wholly or partially shut down, and methods have not been standardised, so that any but the most basic comparisons have not been possible.
Value of research from other regions: monitoring in other regions can be valuable in informing European policy-makers about global trends, especially if methodologies can be standardised at the global scale.

(Mr. Price presentation isreported here in note form).