

Mountains of the World: A Global Priority...More Now than Ever

The title of this column emanates from a book edited by Bruno Messerli and Jack Ives (Parthenon Publishing Group, 1997), and the title is even more apt today. Concerns over sustainability and vulnerability have been replaced in some mountain regions by concerns for security and economic globalization [for a riveting study in political-military geography of mountain regions, read the latest (2002) edition of *War at the Top of the World—The Struggle for Afghanistan, Kashmir and Tibet*]. It is difficult to imagine landscapes where opportunities for geographic understanding are as great—and as urgent—as in the mountain regions of the world. The imposing physical landscapes and incredible adaptations of mountain inhabitants continue to attract the attention of scholars across the breadth of the discipline. Physical geographers cannot traverse mountains without being impressed by the cultural diversity and heritage. Human geographers cannot help but notice the in-your-face assemblage of landforms, vegetation zones, microclimates, and water paths. The AAG Mountain Geography Specialty Group has grown in numbers (since being founded at the 1999 Honolulu Meeting) and has provided a variety of forums where geographers of all backgrounds (physical, human, techniques) integrate and synthesize knowledge, techniques and theories to provide especially stimulating exchange of ideas and experiences.

Mountains cover 52% of Asia, 36% of North America, 25% of Europe, 22% of South America, 17% of Australia, and 3% of Africa—24% of the terrestrial earth surface as a whole. In mountains are found the deepest river gorges, steepest hillslopes, and some of the world's largest and most erosive rivers. Mountains provide critical habitat for many species of wildlife, mineral deposits, timber resources, hydropower potential, plus dramatic scenery. With great expenditure of human

energy, terraced agriculture turns steep land environments into productive cropland with long-term sustainability. Where principles of terrain evaluation have been ignored, human occupation of mountains leads to inevitable encounters with natural hazards: earthquakes, volcanoes, floods, slope failures, lightning, wildfires, high winds, and extremes of temperature and radiation. Mountains have been described as the "water towers of earth" by geographer Martin Price because they provide about one-half of the world's water supply. In Wyoming, for example, only 15% of the land area is situated within mountains that experience an annual water surplus; runoff from these mountains supplies the remaining 85% of the state situated in water-deficient lowlands.

Mountains are popular destinations for recreation and tourism but also home for a disproportionate number of the world's poorest peoples. The issues surrounding sustainable development in mountains led to the United Nations declaring 2002 as the International Year of Mountains. The challenges that face mountain inhabitants have led to intervention by governments and NGOs at a scale exceeding that in most other ecoregions. *The Key Issues for Mountain Areas* were outlined nicely in a 2004 book by that title edited by Price, Jansky, and Iatsenia and published by the United Nations University Press. The following nine policy suggestions have been identified by U.N. agencies networking with the world's mountain scholars: 1) strengthening of knowledge about the ecology and sustainable development of mountain ecosystems; more research and monitoring to identify knowledge gaps, needs and constraints; 2) development capacity for mountain populations (600 million worldwide) and minorities to counteract margin-

alization; 3) maintenance and development of cultural diversity; 4) holistic and interdisciplinary management schemes for environmental conservation and sustainable development; 5) dissemination of more realistic and accurate information through the mass media; 6) greater attention to urban aspects of mountain issues; 7) empowerment of local communities, especially women; 8) more attention to conflicts and resulting destruction of mountain ecosystems and livelihoods; and 9) promoting integrated watershed development and opportunities for alternative livelihoods.

Several initiatives of interest to mountain geographers are underway. Fort Lewis College in Durango, Colorado, will soon start offering an undergraduate minor in mountain studies. The nearby, not-for-profit Mountain Studies Institute facilitates academic study, field research, database development, experiential learning, and provides facilities and support. Their workshops have involved many geographers from North America and Europe. The U.S. Geological Survey is currently funding a fairly large Western Mountain Initiative (WMI), involving geographers Steve Walsh, Dave Butler, George Malanson, Tom Veblen, Lisa Graumlich, Dan Fagre, to mention a few. A Consortium for Integrated Climate Research in Western Mountains (CIRMOUNT), is underway to study climate change in the mountains of western North America; geographers Glen MacDonald and Franco Biondi are in the middle of this multiagency research community effort to tackle problems of climate change in mountains of western North America. Bishop and Shroder believe that examining the scientific



Marston

Continued on page 7

AAG Washington Monitor

AAG Urges Increases for Geography and Related Fields at NSF

Feeding off the momentum of the State of the Union Address, in which President Bush urged funding increases for science education and research, Rep. Bart Gordon (D-TN), Ranking Member on the House Science Committee, has been pushing a trilogy of pro-science bills he recently introduced.

One of Gordon's bills, the *Sowing the Seeds Through Science and Engineering Research Act* (H.R. 4596), calls for a ten percent increase per year in funding for basic research in the physical, mathematical, and engineering sciences at federal agencies such as the National Science Foundation. The bill would provide up to 200 new awards per year to early-career researchers and would create a graduate fellowship program for individuals pursuing studies in areas of national need.

Gordon recently held a briefing on his bills for Washington-area scientific community leaders, which was attended by representatives of the AAG. While many of those present were supportive of Gordon's legislation, some were concerned by the excessive focus on the physical sciences. Accordingly, AAG Executive Director Doug Richardson and I sent a letter to Gordon to praise his efforts on behalf of science, but also to stress the need to provide substantial increases for the social and behavioral sciences. We noted that:

The Foundation's Social, Behavioral, and Economic Sciences Directorate (SBE) supports fundamental research on human cognition, behavior, social structures and social interaction, as well as studies on intellectual and social contexts that govern the development and use of science and technology. Research supported by SBE over the past decades has resulted in substantial advances in our under-

standing of human and social development, and of key social and economic institutions and indicators.

Within SBE, the Geography and Regional Science Program encourages research into the nature, causes, and consequences of human activity and natural environmental processes across a range of scales. The program also supports cutting-edge research in the geographic information sciences, which the Department of Labor recently designated one of the three most important emerging and evolving high growth industries in the United States. In addition, several geographers have received funding from NSF for rapid response research on the Hurricane Katrina disaster and the affected Gulf Coast areas.

Science funding is expected to remain a hot topic on Capitol Hill this year. We will keep you apprised of any key developments.

John Wertman
jwertman@aag.org

Mountains from page 3

processes taking place in the highest mountains in the world could not only reduce tensions between India and Pakistan, but also advance science and benefit the people of South Asia. So they have organized an international Karakoram Himalaya "Science-for-Peace" workshop that will bring together geoscientists from the Americas, Pakistan, India, and other countries.

New technologies in geography have helped overcome the difficulties of access to remote steep-land environments. Recent breakthroughs in geospatial analysis have allowed earth scientists to study mountain environments in new ways. Some of this exciting work is highlighted in a book titled *Geographic Information Science and Mountain Geomorphology*, edited by Mike Bishop and Jack Shroder (Springer, 2004). The book presents thorough coverage of exciting topics in the physical geography of mountains using GIScience concepts and geospatial techniques: digital terrain representation, remote sensing, geostatistics, artificial intelligence, cartography and visualization, mountain hazards, surface hydrology, snow and

ice, regional climate, and tectonic geomorphology and landscape evolution.

Some of the highest rates of erosion ever measured on our planet have been reported for mountain regions, in particular the Nanga Parbat Massif in Pakistan, by combining field data with geomorphometry of DEM data sets, remote sensing, and process modeling. Some major disasters in mountain settings could have been avoided had geospatial analyses been applied. Advances in field-based GPS (global positioning system) and remote sensing techniques, such as LIDAR (light detecting and ranging), provide a wealth of new data to be incorporated in GIS analysis of mountain regions. William Bowen, retired professor of geography from California State University in Northridge, has generated a stunning collection of computer-generated panoramas of mountain landscapes that are readily available on the web.

It is clear from the *Millennium Ecosystem Assessment* and other reports that mountain ecosystems are especially fragile and degrading rapidly. Both poverty and ethnic

diversity are higher in mountain regions and people are more vulnerable than populations elsewhere. Mountains often represent political borders, restrict access to narrow corridors, and serve as refuges for minorities and political opposition. Sustainability of both upland and lowland peoples depends on greater understanding of highland-lowland linkages. As mountain geographers addressing the key issues facing mountain areas identified in this column and elsewhere, we should take strength in the words of Junko Tabei who, after becoming the first woman to climb Everest in 1975, said "Technique and ability alone do not get you to the top; it is the willpower that is the most important. This willpower you cannot buy with money or be given by others...it rises from your heart." Mountain peoples deserve our respect and assistance as best offered through our scholarship and meaningful assistance through government and NGOs.

Richard A. Marston
rmarston@ksu.edu