Comments: A New Typology for Mountains and Other Relief Classes: An Application to Global Continental Water Resources and Population Distribution

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Comments

A New Typology for Mountains and Other Relief Classes: An Application to Global Continental Water Resources and Population Distribution

By M Meybeck et al, MRD, Vol 21 No 1, pp 34–45.

We thank the authors for their most stimulating publication in *MRD,* Vol 21 No 1. We are persuaded that we need new definitions of mountains—definitions that answer precise questions about such things as the amount of mountain water runoff or the size and location of different types of mountain forests. In this sense, we have some additional definitions, for example, at the global scale for mountain protected areas and at national scales for mountain agriculture. All such definitions help us understand certain problems and processes. But we must distinguish carefully between approaches at the global scale, which are most important for all research programs on global change, and approaches at local and regional scales, which reflect the reality and diversity of the problems and processes in different climatic zones.

We are very impressed by the global database available today, but sometimes available knowledge is hidden. If contemporary runoff at 0.5° grid resolution is computed by a water balance model and converted to discharge, how is it possible that hills are more humid (445 mm/year runoff depth) than all different categories of mountains? Hills have an average elevation of 200–500 m (Table 2 of Meybeck et al), while mountains are divided into low, midaltitude, high, and very high, from 500 to more than 6000 m. How can we explain this result, and do we really have enough data, especially from the tropics and subtropics, where the water supply is an existential question, to understand and to quantify runoff from mountain areas?

We agree that high plateaus such as Tibet, the Andean Altiplano, etc, are not really mountains and they have a very limited roughness, which is certainly an important factor in understanding the hydrological processes. But we should not forget that, in many cases, precipitation on these plateaus is higher and that especially the periodical snow cover, with its retarded runoff, is fundamental for the water supply and irrigation in the surrounding lowlands during a climatologically critical season. How could Bangladesh increase its food production if it cannot use mountain runoff in the dry winter season for high-yield species of rice?

Global annual average data are certainly important for global analysis. But runoff in the boreal, subpolar, and polar regions is not determined by mountains; it is much more a function of the seasonal melting process of snow, ice, and permafrost, independent of relief. Also, in the humid tropics such as the Amazon Basin, where the precipitation in the lowlands is higher than 1500 mm/year, the contribution of the Andes becomes quite modest. But in the high-risk areas of the arid and semiarid zones, mountains will play a prominent role, as we can see in different case studies (Nile Basin, Near East, northeastern and southern Africa, Central Asian countries, California, Atacama Region of South America, etc).

It is also astonishing that 26% of the global population lives in mountain areas. Considering cells of 0.5° × 0.5°, we should perhaps say that these populations are living in and just around mountain areas. In any event, it is not easy to understand that the very high mountains have a population density of 83 people/km^2. Even if we assume deep valleys with a denser settlement, it is difficult to understand why these very high mountains have a higher density than all the other relief classes from plains to mountains, with the exception of rugged lowlands (Table 3 of Meybeck et al: Population density in exorheic areas).

These points should not be taken as criticism of the article but as questions for future development of the existing database, which is now open for discussion. If it could be combined with climatological data and specified for different climatic zones, we would take a big step forward in the evaluation of water resources and also in the estimation of water storage in mountain areas. If it is true that 26% of the world's population is living in or just around mountains, then not only mountain hazards and disasters but also the whole question of economic–social–cultural highland–lowland interaction takes on much greater significance than we have assumed until now. In this sense, the article is very stimulating and constitutes a basic instrument for future research.

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Development Indicators for Mountain Regions

By H Kreutzmann, *MRD*, Vol 21 No 2, pp 132–139.

Prof Dr Kreutzmann argues convincingly that we need to apply widely accepted development indicators to mountain regions. He believes this approach will show the way for new directions in interdisciplinary comparative mountain research.

While I obviously support comparative perspectives and interdisciplinarity, I have serious misgivings about building either research or sustainable development around "indicators" as defined by international agencies, especially the World Bank. Such indicators tell us more about agency bureaucrats who define, measure, and make their living from distantly designed development policies and programs than about the lives and conditions of mountain people. An indicator-driven R&D agenda pulls us fully back into the externally defined "lowland, flatland thinking" that mountain people and grassroots practitioners have been trying to overcome for years.

Development indicators are riddled with problems other than their poor quality or highly aggregated nature. Quality of life indicators, for example, are essentially criteria that are externally imposed on local circumstances with 4 strong biases: (1) urban/technocratic, (2) economic/production, (3) middle class/Euro-American, and (4) unidimensional /aggregated/short term. They reflect the social values of postindustrial nations that use foreign aid as a globalizing policy tool. As someone, for example, who witnessed Kathmandu 40 years ago when its "indicators" would have been low, and modern, polluted, and crowded Kathmandu today when its "indicators" are high, I can only marvel at why we give any credence to these presumably objective measures. A Gender Development Index (GDI) that shows that Bhotiya women are more deprived and excluded from access to basic resources than lowland Hindu or Muslim women is nothing short of silly. But, in fact, this is what the culture-free GDI shows for Nepal.

I have no argument with Kreutzmann's thesis that we need better data about mountainous areas vis-à-vis lowlands or the larger nation state. However, instead of building mountain-specific interdisciplinary comparative research around decontextualized indicators, why not design and create knowledge banks that reflect the realities and complexity of mountain communities?

As it stands today, mountain researchers continue to pile up isolated case studies, surveys, and statistics that are accessible to a select few. Such information is typically published in foreign languages or archived away and soon forgotten. It is urgent that "knowledge erosion" of mountain research be stopped through concerted institutional and individual efforts to build mountain-rich knowledge banks that include not only relevant indicators but also qualitative information on cultural context. Advances in computer software and interactive information technologies allow for a more accessible and permanently expanding knowledge base. An interinstitutional project at ICIMOD called "Mountain Agricultural Systems and Societies Files" (MASSIF) is demonstrating how such an in situ informational system would work. By starting from the uniqueness of mountain conditions—instead of forcing mountain realities into externally defined categories—we can move toward a true interdisciplinary science of mountains.

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