Focus Issue: Woodland Resurgence and Sustainability in Mountains—Patterns, Drivers, and Social-Ecological Consequences

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Dear Readers,

In recent decades, the resurgence of forests and other woodlands has become apparent in different regions of the world, challenging the perception of deforestation as the dominant land cover change pattern. Woodland resurgence has been particularly pronounced in mountain areas, where conditions limit the scope for agricultural mechanization and rural outmigration has favored land abandonment. In addition, many governmental and nongovernmental initiatives to promote forest management, restore forests, protect biodiversity, and conserve ecosystem services have focused on mountain areas.

While forest resurgence and its implications for sustainability have been documented in different mountain systems of the world, the underlying causes and drivers, as well as the social-ecological consequences, are less well-understood—and they are likely to differ from one region to another. In addition to typical forests, both natural and planted, other types of woodlands such as shrublands, open woodlands, or agroforestry systems such as trees on farmland are also expanding. However, as those woodlands feature smaller trees, they are less charismatic and more difficult to map via remote sensing than forests with tall trees and a dense canopy.

Changes in woodland cover are expected to have major impacts on social-ecological systems. These will affect hydrological cycles, carbon sequestration, habitat quality for biodiversity, and a variety of ecosystem services for human societies, be it locally (timber, fuel, fiber, food, medicinal plants, and landscapes for recreational activities), regionally (watershed protection), or globally (climate regulation). While mountains are a paradigmatic example of social-ecological heterogeneity, research on the social-ecological effects of woodland expansion often assumes relatively simple or common features, including that forests improve local livelihoods by providing resources or reducing soil erosion. Many of these assumptions may not hold up to local validation.

With this focus issue, MRD aims to contribute to a better understanding of woodland resurgence and sustainability in mountain areas. Articles published in this issue provide examples of the diversity of woodland resurgence in diverse mountain contexts across the globe. They also show the growing importance of restoration in woodland resurgence. In the MountainDevelopment section, Tina Christmann, Mayté López Aranda, and Jorge Recharte assess a model Polylepsis woodland restoration project led by the Instituto de Montaña in Aquia, Peru (https://doi.org/10.1659/mrd.2024.00017). They combine a document analysis with semistructured interviews to give a long-term view of project outcomes and sustainability. Based on this, they provide insights into the restoration procedures and outcomes, and identify key factors for restoration projects to be successful. Also in the MountainDevelopment section, Teruyuki Takahashi and Takuya Soma evaluate the impacts of a reforestation project in Nepal that integrated local ecological knowledge (https://doi.org/10.1659/mrd.2024.00015). Based on remote sensing and statistical causal interference methods, their findings suggest that the project not only enhanced canopy cover but also increased soil nutrient availability and organic carbon storage. They conclude that integration of local knowledge may have played a crucial role in these improvements.

The MountainResearch section features two pieces. In their study in the Annapurna Conservation Area of Nepal, Prakash Basnet and coauthors assess forest structural complexity based on handheld mobile laser scanning (https://doi.org/10.1659/mrd.2024.00009). They conclude that efforts to preserve or restore structural complexity in the forests of the Himalayas should adopt a mixed-species, multistoried forest management approach. They also highlight the importance of tailoring conservation and management strategies to the specific needs of the region. The second article takes us from forests into the domain of farmland trees and to the High Atlas Mountains in Morocco, where Chaima Mobarak and coauthors apply the cultural keystone species framework to assess the cultural and livelihood importance of five farm tree species (https://doi.org/10.1659/mrd.2024.00024). Their work illustrates the importance of farm trees' cultural status in conservation, stewardship of existing trees, and sustainable development in the region.

In the first of two contributions in the MountainPlatform section, Stefan Schneiderbauer and coauthors share their experiences from the first 5-year phase of Global Mountain Safeguard Research (GLOMOS), a joint scientific program between the United Nations University, Bonn, Germany, and Eurac Research, Bolzano, Italy (https://doi.org/10.1659/mrd.2024.00047). GLOMOS focuses on risks in mountains and the complex interrelations and interdependences of upland and lowland areas. In the second contribution, V. Ralph Clark and coauthors present the Malagasy Mountain Programme, a collaborative partnership between the Afromontane Research Unit at the University of the Free State in South Africa, Association Vahatra in Madagascar, and the University of Antananarivo in Madagascar (https://doi.org/10.1659/mrd.2024.00044). The program aims to attract interest in Malagasy mountains as social-ecological systems and is designed as a net for cooperative research, practitioner interventions, and policy impacts. Both GLOMOS and the Malagasy Mountain Programme invite cooperation and partnerships to conduct research and bridge science, policy, and practice for sustainable mountain development.

Changes in woodlands will continue to affect social-ecological systems in the future. Further research will be needed to understand conditions and approaches under which woodland cover can contribute to more sustainable socioeconomic and environmental outcomes.

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