

## Mountain Ecosystems and Communities Face Challenges Worldwide

An unprecedented global assessment examines climate, economic, and governance threats to mountain systems and the benefits they provide, suggesting pathways toward sustainability.

Source: Earth's Future



Herdsmen and their yaks in the Nyainqntanglha mountain range in central Tibet. Credit: J. A. Klein

By Sarah Stanley © 5 June 2019

More than half of the world's population relies on resources from mountain ecosystems, such as timber and water. Rising like islands above the lowlands, mountain systems face unique threats to their sustainability. New research by *Klein et al.* (<https://doi.org/10.1029/2018EF001024>) explores these threats at a global scale for the very first time.

illuminating strategies needed (<https://mountainsentinels.org/>) to improve sustainability. The work was led by Mountain Sentinels (<http://www.mountainsentinels.org/>), a group

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The project began with a workshop attended by experts from 12 different mountain systems, each with decades of experience. Working with additional scholars, the identified key facets of mountain systems around the world, including their common characteristics, stressors, paradoxes (such as being rich in resources but poor in benefits to humans). This collaboration enabled the researchers to build a conceptual model of mountain systems.

The scientists then explored how their conceptual model applies to mountain systems around the world. They surveyed experts from 57 systems across 37 countries for detailed data on land use, stressors, the role of local knowledge, and more. Using this information, they conducted a series of computational analyses to better understand the current state of mountain systems worldwide.

The analysis revealed that many mountain systems face both [abrupt threats](https://eos.org/research-spotlights/peering-beneath-the-powder-using-radar-to-understand-avalanches) (<https://eos.org/research-spotlights/peering-beneath-the-powder-using-radar-to-understand-avalanches>), extreme weather events and economic crises, and gradual threats, such as [climate change](https://eos.org/research-spotlights/how-will-melting-glaciers-affect-streamflow) (<https://eos.org/research-spotlights/how-will-melting-glaciers-affect-streamflow>) and [policy change](https://www.sciencedirect.com/science/article/abs/pii/S0959378014000557?via%3Dhub). The most widespread threat comes from policies implemented by people who live outside of mountain systems and may lack [important local knowledge](https://www.sciencedirect.com/science/article/abs/pii/S0959378014000557?via%3Dhub) (<https://www.sciencedirect.com/science/article/abs/pii/S0959378014000557?via%3Dhub>) about the mountain environment.

By categorizing mountain systems according to land use types, such as logging and tourism, the researchers were able to explore the different threats faced by different types. They found that mountain systems in the developing world where people's livelihoods are subsistence oriented—especially systems that mix agriculture and animal husbandry—are most at risk, despite the many benefits and resources they provide.

These findings point to the complex, cross-disciplinary, and cross-sector efforts necessary to ensure sustainability of Earth's mountain systems. The authors suggest for scientists, local stakeholders, and policy makers to collaborate on decisions about what an ideal future looks like for a given mountain system and how best to achieve it. They highlight the importance of filling gaps in knowledge about mountain systems while also addressing poverty and food security. (*Earth's Future*, <https://doi.org/10.1029/2018EF001024> (<https://doi.org/10.1029/2018EF001024>), 2019)

—Sarah Stanley, Freelance Writer

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