

>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

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Abstract

Mountains are sentinels of climate change, and their ecosystems and people are among the particularly affected ones. However, so far, a comprehensive overview of the extent to which environmental and human systems in mountain regions have been affected by recent anthropogenic climate change has been missing. This information, however, is crucial to a better understanding of the implications, rate and scale of climate change in mountains, and to the design of adaptation strategies that consider that diversity of social, physical and ecological systems in the world's mountains.

Here we report on an unprecedented effort undertaken in the framework of the 6th Assessment Report of the IPCC to detect observed impacts of climate change in mountains regions across all continents and to attribute them to anthropogenic climate change. We applied an extensive review of peer-reviewed and grey literature and identified more than 300 samples of impacts (aggregate and case studies). The role of anthropogenic climate change is evaluated against different drivers of change, using multiple lines of evidence, including data from several gridded observational climate products and global climate models, documented behavior of natural and human systems, local knowledge and system understanding.

We show that a wide range of natural and human systems in mountains have been affected by climate change, including the cryosphere, the water cycle and water resources, terrestrial and aquatic ecosystems, energy production, infrastructure, agriculture, health, migration, tourism, community and cultural values and disasters. Our assessment documents that climate change impacts are observed in mountain regions on all continents. We find that anthropogenic climate change has a clear and discernable fingerprint in changing natural and human mountain systems across the globe. In the cryosphere, ecosystems, water resources and tourism the contribution of anthropogenic climate change to observed changes is significant, showing the sensitivity of these systems to current and future climate change.

We highlight the inclusion of a substantial number of place-based insights from local/indigenous communities representing important alternative worldviews. In fact, our analysis reveals the need to consider the plurality of knowledge systems through which climate change impacts are being understood in mountain regions. Such attempts at inclusivity, which addresses issues of representation and justice, should be deemed necessary in exploring climate change impacts.