MOUNTAINS AND CLIMATE CHANGE

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Human activities are profoundly affecting the world's climate, and mountains are a sensitive indicator of that effect. Many scientists believe that the changes occurring in mountain ecosystems may provide an early glimpse of what could come to pass in lowland environments, and that mountains thus act as early warning systems. For this reason, understanding how climate change affects mountains is vital as governments and international organizations develop strategies to reverse current global warming trends. Because of their altitude, slope and orientation to the sun, mountain ecosystems are easily disrupted by variations in climate. As the world heats up, mountain glaciers are melting at unprecedented rates, while rare plants and animals struggle to survive over ever diminishing areas, and mountain people, already among the world's poorest citizens, face greater hardships. Changes in the depth of mountain glaciers and in their seasonal melting patterns will have an enormous impact on water resources in many parts of the world. As glaciers melt and retreat, life forms are also profoundly affected. But it's not just glaciers that are affected. Given that 23 percent of the earth's forest cover are mountain forests and that these contain considerable quantities of carbon as well as providing ecosystem services, climate change is also a major issue for those managing the forests as well as the forest dependent communities. Evidence of climate change impacts have also been reported in dryland mountain ecoregions, likely to have a very adverse impact on agriculture, water resources, ecosystem production and human health.

Shifting climate patterns

Each day, the burning of fossil fuels produces greenhouse gases that enhance the heat-trapping capability of the Earth's atmosphere, gradually raising the planet's temperature. Some climate models predict that average global temperatures will rise between 1.4 and 5.8°C by 2100 and temperature increases will be greater close to the Poles. Among the consequences foreseen, fierce storms will become more frequent, sea levels are expected to rise, causing floods and untold damage to island nations and low-lying coastal communities, and droughts and forest fires will all become more frequent.

Mountain people, as well as many other animal and plant species, will have to adapt to changes. At the same time, mountains will become more dangerous as melted permafrost and glacial run-off accelerate soil erosion as well as the likelihood of falling rocks, landslides, floods and avalanches. Extreme events and catastrophes, as well as infectious diseases – carried by insects that are spreading to higher altitudes as temperatures warm - are predicted to become more and more common. With few resources, mountain people are likely to be among global warming's greatest victims if human activities that contribute to climate change are not soon reversed.

Why mountains are so indicative?

Mountains exist in many regions of the world. They occupy very different positions on the globe and they differ in shape, extension, altitude, vegetation cover, and climate regime. They will therefore be affected differently by climate change. However, they share some common features relating to climate change: firstly, mountain areas have a marked and complex topography and so their climates vary considerably over short distance. Secondly, temperature changes with altitude. The impacts of a warmer climate are different for different elevations. Thirdly, melting of glaciers and permafrost will trigger the release of loose rock and soil and exacerbate the danger of rockfall, debris flows, and mud flows. A specific risk is the build-up of glacial lakes and the threat of lake outbursts, which could result in destruction of property and death. Fourthly, mountains themselves play a major role in influencing regional and global climates. They act as barriers for wind flow but changes in atmospheric wind flow patterns may induce large and locally varying precipitation responses in mountain areas, which could be much stronger than average regional climate change (IPCC 2007a).

Mountains and Climate Change: A Global Concern

Mountains provide freshwater to half of the world's population. Climate change will affect the availability of water and will have important implications for irrigation, urbanization and industrialization, and hydropower generation. This will mean using water more efficiently, increasing storage capacities, and establishing, or re-visiting, institutional arrangements for sharing water equitably within and between nations. Climate change is also likely to increase this exposure to hazards in mountain areas, as extreme events such as storms, landslides, avalanches, and rockfalls are likely to become more common and more intense, threatening both livelihoods and infrastructures. Hazards cannot be prevented, but mountain regions can be supported in managing the risks emanating from these hazards. Moreover, half of the global biodiversity hotspots are in mountain regions. Impressive achievements have been made in safeguarding the heritage they represent. Mountains are home to about 12 percent of the global population. The large majority of mountain people live in developing countries. One third of them are food-insecure, a high proportion in global comparison. External support is needed in order to reduce poverty levels. Climate change might also hold prospects for mountain agriculture and forests, provided that water, land, labor and capital through credit schemes or remittances from migrants are available to exploit such opportunities, and that access to markets is assured.

The way forward

Climate change action must be embedded into a more general framework as provided, for example, by the concept of sustainable development. Specific and tailored strategies will therefore be needed when it comes to climate change action. Rio+20 has represented an unmatched opportunity to put mountains, their populations and the goods and services they provide under the spotlight. Policy makers have been looking to deliver on their promises for human well-being and natural prosperity ("the future we want"), and to make Mountain Services a key priority for action in a post Rio+20 world. While, at the national and regional levels, there is a growing number of Payment for Environmental Services (PES) programmes relating to watershed management, water regulation for hydropower and irrigation, biodiversity conservation, and hazard prevention. Research is also pivotal inasmuch as it sensitizes policy-makers and the public about climate change in mountains and its implications in wider highland-lowland interactive development contexts. Research should also focus on designing integrated mitigation and adaptation measures. Now it's the time for action in addressing climate change issues in mountains. This could help transform currently perceived problems into opportunities for a better future in mountain regions and in the many lowland areas that depend on their services.

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