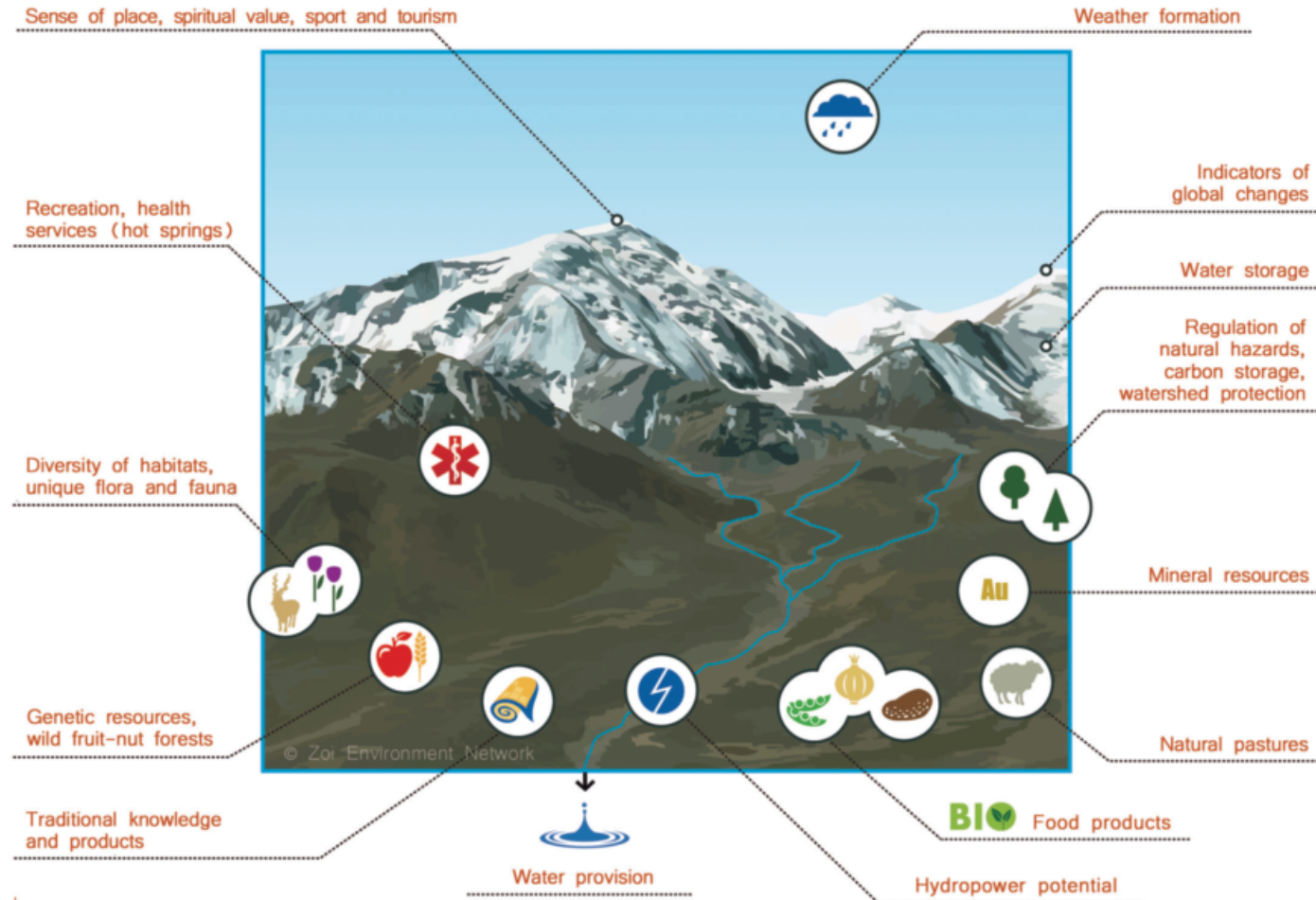


MOUNTAIN ECOSYSTEM GOODS AND SERVICES



Contributing Organizations:



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WHY MOUNTAINS MATTER FOR CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION

A CALL FOR ACTION ON THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)



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CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION (DRR) IN MOUNTAINS: A CALL FOR ACTION ON THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Sustainable mountain development should be a global priority given the multitude of ecosystem goods and services that mountains provide; among the most important is water for half of humanity for drinking, irrigation and energy production. These ecosystem services – as well as the mountain people who are their custodians and beneficiaries – are particularly vulnerable to the impacts of climate change and natural disasters yet there are also direct consequences for downstream regions.

Following the call for sustainable mountain development in Chapter 13 of Agenda 21, the action plan endorsed by the 'Earth Summit' in 1992 and the recent Rio+20 outcome document, "The Future We Want", mountain issues need to be covered by the SDGs, especially the goals concerning poverty, environmental sustainability, water, energy, climate change and natural disasters.

The following actions are needed to protect fragile mountain ecosystems and communities¹, in particular, in developing countries:

- ➔ Increase global awareness of the threat climate change and natural disasters in mountain regions pose to sustainable development; also, the socio-economic and environmental impacts climate change and natural disasters have on human well-being and on both mountain and downstream environments;
- ➔ Recognize mountains as early warning indicators of climate change;
- ➔ Consider approaches to address loss and damage associated with climate change impacts in mountains, taking into account the UNFCCC Work Programme on Loss and Damage;
- ➔ Recognize that the unsustainable use of natural resources and ecosystems in mountains limit their ability to curb the impacts of climate change and natural hazards;
- ➔ Strengthen the sustainable use of natural resources in mountain areas and adopt integrated, multi-sectoral ecosystem management approaches including climate change adaptation, which can benefit mountain communities as well as downstream areas;
- ➔ Enhance data availability and accessibility related to climate change and natural disasters and promote climate risk assessment methods for mountain regions;



¹ While these recommendations specifically refer to mountain regions, they might also apply to other regions.

➔ Create and improve adequate policies and frameworks particularly at the transboundary level and provide incentives for investments in sustainable development in mountain countries including for climate change adaptation and disaster risk reduction, and spur opportunities for Public Private Partnerships;

➔ Support the development of sustainable solutions and practices in the fields of water, food security, renewable energy and energy efficiency in mountain areas which will provide benefits for climate change adaptation and disaster risk reduction, while considering the needs and priorities of men and women who reside in mountain areas;

➔ Support the establishment of mountain-related targets and indicators for goal areas related to poverty, environmental sustainability, water, energy, climate change and natural disasters:

REFERRED GOAL	PROPOSED TARGETS	PROPOSED INDICATORS
Poverty	"Eradicate extreme poverty within mountains."	Proportion of mountain people living below the national poverty line.
Environmental Sustainability/ Climate Change/ Natural Disasters	"By 2030, build resilience and reduce affected populations and losses from natural disasters in mountain regions by 50 percent."	Number of national disaster risk reduction plans specific to mountains adopted and referenced in national development plans. Number of men, women, children killed by hazard type and socioeconomic group as proportion of population exposed. Percentage of communities implementing an integrated risk management approach. Percentage of communities with an early warning system in place.
Environmental Sustainability/ Water	"Safeguard mountain ecosystem services and biodiversity, and ensure good management of water and other natural resources."	Plans of sustainable management for mountain ecosystem resources such as water and soil. Number of countries incorporating and supporting mountain specific ecosystem-based management and adaptation approaches. The proportion of degraded mountain ecosystems restored, ecosystem resilience built and the contribution of biodiversity to carbon stocks enhancement.
Energy	"By 2030, increase the share of sustainable energy in the energy mix, including the adoption of adequate safeguards, especially in mountain countries." "By 2030, double the global rate of improvement in energy efficiency in buildings, industry, agriculture and transport in mountain countries."	Share of sustainable energy within the overall energy mix. Global rate of improvement in energy efficiency in mountain countries.

CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN MOUNTAINS: KEY FACTS AND FIGURES

The Challenges

People living in mountain regions, as well as downstream populations, are vulnerable to multiple hazards and natural disasters, due to the steep topography, remoteness and highly variable climatic conditions of mountain regions.

People living in mountain regions are among the world's poorest. 245 million mountain people are threatened by food insecurity. The mountain poor are mainly dependent on subsistence agriculture and livestock, making them especially vulnerable to deviations from average climate conditions and climatic extremes.

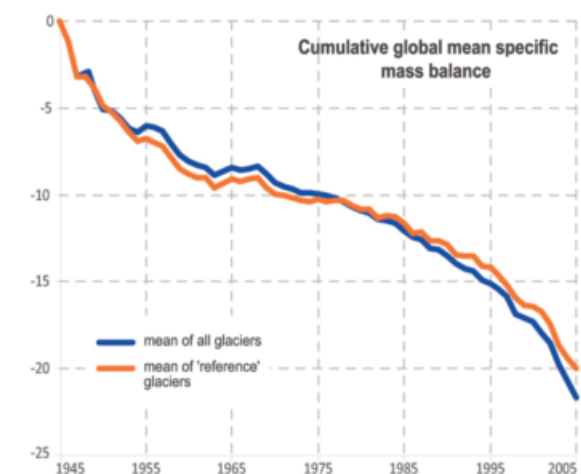
Mountains of the world are the water towers of the world, but climate change poses a serious threat to their ability to provide freshwater and other ecosystem goods and services for millions of people downstream – threatening food security, agriculture and energy production. Glaciers and snow lock up precipitation during the winter or rainy season, and release water regularly during the dry season – when it is most needed by downstream populations. However, almost globally, glaciers continue to shrink due to climate change. Shifts in precipitation patterns in mountains can cause widespread disruptions of freshwater availability, which could lead to sudden floods as well as severe droughts and water shortages.

Disasters and ecosystem degradation in mountain regions can have long-term consequences for human development: Mountain communities are particularly vulnerable to natural hazards, which are a common feature of mountain environments. Earthquakes, landslides, heavy rainfall and floods and glacial lake outburst floods (GLOFs) can destroy lives and livelihoods especially when infrastructure and settlements are built in hazardous areas. Climate change is making rainfall patterns more irregular and is increasing the probability of extreme droughts and flooding events. In many areas, ecosystem and livelihood resilience has already been reduced due to pressures from unsustainable extractive industries, increased urbanization, changing farming practices – such as an increase in mono-cropping and loss of agrobiodiversity, and the clearing of marginal lands (e.g. on steep slopes).

Human health can be directly affected by climate change in mountains: Higher temperatures may affect the health of humans and livestock through heat-stress and the emergence of "lowland" diseases (e.g. malaria, as already reported from East Africa and the Andes); floods can bring water-borne diseases such as cholera, and reduced water quality can lead to poor sanitation and increased incidences of health problems.

The opportunities: Enhancing adaptation and resilience within mountain communities and ecosystems

Mountain communities have a wealth of knowledge and strategies, accumulated over generations, on how to cope with harsh environments and to adapt to climate variability. Mountain communities should not be viewed simply as vulnerable: they also have rich experiences and indigenous solutions to



In most regions of the world, glaciers are losing mass, although a few exceptions do occur e.g. in the Karakoram range". Graphic source: GRID-Geneva.

many climatic and non-climatic challenges. Adaptation strategies should recognize and build on such knowledge. Traditional knowledge should be coupled with advances in technology, including early warning systems for hydro-meteorological disasters.

When mountain ecosystems are managed sustainably, they can continue to provide essential regulating services that act as buffers against climate change and natural disasters. For example, improving the resilience of mountain ecosystems by preventing soil erosion and maintaining mountain meadows and forests, can help protect people in downstream areas from landslides and flash floods. Ecosystem-based adaptation for mountain ecosystems is an emerging approach that helps mountain communities to conserve, restore and sustainably manage key ecosystem goods and services. Identifying and projecting key climate change impacts on these ecosystems, as well as strong community engagement, are key elements of this strategy. In some cases, climate change may have positive impacts, including milder climates, which benefit cropland and pasture.

Enhancing the role of women in adaptation and disasters risk reduction will lead to more resilient mountain communities. In addition to disaster risk reduction efforts, adaptation programmes in food security, agriculture, rangelands and managing natural resources, as well as efforts in disaster risk reduction, should be implemented in ways that are sensitive and responsive to the different and multiple roles women and men play in various spheres of natural resource management, as well as their households, communities, livelihoods, and customary and statutory institutions and relations (local, national, regional and global).

Reducing emissions of short-lived climate pollutants to reduce warming

Black carbon alone is responsible for about half (0.6°C) of the warming across the Tibetan Plateau and the Himalayas since the 1950s. Providing alternative energy-efficient solutions such as clean cooking stoves, proposing sustainable non-wood energy sources and introducing technology for reducing soot emissions from coal combustion in small industries could have major impacts on the radiative forcing due to soot, reducing warming significantly in mountain regions. Measures should especially target lowland areas, as these are the most heavily populated and industrialized.