



# **Responding to climate change in the mountains:** Opportunities for parliamentarians to act



Market day in El Alto, Mt Huayna Potosi (centre) and Mt Chacaltaya (right) in background, La Paz, Bolivia. © James Brunker / Alamy Stock Photo

Mountains are vital ecosystems for people and the planet. They provide freshwater for half of the world's population and host rich biodiversity and cultural importance for communities around the world. Unfortunately, they are also facing some of the clearest indications of climate change – rapid temperature warming and melting glaciers, more frequent and intense natural hazards, and changing precipitation patterns that can have severe impacts on ecosystems and human wellbeing.

Mountains are also particularly vulnerable to these impacts, with rugged conditions and a lack of adequate infrastructure to adapt to worsening conditions. These factors threaten livelihoods and may be a source of conflict and displacement in the future, creating further challenges to be dealt with. Moreover, the consequences of climate change in the mountains do not remain in the mountains, but spread throughout the lowlands and reverberate across countries and regions around the globe. As climate warming continues, these consequences are intensifying.

The purpose of this issue brief is to help parliamentarians respond effectively to these conditions by providing them with an understanding of how climate effects in the mountains create downstream repercussions, and by identifying policies and actions they can take across the range of potential impacts. Parliamentarians are responsible for representing the mountains in their countries, and their decisions often have long-term impacts on mountainous environments and the people who live there.

# Conditions in the mountains

About 15 per cent of the world's population, or 1.2 billion people,<sup>1</sup> live in mountain regions. About 90 per cent of these people live in developing countries, and about 65 per cent live in rural areas. In general, poverty levels are higher in mountain areas, and food insecurity threatens some 346 million people.<sup>2</sup> More than 100 countries have mountains, and many others depend on mountains in neighbouring countries for ecosystem services such as freshwater supply.

Increasing temperatures in the mountains are accompanied by changes in seasonal weather patterns. the melting of glaciers, the thawing of permafrost, and reductions in the extent and duration of snow cover. Even in the best-case scenario, half of the world's glaciers are projected to disappear by the end of the century, increasing sea level by 115 millimeters and putting more than 10 million people below the high tide line. Glaciers also store 70% of the world's freshwater, providing water supply for up to 2 billion people. Additionally, the number of extreme precipitation events is increasing, threatening communities and ecosystems with flooding and destabilizing slopes. Other areas that face a reduction in precipitation are at risk from droughts, impacting agriculture and livelihoods.

These conditions increase the potential for compounding and cascading hazards - floods, landslides and debris flows - that grow more intense as they move downhill. The results can include dam failures and damage to roads and infrastructure. Losses of property, livelihoods and lives can occur in the mountains and far downstream, and may cross international borders.

Warmer temperatures and drier conditions increase the occurrence and severity of wildfires, the effects of which include a reduction in the quantity and quality of freshwater, the loss of habitat that supports biodiversity, and an increase in soil erosion and landslide risks. The earth experienced its hottest three-month period on record in 2023, with wildfires raging in Algeria, Canada, Greece, Italy, and Spain, causing evacuations and subsequent increased emissions. Such wildfires also displace and kill animals, and compound the risk of extinction for species that need to move to higher elevations or other cooler locations to adjust to the warming climate.

Changing patterns in the timing and extent of the seasons are undermining mountain tourism, particularly for winter recreation by reducing snow availability in ski resorts. Reductions in the amount of snow at lower elevations have made operating conditions difficult, and climaterelated hazards are creating more risks along climbing, hiking and mountaineering routes.

#### Political representation: Proportion of national electoral districts in mountain areas



c Constituency-Level Elections Archive (CLEA), Center for sity of Michigan; A hierarchical inventory of the world's m comparative mountain science. Nature Scientific Data 20

#### **RESPONDING TO CLIMATE CHANGE IN THE MOUNTAINS**

<sup>1</sup> https://genevasolutions.news/climate-environment/the-world-s-one-billion-mountain-people-speak-out#:~:text=Why%20do%20we%20 talk%20about,65%25%20in%20rural%20areas

<sup>2</sup> https://www.fao.org/documents/card/en/c/cb2409en



#### Upstream-Downstream Linkages: why mountains matter for the lowlands

### Downstream consequences

Everyone living downstream has a direct or indirect stake in the effects of climate change in the mountains because everyone benefits in one way or another from the ecosystem services provided by them. Direct beneficiaries include the 2 billion lowlanders who depend on the mountains to deliver freshwater. Indirect beneficiaries include anyone who eats food grown on the 68 per cent of irrigated agriculture worldwide supported by mountain water.<sup>3</sup> In the short run, disruptions of water supplies in the mountains thus potentially affect countless millions in terms of water and food security and general well-being. In the long run, the disruptions may affect billions.

Changes in water flows can threaten hydropower generation and thus reduce the potential of renewable energy. The repercussions for a transition to green energy and the renewable energy sector may carry economic consequences at the local, national and global levels. Mountains harbor important biodiversity areas and provide reservoirs for agricultural biodiversity. Mountain forests, which account for up to 28 per cent of natural forest cover worldwide, provide natural carbon sequestration – the capture and storage of carbon. These resources provide refuge for endemic and threatened plants and animals, sustain genetic diversity, and help reduce the frequency and severity of downstream flooding.

Mountains provide recreation and tourism opportunities, and in 2019, mountain tourism contributed an estimated \$1.4–1.9 trillion to global GDP. Some visitors come to connect with their cultural heritage or out of a spiritual affinity with the mountains. Regardless of what draws the visitors, mountain tourism contributes to economic development and to the well-being of visitors and residents alike.

# Opportunities for parliamentarians

Despite the many examples of successful adaptation efforts in the mountains, the Intergovernmental Panel on Climate Change (IPCC)<sup>4</sup> finds that current global adaptation efforts are insufficient, and suggests that decision-making processes engage local people and incorporate their concerns and values into projects. The IPCC also suggests that projects that address multiple risks are more robust than those with a single focus. For example, a water resource management project in Rwanda<sup>5</sup> aimed to address flooding and erosion issues by introducing terraces to slow the inflow of water and minimize flood-related damage. The project also factored in agricultural and water resource needs in its planning, bringing in water harvesting tanks and controlling water flows on farmland. This project demonstrates how a risk management strategy can incorporate the needs of different sectors to be more successful in addressing overall adaptation concerns. The IPCC further finds that regional cooperation and transboundary governance can help enable long-term adaptation actions.

The IPCC has identified that most adaptation options are currently being implemented on the individual or community level, rather than being institutionally driven. While these actions yield notable results, their scale prevents meaningful, country-wide impacts. As many of the aforementioned challenges can have significant impacts on large populations (natural hazards, water resource concerns, and food insecurity), they require a large-scale approach to target the root causes of vulnerability and develop coherent risk reduction strategies. With their legislative, budgetary, oversight and representation functions, parliamentarians have key roles to play in accelerating climate action in mountain areas. As representatives of the people, parliamentarians can help ensure that the needs of their constituents affected by climate change in mountain areas are addressed in decision-making processes. They can prioritize legislation that explicitly supports climate action in the mountains, and allocate adequate funding to mountain-specific adaptation efforts. Legislation in spatial planning and development is key for sustainability and priority setting of climate change adaptation in mountains.

Among the most pressing issues facing parliamentarians are strengthening water management, ensuring food security, promoting biodiversity conservation, addressing migration and displacement, and adopting a gender and social inclusion perspective. By addressing these issues, parliamentarians can support the upland and lowland communities that depend on the mountains for their health, security and well-being. These issues also reinforce each other; water supply affects food security and biodiversity and can lead to eventual displacement in instances of intense stress, while inclusive approaches to addressing these issues tend to shed light on more effective conservation and resource management, simultaneously helping to address the root causes of migration.

4 The United Nations body for assessing the science related to climate change has 195 Member countries.

5 <u>https://adaptationataltitude.org/solutions-portal/getting-slopes-in-shape-the-ewmr-pilot-project-in-rwanda</u>

# Water Management



More than half of the global population relies on mountains for freshwater for consumption, agriculture and energy. As climate change disrupts the water cycle in the mountains, both the uplands and the lowlands are experiencing more frequent and severe flooding and periods of water shortages. The melting of glaciers adds more uncertainty – more water in the short term, causing instances of flooding and less in the long term, putting water resource availability at risk. Competing uses across international borders raise the stakes, and may lead to conflicts. Cooperation on water use may be essential to the well-being of water users both upstream and down.

#### Actions that parliamentarians can take:

- Adopt legislation that improves water management in the mountains and provides legal protection for access to clean and safe drinking water, including for remote, Indigenous and minority communities. Factors to consider would be preventing water over-use or pollution, putting in place mechanisms to prevent or respond to extreme events such as floods and droughts, and implementing plans that account for local needs.
- Promote the development of upstream-downstream cooperation on the management and allocation of water resources within national boundaries. Water governance traditionally focuses on one portion of the water cycle, causing fragmented and ineffective strategies. Management plans should factor in needs at all stages from the water source to the downstream communities using water for consumption or agriculture.
- 3. Promote the development and ensure the implementation of regional water management agreements that govern the use of water resources shared across borders, and that establish cooperation on monitoring, data exchange, disaster risk management and mutual assistance during periods of water scarcity. With many rivers traversing borders and supplying multiple countries

with a source of water, it is vital that regional collaboration takes place to avoid conflicts and mismanagement of these systems. Parliamentarians can consider existing regional frameworks or promote dialogue with neighboring countries on these issues.

#### Water management in Central Asia<sup>6</sup>

The Ministries of Agriculture and Water Resources in Turkmenistan and Uzbekistan developed an interministerial agreement between the countries to foster cooperation on water management on the lower Amu Darya River. The agreement responds to the competing demands – agriculture, hydropower, and ecosystem preservation – and to a diminishing water supply due to climate change with a collaborative, joint approach to the management of these transboundary waters. The agreement covers the co-management and decision-making on shared water resources, cooperation on flood management, the sharing of information, and joint responses to emergencies with transboundary impacts.

### **Biodiversity conservation**



Half of all global biodiversity hotspots are in the mountains, and mountain biodiversity represents one-quarter of all terrestrial biodiversity.<sup>7</sup> Rising temperatures are pushing the tree line upwards and forcing animals and plants to seek higher ground. The loss of forests converted to agricultural uses or destroyed by wildfires brought on by hotter, drier conditions can exacerbate the biodiversity losses. Preserving mountain biodiversity sustains mountain tourism opportunities, protects cultural heritages and conserves crop wild relatives and other plant resources that may loom large in the development of medicines.

#### Actions that parliamentarians can take:

- Adopt legislation that employs nature-based solutions<sup>8</sup> in the conservation of biodiversity. Climate resilience can be enhanced through an ecosystem-based approach, such as through planting buffer zones to protect habitats, restoring ancient water management systems, and conserving wetland areas to revitalize other species. These actions can be incorporated in legislation that focuses on adaptation and conservation simultaneously.
- Allocate budgets that support ecosystem-based adaptation such as afforestation,<sup>9</sup> reforestation and improved forest management to reduce the risks of shallow landslides; river restoration to reduce the risks of floods; and natural resources management that identifies and protects key biodiversity areas.
- Ensure that the biodiversity knowledge of local communities, especially Indigenous mountain communities, is reflected in decision-making processes and dialogues on climate change.

#### Indigenous knowledge in Canada<sup>10</sup>

Under a recent programme, the Canadian government is ceding large portions of the country's boreal forests to Indigenous communities, and is providing financial resources to establish and manage the conservation of protected areas. These forests are home to 70 per cent of Canada's Indigenous peoples,<sup>11</sup> and the 50 Indigenous communities designated to oversee these areas bring vital knowledge to the effort to combat deforestation and protect carbon sinks that store about 208 billion metric tonnes of carbon – some of the largest carbon sinks in the world.

- 7 https://link.springer.com/chapter/10.1007/978-3-642-20992-5\_1
- 8 Nature-based solutions: actions that address socio-environmental challenges through the protection, sustainable management, and restoration of ecosystems that benefit the environment and human well-being
- 9 Afforestation: the process of establishing a forest on land where there was previously no tree cover
- 10 https://www.nytimes.com/2022/11/16/climate/canada-climate-change-indigenous-people.html
- 11 https://natural-resources.canada.ca/our-natural-resources/forests/sustainable-forest-management/boreal-forest/13071

# **Food security**



Many mountain communities rely on agriculture for their household needs and for generating income. Rising temperatures and disrupted precipitation patterns are changing the growing conditions in the mountains, and landslides and other natural hazards can diminish the productivity of agricultural land. Adaptation strategies aimed at improving food security in the mountains need to take into account the current and projected changes in the availability of water, higher temperatures, an increase in pests, and a reduction in pollinators. The relationship between the mountains and the food security of people living in the lowlands is primarily a water management issue, and adaptation projects in the mountains need to consider how the project outcomes will affect the interests of downstream water users.

#### Actions that parliamentarians can take:

- Allocate budgets that support investment in sustainable farming technologies, expansion of rainwater collection, and research and development on the adaptation of crops to evolving climate conditions.
- Enact legislation on climate-resilient agriculture that reduces water consumption, stabilizes food production, and minimizes the environmental footprint of agrifood systems.
- 3. Ensure the representation of diverse groups to evaluate needs and find solutions. This may include those who have disproportionate risk of hunger and malnutrition, including women, children, and remote and Indigenous communities, in order to support social protection schemes to promote their food security and health. This could also actively involve women who are responsible for food production and agricultural labor to ensure that different voices are adequately engaged in planning.

#### Livestock insurance in Kenya and Ethiopia<sup>12</sup>

In order to combat financial losses related to drought, the governments of Kenya and Ethiopia have allocated resources to provide payouts to pastoralists who are insured under the Pilot Livestock Insurance Program. The initiative takes an innovative approach to assisting nomadic pastoralists in the most heavily affected areas. The insurance payouts allow them to purchase animal feed and water, procure animal health care services, or move animals where necessary. Livestock is a key component for both food security and the economy in both countries, and supporting pastoralists helps ensure that poorer members of the community have the necessary protections against hazards as well.



# **Migration and displacement**

A shortage of economic opportunities leaves mountain people in poverty and without adequate livelihood options. Many people, particularly men, seek work abroad, and their remittances can be an important part of household income. As climate change worsens the conditions in the mountains, more men may leave for work elsewhere. The separation of families creates its own set of pressures, and the women left behind face growing challenges in managing their households. In addition to this economically driven migration, natural hazards - landslides, avalanches, droughts, wildfires and floods - are causing temporary or permanent displacement of entire populations. The out-migration of people from mountain areas can create pressure within host communities in lowland areas in terms of livelihoods, natural resources, healthcare and social services.

In addition to agriculture, tourism provides a significant number of jobs in the mountains, and represents an important economic sector. Adaptation projects that work to protect both agriculture and tourism or diversify employment opportunities may help arrest the outmigration from the mountains as both of these sectors are under threat due to climate change.

#### Actions that parliamentarians can take:

- Allocate budgets that support the development and implementation of comprehensive disaster risk reduction plans – early warning systems, flood controls, hazard reductions, and other prevention and protection initiatives – and that raise the awareness of those living downstream about how adaptation in the mountains protects them as well.
- Enact legislation that supports mountain areas financially through social benefits, livelihood diversification programmes, transfer payments, tax cuts, and other incentives designed to provide financial stability to mountain households and communities.

3. Advocate for the rights of migrants and displaced populations who have moved to lowland areas and ensure host communities are equipped with adequate resources and support to accommodate them so that the well-being of all groups is promoted.

#### Financial benefits in Georgia<sup>13</sup>

The Parliament of Georgia adopted a law establishing benefits for people living in high mountain regions in order to ensure their well-being, raise their living standards, promote employment, and improve their social and economic conditions. The law provides for direct payments and tax privileges, and establishes a high-level National Mountain Development Council chaired by the Prime Minister with representatives from relevant government departments, and with at least half of the Council members being from high mountain regions.

# Gender and inclusion



The IPCC finds little evidence that adaptation in the mountains is affecting the underlying determinants of vulnerability - such as gender and ethnicity - yet women and Indigenous peoples are among the groups most vulnerable to climate change. These groups are also important actors of change for adaptation, bringing in new perspectives and knowledge that help resilience planning. The IPCC suggests that utilizing inclusive and comprehensive adaptation approaches can be more successful, and notes that local stakeholders often have different climate risk priorities. Rather than look for projects that target gender inequities or exclusionary practices, parliamentarians may extend their reach by incorporating gender and inclusion elements into every project, with the goal of empowering these groups throughout the adaptation process. Local knowledge can inform the development of potential adaptation solutions that meet the needs of the intended beneficiaries.

#### Actions that parliamentarians can take:

- Enact legislation that mainstreams gender and inclusion considerations into the development, implementation and oversight of all mountain projects by specifying requirements for the participation of women stakeholders.
- Adopt policies that apply a gender-responsive approach ensuring that projects and programmes consider gender norms, roles and inequalities, and that take measures to actively address them.
- Ensure that planning incorporates the interests of women and other vulnerable groups by engaging them in a participatory planning process, such as local-level meetings or roundtable discussions.

#### Mainstreaming gender

In Nepal, the International Centre for Integrated Mountain Development is collaborating with the Commonwealth Scientific and Industrial Research Organisation to improve the gender mainstreaming capacities of collaborators and stakeholders in the Kamala Basin Water Resources Development Strategy.<sup>14</sup> In a similar effort, the Organization for Security and Co-operation in Europe is working in Central Asia on gender mainstreaming in Integrated Water Resources Management.<sup>15</sup> And South Sudan has responded to climate challenges with a National Action Plan that emphasizes gender inclusivity and the promotion of women's representation.<sup>16</sup>

15 https://www.osce.org/oceea/465531

<sup>14</sup> https://www.icimod.org/news/supporting-the-kamala-basin-water-resources-development-strategy-implementation-project/

<sup>16</sup> https://adaptationataltitude.org/knowledge-base/adaptation-in-mountains/webinar-women-move-mountains-in-adapting-to-climate-change

## In summary

The rationale for parliamentary interest in climate change in the mountains is clear. Climate change threatens the water, food, and energy security of those who live in the mountains, and directly affects some 2 billion people who live in the lowlands and depend on mountain ecosystem services. The many other people affected indirectly include those who eat food grown on the 68 per cent of irrigated agriculture worldwide supported by mountain water.

Parliamentarians have opportunities to respond to the climate challenges across a range of issues – water management, biodiversity conservation, food security, migration and displacement, and gender and inclusion – and to tailor their responses by enacting legislation, allocating budgets and adopting policies that target specific needs in their constituencies.

# **Post Script**

The barriers to constitutional solutions may be significant in many countries, but where the opportunities exist, parliamentarians have an inspirational example to follow. The constitution of Bhutan makes every citizen a trustee of the nation's natural resources for the benefit of present and future generations, and establishes a fundamental duty of each citizen to actively contribute to the protection of the natural environment, the conservation of the country's biodiversity, and the prevention of ecological degradation.

It also mandates that at least 60 per cent of Bhutan's total land be forested, and it empowers the Parliament to enact legislation to ensure the realization of this requirement. Consequently, Parliament has taken significant strides in implementing and enforcing measures that contribute to the protection of Bhutan's natural heritage and the promotion of sustainable practices.

Where amending the constitution is not a viable option, parliamentarians may still use the Bhutan example as a guide for developing policy and legislation.

#### **Resources and guidance**

The Adaptation at Altitude programme of the Swiss Agency for Development and Cooperation provides guidance to policymakers on the risks that mountain communities face. Adaptation at Altitude and the Inter-Parliamentary Union (IPU) have collaborated to ensure that parliamentarians have access to accurate resources on how to address climate change and support adaptation in the mountains in their countries.



The IPU facilitates parliamentary diplomacy and empowers parliaments and parliamentarians to promote peace, democracy, and sustainable development around the world. The IPU mobilizes parliaments through climate-related resolutions and enhances their capacity to address climate change through knowledge-sharing and training programmes leading to increased awareness, stronger climate legislation, and greater commitment to climate action.

The IPU's recently launched campaign, <u>Parliaments for the Planet</u>, encourages parliaments and those who work in them to lead by example, reduce their own carbon footprint and take concrete measures to implement the Paris Agreement on climate to limit global warming to 1.5 degrees Celsius.

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