



Climate Change and the Hindu Kush-Himalayan Rangelands

INFORMATION SHEET #8/09

Climate change has strong direct and indirect impacts on the Hindu Kush-Himalayan rangelands and on the pastoralists who depend on them. Over thousands of years, pastoralists have developed their own ways of coping with the uncertainties involved in pastoral production, but these strategies are not enough to cope with the current environmental and socioeconomic changes. Although rangelands represent the major ecosystem in this mountain region, there is a lack of clear and detailed information about their status and functions and the impacts of climate change, and it is difficult to develop appropriate recommendations for adaptation approaches. ICIMOD's regional rangeland programme will focus on developing a regional knowledge base on climate change impacts in the Hindu Kush-Himalayan rangelands and providing an orientation for adaptation activities by key stakeholders in the region.

Rangelands of the Himalayan region

Rangelands in the Hindu Kush-Himalayas, the world's highest mountain region, are the source of livelihoods for some 25 to 30 million pastoralists and agro-pastoralists. They also play a significant role in storage and regulation of water; storage of carbon in soil and peatlands; and stabilisation of climate, soil,

Rangeland means the type of land that is suitable for grazing by wild or domesticated animals and is maintained as a quasi natural ecosystem, with the predominant vegetation either grass alone or grass together with shrubs and/or scattered trees.

and nutrients. They nurture a rich biodiversity with many species of fauna and flora endemic to the region; provide clean air and open spaces for recreational purposes, and support a rich cultural diversity. The ecosystem services provided by these rangelands serve both the people in the region and the 1.3 billion people living downstream.

More than 60 per cent of the Hindu Kush-Himalayan region is rangeland, including natural grasslands, meadows, steppe, shrubland, scrubland, open woodland, hot and cold desert, tundra, peatland, and marshes and bogs.



Climate Change and the Rangelands

Climate change is one among a number of important drivers of change in the region. It has both direct and indirect impacts on the ecological and socioeconomic components of the Himalayan rangelands at different spatial and temporal scales.

The direct impacts of climate change on the Himalayan rangelands are seen in changes in evaporation and runoff, changes in vegetation composition and diversity, changes in above-ground productivity, changes in decomposition rates, changes in carbon sequestration effects, increased risk of fire disasters, drying-up of wetlands/peatlands, drowning of pastures close to glacier lakes, and changes in wildlife habitats. Climate change indirectly affects livestock productivity, the health of both people and livestock, soil characteristics and nutrients, and invasion by exotic species, although the extent of such impacts, and the extent to which other factors play a role, is still unknown. Generally speaking, the drier the rangelands, the more sensitive they are to climate change and the faster they degrade toward desertification. Changes have often been reported of vegetation alteration toward drier types and a reduction in biomass and vegetation coverage, particularly in the cold and hot deserts such as in the northwest Tibetan Plateau and southern Afghanistan and Pakistan.

Climate change impacts in the HKH rangelands are also likely to be seen in changes in ways and means of production, changes in incomes and prices, and changes in employment and markets. But these are more difficult to attribute to climate change as such, and there is a lag time between the manifestation of direct climate change impacts and the manifestation of these economic changes.

The Information Gap

Although changes are leading to changes in rangeland ecosystem services and challenge regional sustainability, the precise mechanisms involved are only poorly understood, making it difficult to develop wise coping mechanisms to reduce vulnerability and enhance the resilience of both the people and the natural ecosystems.

The Hindu Kush-Himalayan region in general is a scientific 'white spot' in terms of available data and information that can be used to identify and understand climate change and its impacts. Scattered studies in rangeland areas, particularly on the Tibetan Plateau, indicate that the region is very sensitive to the changing climate, but climatic changes in the HKH region are not homogeneous and their impacts are complex. For example, although there has been an overall increase in annual mean temperature throughout the region, the temperature change patterns in different areas are diverse. People's perceptions and responses also confirm this. Almost all herders interviewed from the Karakorum Range in Pakistan were sure that summers had become longer in the past decade or so; whereas herders from the Tibetan Plateau in China in a similar interview were sure that winters were becoming longer. Secondary data analysis also indicates that air temperatures in spring and autumn on the Tibetan Plateau are going down, although the annual mean temperature has been increasing. Similarly, although there is a general decreasing trend in annual precipitation in the Hindu Kush-Himalayan region as a whole, there is actually more precipitation in winter in the eastern part of the region and northern Pakistan is experiencing the most moisture for the last 1000 years. Other climatic changes perceived by pastoralists in the Himalayan rangelands include stronger winds and changed wind directions, more uncertainty in the availability of water, melting glaciers, and the occurrence of more frequent and severe droughts, floods, and snowstorms.

Pastoralists' Traditional Coping Mechanisms and Vulnerability

Pastoral communities across the world have developed their own ways of adapting to the highly variable geophysical, climatic, and biotic conditions of rangeland areas over thousands of years. Mobile livestock grazing, for example, is a traditional mechanism developed by herders to cope with changes in the availability of water and grass at different places and times induced by climate variability. In the Hindu Kush-Himalayas, as elsewhere, restriction of mobile livestock grazing within and between administrative units (cross-border) has further added to the vulnerability of pastoralists by taking away this basic coping strategy.

Pastoralists are heavily dependent on nature and natural resources, including water, and are thus extremely vulnerable to climatic and other environmental changes. The present accelerated rate of climate change has led to more difficulty in predicting rangeland productivity and changes in the availability of water and grass resources, making the means and results of pastoral production more uncertain than ever before. This coupled with conflict and other socioeconomic disadvantages means that pastoralists are less able to cope with the changes and suffer more. In Afghanistan, for example, in the prolonged drought from 1997 to 2004, some 70 to 80 per cent of domestic livestock in the northern and western parts of the country perished, and an extremely harsh winter in 2007/08 again claimed the life of over 300,000 animals and 800 people. Although these losses were triggered by climate change impacts, the reason the impact was so large is related to deteriorating security, the blockage of traditional migration routes for livestock and certain pastures for nomadic people, and a lack of alternative livelihood options, all of which limit the traditional possibilities for coping and adaptation.

Possibilities for Adaptation

Rangeland degradation and desertification is a problem throughout the Hindu Kush-Himalayan region, and threatens not only the rangeland ecosystem structure and functions and local people's livelihoods, but ultimately, the sustainability of the region itself. In China, more than 90 per cent of the rangelands are degraded with about one-quarter of them under severe degradation or threat of desertification. The more rangeland people depend on the resources provided by rangelands for their livelihoods, the more vulnerable they will be. Pastoralists need to be helped to understand what is happening so that they can identify possible solutions and make adaptive efforts.

Options for coping with climate change, taking into account socioeconomic changes and uncertainties, may include but are not limited to the following:

- Educating and empowering rangeland people in innovative adaptation to environmental and socioeconomic changes
- Adjusting livestock composition and, accordingly, management mechanisms: more tolerant and highly productive livestock species or varieties from the region may be selected or introduced to use certain types of rangelands, while reducing stocking rates and following more adaptive grazing patterns
- Improving vegetative coverage on rangelands (which not only increases soil moisture and stability, but also captures more atmospheric carbon) by restoring degraded areas and planting suitable species
- Applying new energy options: renewable energy technologies can significantly reduce the overuse of rangeland resources, especially the uprooting of shrubs and scrub, assist in returning of livestock dung to rangelands as fertiliser, and help to reduce greenhouse gas emissions
- Co-managing rangeland resources through the participation of, and contribution from, all community members and other stakeholders, such as eco-tourism development agencies and tourists, carbon trading agencies, and conservationists
- Diversifying livelihoods: this helps reduce pastoral communities' dependence on rangelands thus avoiding overuse of rangeland resources, and enhances their resilience in coping with change



What is Needed?

ICIMOD, as a regional learning and enabling centre with more than a decade of experience in promoting the legally supported co-management of rangelands in the Hindu Kush-Himalayan region, can organise regional partners, governments, and pilot pastoral communities to systematically document climate change impacts on the rangelands, and to identify and promote planned adaptation mechanisms.

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ICIMOD, is interested in developing a new regional rangeland programme building on the extensive past experience, which focuses on the development of a knowledge base related to climate change and impact, and on the orientation of adaptive actions by key stakeholders. The expected outcomes of the five-year regional programme are: (1) climate change impacts on the HKH rangelands are better understood by the scientific community and regional stakeholders; (2) regional rangeland stakeholders are able to plan and carry out adaptive actions in a collaborative way; (3) pilot pastoral communities are living well above the poverty line by applying planned adaptation strategies and pursuing diversified livelihood options; and (4) climate change adaptation strategies are incorporated into the national rangeland policies and development programmes/strategies of ICIMOD's regional member countries.

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