

consider that mountains are barriers to development. We try to implement pre-conceived ideas without properly understanding the issues of the areas. Our policies often promote exploitation of mountain resources with very little incentive for their sustainable management. Mountain people are not empowered enough or getting enough opportunity to explore their potential to manage their mountains. Mountain environments and cultures are in the process of a rapid change. Mountain environments have been affected by actions taking place far beyond their boundaries. The erratic climatic phenomena will have serious impacts on mountain ecosystems and the lives of the people. How to manage these changes is crucial to achieving long-term sustainability of mountain resources, both natural and cultural. The Mountain Forum can develop public opinion to encourage government and other development agencies to give special attention to mountain issues such as climate change, poverty, resource degradation, cultural erosion, and a sustainable financing mechanism for mountain development. For example, Mountain Forum could help generate knowledge on payment of environmental services approaches (PES) and encourage national and regional policy development to support a PES mechanism. If we could just recycle a small portion, may be 10-20%, of what countries get from mountains, the situation of the mountain regions would be completely different.

Q7: How can a global network like Mountain Forum promote the mountain agenda at the national and local level?

Mountain Forum should engage with and encourage members to work more on emerging mountain issues. MF should make more effort to promote good development practices in mountains in order to save the rich and unique biodiversity, traditions, and culture. Devolution of power and the revival of traditional resource management practices can make a big difference in sustainable mountain development. Besides what it has been doing currently, MF should consider establishing a 'mountain development fund' to support innovative activities for its members. Another possibility could be the establishment of an 'award' as a token of appreciation for its members for contributions to environment protection and the promotion of sustainable livelihood practices in mountains.

Q8: Lastly, what message do you have for our APMN members?

Mountains are not a mountain of problems but they offer mountains of opportunities if we develop our policies and practices properly. Mountains are our identity and crucial to our survival. Thus mountain issues should be at the core of our development planning. The more, and more judiciously, we invest in mountain development, the more we will benefit. Let us recognise the importance of mountains.

Mountain Highlights

Understanding Community-based Climate Change Adaptation in the Himalayas: Balancing Development and Disaster Preparedness

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Understanding adaptation

Mountain communities of the Himalayan region are highly vulnerable to climate change for two main reasons. First, there are likely to be more extreme climatic events resulting in an increased loss of lives, property, and sources of livelihood. Second, already facing a resource crisis, the communities are not in a position to afford huge costs in implementing adaptation measures, and as a result are likely to remain trapped in a vicious cycle of poverty. Indeed, the communities are already suffering from climate change-induced stresses such as a depletion of snow cover, glacier retreat, and glacial lake outburst floods. At the community level, problems like erratic rainfall patterns, water hazards, water shortage, and vector borne diseases are reported to be growing.

Understanding the changing patterns of weather, hydrology, water, vegetation, agriculture, and extreme weather events is essential to develop adaptation measures. Adaptation to adverse impacts of climate change, however, is not a simple task. 'Weather' is a highly dynamic process with complex interactions and diverse earth surfaces; an assessment of vulnerability and addressing of context specific problems are vital for prioritising adaptation measures.

Understanding climate change impacts correctly in the local context is the major challenge for planning adaptation measures. To some extent, relevant knowledge and information available at higher scales (regional or international) are useful to begin adaptation planning, if supplemented with adequate local information. The IPCC defines climate change adaptation as "An adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities".

Climate change inevitably brings additional stresses to livelihoods and the environment. The stresses, however, are not the same for all regions and societies. Most environmental and socioeconomic problems affect the poor most, and stresses induced by climate change are likely to add to this burden, diminishing people's capacity to respond. Climate change impacts are severely felt among people in small communities, who are often the least equipped to cope and adapt. While the need for community level action is growing, a lack of successful community-based examples has hampered planning and implementing urgently needed adaptation measures.

Understanding local impacts of global warming

Efforts towards climate change adaptation should be directed towards identifying critical factors that are important in minimising climate change induced challenges for a particular community or household, and helping them to enhance their resilience so that they can respond successfully. Identification of critical factors, however, is highly context specific and involves, among others, an analysis of livelihoods and environmental issues explicit to local socioeconomic and geographic characteristics. Mountain communities not only have distinct needs and conditions, but are also in need of urgent attention to implement adaptation measures.

Temperature rise

Recent studies (Xu Jianchu et al 2007) show that Nepal's higher altitudes are warming at a higher rate than the middle hills or the Terai (0.8°C per decade compared to 0.6°C and 0.4°C respectively). The temperature rise on the Tibetan Plateau is also reported to be about 0.8°C per decade. In its 4th Assessment Report, the Inter-governmental Panel on Climate Change (IPCC) projects that rising global temperatures will cause increasing drought in mid-latitudes and semi-arid latitudes, increased water stress in many parts of the world, increased damage from storms, and coastal flooding affecting millions more people each year.

The rise in temperature has a widespread impact on glaciers, precipitation patterns, water sources, agriculture, biodiversity, health, forests, and other sources of local livelihoods. Providing details of each of the topics is beyond the scope of this short paper, therefore only a few relevant cases are discussed.

Disappearing glaciers

Fast receding glaciers from the Himalayas will have alarming impacts on flow levels in all the major tributaries of the Ganges river with severe implications for the downstream water on which more than one billion people depend. Hundreds of newly formed and expanding glacial lakes at high altitudes threaten downstream settlements and expensive infrastructure, as they are likely to breach their geologically weak dams that are formed from moraine. In the past, there have been several cases of glacial lake outburst floods (GLOFs) in Nepal, inflicting huge damage to downstream settlements and infrastructure. An ICIMOD study (ICIMOD 2000) identified 20 lakes in the Nepal Himalayas that are potentially unstable and recommended action for implementing mitigation measures.

Fewer rainy days

Although mean annual rainfall and snowfall quantities remain unaltered, a significant change in precipitation has been observed in mountain regions of Nepal. A steady decline in the number of rainy days has been observed in major meteorological stations including Kathmandu. Farmers of Kaski,

Lamjung, Dhading, Kathmandu, Okhaldhunga, and Ilam have experienced more heavy downpours of short duration in recent monsoons. According to them, this is in contrast to past years when lighter rain of longer duration, usually one to three days (jhari barsa), used to be a common feature. A direct impact of the reduced number of rainy days is the reduced recharge of groundwater. As a result, spring sources are not restored fully during the monsoon and are drying out earlier than in the past. The springs are critically important for sustaining mountain livelihoods as they provide both domestic and irrigation water supplies. At the same time, the increased amount of stormy rain leads to erosion and damage to standing crops. The collective impact of these changes results in a loss of agricultural productivity and additional hardship to hill farmers.

Multiple stresses on high mountain dwellers

Unusual precipitation is evident in high mountain villages. In the Mustang and Manang districts of Nepal, people are experiencing rain in summer when they used to have several months of dry weather. In contrast, they receive less snowfall in winter. Both of these changes have negative impacts on their livelihoods. The walls and roofs of the traditional mud-built houses are eroding fast due to the rains. According to local residents, they are trying to cope with the problem by repairing the damaged parts of the houses but it is not helping them much. They feel that in the future their roofing design may need to change to protect themselves from rain. For them, a drier winter means inadequate snow deposits for water supply during post winter and summer seasons. There is a growing concern for water as their traditional irrigation sources are snow-melt springs.

Another issue of local concern is the increased number of stormy snowfall events. These storms usually lead to damaged crops and livestock. There are cases of severe flooding that have led to seriously damaged settlements, roads, and bridges. Death of livestock due to avalanches triggered by heavy snowfall is also a serious concern.

Identification of community-based adaptation measures

Coping with multiple climate change induced stresses requires both long-term planning and short-term adaptive measures. As mountain people are more exposed to climate change induced hazards, they have already experienced hardships to their livelihoods from multiple fronts. As the majority of mountain households depend on natural resources and subsistence farming practices for their livelihoods, they are the most vulnerable groups from a climate change perspective. For example with declining water supplies at local streams and spring sources as a result of the reduced number of days with rainfall, and substantially increased time and costs for fetching water supplies. In this case a good adaptive measure to climate change impact can be helping local communities with appropriate technologies and skills for efficient water management.

Loss of grass productivity due to alien invasive species is another issue of concern in the mid hills. Diseases in fodder trees are also reported more frequently in recent years. People from high mountain regions have serious concerns over the declining grassland productivity. They link the problem with moisture deficiency as they have noticed disappearing winter snowfall and increased wind intensity. Harvesting the stormy precipitation that they receive in winter or post winter months might be an option. In the context of growing uncertainties in the rainfall pattern, (more intense rains, longer droughts leading to reduced supply of water for irrigation) it is reported that in recent years mountain farmers have to bear additional costs to produce the same amount of grain. In response to the growing water concerns, farmers tend to look at different types of crops that can survive the drought and can be harvested earlier. They also seek support to harvest water for irrigation and off-season farming. In the climate change literature, these examples are usually categorised as options for community-based adaptation (CBA). This begins by identifying communities most vulnerable to climate change. These communities are generally very poor and depend on natural resources but occupy areas already prone to natural hazards such as floods and droughts. Gaining the trust of the local communities, identifying appropriate adaptation options, and building on existing community capacity, knowledge, and practices are the follow up steps. The introduction of an adaptation measure helps the community to understand the climate change risks and associated factors, as a result converting their knowledge and skills into actions.

The importance of synchronising disaster preparedness and development practices

Though capacity building is mentioned as the common answer to climate change challenges, it requires redefining in the context of the specific needs of target communities. A reorientation of regular socioeconomic development activities with a climate change sensitive approach is one way of incorporating climate change components in the capacity building process. Another approach is climate change sensitive disaster preparedness planning that also helps achieve the adaptation goal. The combination of disaster preparedness and good development practices can be an effective way of planning adaptation.

Six important programme components for reducing climate change stresses of mountain communities are drawn based on successful local practices carried out in Nepal:

- Raising awareness among community members on potential impacts of climate change on their livelihood sources through a participatory approach
- Assessing the vulnerability to climate change hazards
- Exploring the options and challenges for sources of income diversification in individual households
- Application of appropriate technologies, skills, institutions, networks, and other relevant resources for livelihood enhancement
- Participatory monitoring of climate change patterns, water sources, crop productivity, forest-based resources including biodiversity, and natural hazards as experienced in and around the community
- Implementation of disaster preparedness and climate change sensitive development practices

These activities are neither new nor exclusive for a good development project or disaster preparedness plan. Orientation of local development plans and disaster preparedness schemes towards emerging climate change challenges would serve the purpose at the local level. However, the scope of climate change related work is much larger than that of other schemes.

Conclusions

Climate change has further exposed the vulnerability of mountain communities. The limited understanding of the uncertainties and complexities of the climate change process is possibly the biggest challenge for planning a response mechanism. Those with limited access to livelihood options and directly dependent on natural resources are more vulnerable than others. Though there is no fool-proof approach to address these inherent challenges of mountain people, an approach built on both local knowledge and modern scientific findings would probably offer the best answer. Community-based climate change adaptation planning is one such approach that identifies local knowledge and skills relevant to address climate-induced challenges and seeks to supplement the knowledge with contemporary scientific information and tools. Common steps involved in planning community level adaptation schemes include i) an assessment of impact and vulnerability, ii) potential schemes for pilot demonstrations, iii) bridging knowledge gaps through the dissemination of relevant scientific information, and iv) prioritising areas for immediate action such as mitigating risks associated with GLOFs. These activities are performed through the active participation of stakeholders. Studies and assessments of measures for adaptation are an essential part of the community based adaptation planning, which is actually a 'learning by doing' process.

References

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