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CLIMATE CHANGE
AND ITS IMPACT ON INDIGENOUS PEOPLES IN NEPAL HIMALAYA

Glacial lake on the brink of bursting - Photo: Kamal Rai

Indigenous peoples worshiping their ancestors, Nepal - Photo: Kamal Rai

Nepal is a landlocked country in South Asia. It is bordered by the Tibet Autonomous Region of the People's Republic of China to the north and India to the south, east and west. Nepal is also known as the country of Mount Everest '*Sagarmatha jhomolongma*', the highest peak in the world. The Himalaya mountain range runs across Nepal's northern and western parts, and eight of the world's ten highest mountains are situated within its territory.

Characterised by its diverse geography and climate, the Himalayan region is a storehouse of biodiversity and constitutes an important component of the global ecosystem. In Nepal, the Himalayan region has more than 2,300 glacial lakes and more than 3,200 glacial rivers originate in the Himalayas. Himalayan glaciers feed seven of Asia's great rivers: the Ganga, Indus, Brahmaputra, Salween, Mekong, Yangtze and Huang Ho, and it is estimated that 20% of the world's population depend directly on the use of Himalayan resources for their livelihood and well-being. Agriculture and power generation in the downstream regions are fully dependent on the freshwater supply fed by the discharges of Himalayan glaciers.[1] For this reason, the mountain range is called the 'water tower of Asia', often with regionally and locally-specific variations. For example, in neighbouring India to the south, the Himalaya range is called 'the water tower of the Ganges', and provides some 45% of the annual flow of the Ganges and its tributaries.

The indigenous peoples of Nepal Himalaya

Nepal is a pluralistic country with many castes and ethnicities, cultures, languages, religions and practices. Of a total population of 22.7 million, indigenous peoples comprise 8.4 million or 37%, speaking more than 90 dialects. Fifty-nine indigenous groups are legally recognised but numerous groups are yet to be recognised.

The Himalayan region is home to millions of indigenous peoples. Of the total population livening in the Himalayan region, approximately 30% are indigenous peoples. The Sherpa, Tamang, Kiranti and Dolpali are among the indigenous groups residing in the Nepal Himalaya. These indigenous groups have their own customary laws, folklore, culture and traditions, which have symbiotic relationships with the Himalayan ecological biosphere and conservation.

The indigenous peoples' settlements are distributed throughout the fragile topography of the Himalayas. The indigenous peoples of the region depend on small-scale land farming systems, producing crops such as wheat, barley and potatoes. Farming is combined with livestock rearing and indigenous communities depend on high alpine natural resources such as timber, fodder, fuels, fruits, nuts, roots, vegetables and medicinal herbs. Often, the agricultural produce is meagre and only sufficient to sustain families for six months. Consequently, the indigenous peoples of the Nepal Himalaya are among the most disadvantaged and marginalized groups in the country.

Climate change in the Himalayas

Human activities are having a profound impact on the world's climate. Mountains are a sensitive indicator of that effect because mountain ecosystems are easily disrupted by variations in climate. As global temperatures rise, mountain glaciers are melting at unprecedented rates, which has a serious impact on flora and fauna as well as on the lives and livelihoods of the indigenous peoples in the area. Over the past few years, local observations have reported less snow-

Himalaya mountain range - Photo: Kamal Rai

fall in the winter, increased rain and snowfall after the winter, unusually intense summer rainfall and increased frequency of avalanches, flash floods and hailstorms. Mountain areas such as the Nepal Himalaya are therefore expected to be most affected by the adverse impacts of climate change.

Melting glaciers

Over the last thirty years, there has been an average temperature increase of 0.6° Celsius in the Nepal Himalaya, which is contributing to increased rainfall and glacial melt. Himalayan glaciers have been in a state of general retreat since the 1850s, but this situation has accelerated and they are now considered to be receding faster than glaciers elsewhere on the planet. The rate of this glacial retreat is visible in some extreme cases – for example, the Dokriani Barnak Glacier in India retreated 20m in 1998.[2] As a result of fast glacial melt, river flows are increasing and new glacial lakes have formed while those already existing have grown rapidly.

A number of glacial lakes are in danger of bursting as excessive melting of glaciers increases the size of the lakes, which can eventually burst from their confines generating tremendous floods downstream and sweeping away all means of livelihood. This happened in 1985 when a glacial lake burst its banks, sending a 15 meter wall of water rushing downhill, drowning people and destroying homes.[3] The occasional bursting of glacial lakes in the past has seriously damaged the lives and livelihoods of mountain communities. Melting glaciers make the Himalayan region, and thereby also the land which indigenous peoples occupy, more vulnerable to flash floods, soil erosion, landslides and debris flow.[4] Such threats operate in conjunction with other changes to the patterns of river flow, spring water recharge, precipitation and vegetation types expected as a result of global warming in the Himalayas.[5] As well as the implications for regional biodiversity, glacial melt will affect people and livelihoods and have severe consequences for food security.

Biodiversity

Due to their shape and size, mountains support a wide range of climatic conditions. It is said that 'climbing just 100 meters up a mountain slope can offer as much climatic variety as traveling 100 km across flat terrain'.[6] Each rise in altitude generates different conditions, with unique ecosystems that contain some of the world's greatest variety of plant and animal life.

With the rise in global temperatures, conditions in the different altitudes change. Detailed studies have shown evidence of an upward movement on mountains of tree lines and alpine plants. Plants at the highest elevations are competing with – and losing out to -- plants normally found at lower elevations. Such floral retreats and advances on mountains have also taken place in the past but current changes are taking place at an unprecedented speed.[7] Consequently, the diverse Himalayan plant and animal species are being seriously affected. Many rare species are already disappearing or are at risk of extinction. If the current speed with which changes are occurring due to rising temperatures continues, trees are likely to cover the high mountains and indigenous peoples will be deprived of their traditional resources and biodiversity, the means with which they have traditionally been able to cope with variation and change.

Other effects

Ngamindra Dahal, who is the Energy and Climate Change Coordinator at the King Mahendra Trust for Nature Conservation, has described the consequences of climate change in the Himalayas:

> *"Weather-related extreme events like excessive rainfall, longer drought periods, landslides and floods are increasing both in terms of magnitude and frequency. Mean annual precipitation is increasing, as is the occurrence of intense rainfall. This causes more erosion of soils and riverbeds and banks, as well as sedimentation on fertile land. More floods and glacial lake outbursts will destroy irrigation and water supply systems, roads, bridges, settlements and productive land. Flood-related deaths will increase. Land degradation will reduce crop productivity and put more pressure on remaining fertile land. In the dry season, increased evaporation will lead to water scarcity. Soil moisture deficits, droughts, fire and possible pest outbreaks will decrease crop yields. Climate change will have major impacts on ecosystems, land and water resources, and major economic sectors such as agriculture."* [8]

In the mountain regions, there is an increasing risk of infectious diseases as an indirect consequence of warmer temperatures. Scientists have reported that the mosquitoes that carry malaria, dengue and yellow fever are spreading to higher altitudes as temperatures warm up. Ticks are proliferating northwards and at higher altitudes, causing disease, and insect pests are predicted to spread and cause damage to crops.[9] Indigenous peoples in the Himalaya region are among the poorest in the world and, with climate

Nepal Himalaya – Photos: Marianne Olesen

change affecting their subsistence base, it will be increasingly difficult to ward off infectious diseases.

Indigenous peoples' perception of climate change and its effects

In 2007, the author conducted a study into indigenous peoples' views on climate change in Taksindu, Solu and Sagarmatha in Eastern Nepal and Dolpa in Western Nepal. According to the indigenous respondents, they have observed the melting of ice and glaciers, and environmental changes in their traditional territories for many years. Although they are not familiar with scientific data on climate change, they are experiencing the disappearance of foods, medicinal plants and herbs and they feel certain that the changing climate is the reason for the changes they are experiencing in their daily interactions with the local environment.

Effects of climate change on subsistence activities

Environmental and ecological changes noted in the Nepal Himalaya indicate that global warming will have a serious impact on the lives and livelihoods of indigenous communities. Many mountain-living indigenous peoples depend on agriculture for their livelihood and there is increasing concern that climate change will have a significant adverse impact on farming. The study into indigenous peoples' views on climate change revealed that landslides, soil erosion and debris flow as a consequence of melting glaciers, as well as changing rainfall patterns, are leading to low productivity and crop failures are affecting many Himalayan indigenous farming communities, who are increasingly facing food insecurity.

The informants also reported observing adverse affects on the Himalayan ecosystem, and hence on the natural resources on which their livelihood depends, due to changing rainfall patterns and other climate changes. One informant explained:

> *"My father established an apple garden a long time ago. The garden was near a beautiful, sacred glacial lake, Lake Dudhkunda, with a view of the Himalaya, which attracted tourists. And the garden became famous with tourists because at that time, all the apple trees bore very delicious fruits with a shiny, beautiful color. But for the last five years, different kinds of changes are appearing in this apple garden, for example early flowering, failure of fruit setting, early and tasteless apples and the trees and the apples often become rotten. The shiny and beautiful colors of the apples have almost disappeared and that may be the impact of climate change."* [10]

Another informant noted that:

> *"We used to go to wetland sites to collect our traditional wild foods, vegetables, medicines etc. It is one of our ancient traditions to harvest the foods for our livelihood. At present, such foods, vegetables and medicinal herbs are disappearing along with the wetlands. This could be an example of the impact of climate change."* [11]

Himalayan indigenous peoples are cattle and sheep herders, and declining production of grass in the Himalayan grasslands due to moisture deficiencies resulting from reduced snow deposits is therefore a serious concern, forcing people to seek grazing at higher altitudes. Stream flow and spring characteristics have also changed dramatically in recent years, making the management of water supplies a challenge.

Positive impacts of climate change

Although the impacts of climate change are considered mainly negative, some positive changes have also been noted. A study conducted in the Mustang and Manang districts of Western Nepal revealed that, surprisingly, many people in the region feel positive about climatic changes and are hopeful about the future of the environment:

> *"For most of [the respondents] the impact is positive. Farmers are growing new vegetables such as cauliflower, cabbage, chilli, tomato and cucumber, which used to need greenhouses to survive. Local fruits have better sizes and tastes. New plants that only used to grow at lower altitudes can now be found. Many note the fact that their Himalayan district is greener than it was a few decades ago. Local residents say this is because of the changing climate rather than technological inputs or improved seed varieties."* [12]

The study, however, stresses that most people are unaware of the real consequences of global warming and that communities who are most vulnerable to the effects of climate change are generally unaware of the nature of possible impacts.

Cultural impacts of climate change

The pressure on glacial lakes, causing landslides, soil erosion and so on, not only has practical implications for indigenous communities in Himalaya, it also has cultural impacts. The Himalayan range and its snow, water, air and biological resources have secular, cultural, religious and spiritual value for indigenous peoples in the region. Many believe that their ancestors' souls live in the

Himalayan lakes and they visit the lakes to show respect to these souls and pray for good health, a good harvest, healthy livestock and wealth. With many glacial lakes on the brink of bursting, it has in some cases become dangerous for people to visit these important places of worship. There is thus a danger that the cultural, as well as religious and spiritual, dimensions of the Himalayan landscape, along with the ancestral memories inscribed on it, are in danger of disappearing along with the glaciers.

Conclusion and recommendations

It is evident that indigenous peoples living in the Nepal Himalaya region are affected by changes in the natural resource base on which they fully depend as a consequence of climate change. And the effects are likely to be intensified in the future as continued climate change is predicted to lead to major changes in freshwater flows, with dramatic impacts on biodiversity, people and their livelihoods.

However, the relationship between climate change and glacial retreat and the impact on indigenous communities is not yet sufficiently understood and studied to develop an appropriate response in the form of policies, adaptation and mitigation initiatives, let alone disaster management programmes. Understanding how climate change affects indigenous communities in mountain areas is vital as governments and international organizations develop strategies to reverse current global warming trends, producing treaties such as the Kyoto Protocol and the United Nations Framework Convention on Climate Change.[13]

Indigenous peoples have valuable ideas, knowledge, oral history and experiences about climate change and its impact and it is therefore crucial that indigenous peoples participate in future research and the development of a strong legal framework. Such a framework should address their rights and customary systems as well as the unique challenges facing indigenous communities in coping with climate change in the Himalayan region. Equally important in addressing vulnerability is to provide ways forward in order to enable empowerment of indigenous communities through access to information on the application of appropriate technologies suitable for the local context, and education on climate change and adaptation strategies.

During a conference on climate change and its impact on Himalayan indigenous peoples in Nepal in March 2008, the participants made the following observations and recommendations:

- Information is lacking on the issue of climate change and adaptation in the indigenous communities in the Himalayan region. Participatory research to explore indigenous peoples' knowledge and experiences related to climate change, its impacts and adaptation strategies is therefore important.
- There are no organizations working on climate change and how to adapt to its impacts, neither are there organisations working on public education on the issue. Awareness raising, education, capacity building and advocacy programmes on climate change and its impact on indigenous livelihoods are therefore needed in Himalayan indigenous communities.
- Networking, coordination, lobbying and communication to ensure the appropriate implementation of international and national climate change conventions and policies that take into account indigenous peoples' rights, knowledge and customary systems are important.

Notes

1 Andreas, S. (2007): The Mountain Perspective as an Emerging Element. In *International Development Agenda Sustainable Mountain Development*, ICIMOD 53:5
2 Liu, J. and Rasul G. (2007): Climate Change, the Himalayan Mountains. In *International Development Agenda Sustainable Mountain Development*, ICIMOD 53:11
3 www.mountainpartnership.org/issues/climate.html
4 Dorji C. (2007): Mountain Development in South Asia, Sustainable Mountain Development in the greater Himalayan region. In *International Development Agenda Sustainable Mountain Development*, ICIMOD 53:9
5 Dahal, N.: *Perceptions of Climate Change in the Himalayas*. Available at: www.cru.uea.ac.uk/tiempo/newswatch/feature050910.thm
6 www.mountainpartnership.org/issues/climate.html
7 Salick, J. and Byg, A. (eds.) (2007): *Indigenous Peoples and Climate Change*. University of Oxford and Missouri Botanical Garden. Available at: http://www.tyndall.ac.uk/publications/Indigenouspeoples.pdf
8 Dahal, N.: *Perceptions of Climate Change in the Himalayas*. Available at: www.cru.uea.ac.uk/tiempo/newswatch/feature050910.thm
9 www.mountainpartnership.org/issues/climate.html
10 Oral communication.
11 Ibid
12 Dahal, N.: *Perceptions of Climate Change in the Himalayas*. Available at: www.cru.uea.ac.uk/tiempo/newswatch/feature050910.thm
13 www.mountainpartnership.org/issues/climate.html

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