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James W. Thorsell

The Eastern Himalayas - Nepal

Adaptation Case Studies for Responding to Climate Change Impacts

Characteristics

With the exception of the poles, **the vast 2,400km long Himalayan range** contains more glaciers than any other region on Earth and **provides water for over 1 billion people in the region**. About one third of this mountain range is found in Nepal, along with eight of the world's fourteen highest peaks and the Terai lowlands. Its dramatic topography has produced a wide range of distinct ecological zones making it **a country rich in biodiversity and cultural heritage**. It is home to 4.5% of the world's mammal species, over 9% of bird species, supports more than 35 forest types and over 5,000 species of flowering plants, including around 248 species of endemic plants and 700 species of medicinal plants. **Over two thirds of Nepal's people are directly reliant on agriculture for their livelihoods**. They have a low adaptive capacity to cope with negative impacts, such as droughts and natural disasters, mainly because of limited choices and resources.

Climate Change Impacts

The Himalayan region is one of the world's most sensitive hotspots to climate change impacts, many of which are already being experienced. **Satellite imagery suggests almost 67% of the glaciers in the Himalayas have retreated** and in Nepal this process is as rapid as 10m/year¹. Further research is being planned by the International Centre for Integrated Mountain Development to increase understanding of the

exact volume of glacial retreat and the implications of this for the hydrological regime in the region. **Twenty of Nepal's 2,000 glacier lakes are at risk of bursting** due to glacial melt which expands the size of lakes and weakens the moraine walls. Sagarmatha National Park and Kanchenjunga Conservation Area have already experienced these Glacial Lake Outburst Floods (GLOFs). GLOFs can have a devastating impact on people, livestock, forests, farms and infrastructure. As glaciers retreat, the mountain slopes are made increasingly unstable, increasing the risk of natural disasters such as landslides. **Decreases in snow accumulation, coupled with changes in precipitation patterns and unsustainable water management, may contribute to acute water shortages in the future**. As Nepal is a country highly reliant on hydropower as a source of energy, with ambitious plans to significantly expand this sector, changes in the seasonality of precipitation patterns, reduced freshwater flows and run-off are already having a serious effect on energy security.

Climate change is re-weaving the web of life as we know it and is already altering the fragile ecosystems of the Himalayas. As temperatures increase, vegetation and wildlife will move to higher altitudes, but as the altitude of the mountainous region is finite, some organisms are likely to be lost. This change will upset the ecosystem balance and seriously endanger the survival of many plant and animal species.

Rapid climate change may not give plants and animals enough time to adapt to the new climatic conditions and any progress they make may be hindered by fragmented landscapes. Drier conditions are likely to substantially increase the risk of forest fires spreading, further weakening the connectivity of forest landscapes and therefore reducing the space for species to occupy. Biodiversity loss will affect ecosystem functioning in ways that are difficult to predict and will consequently affect the health, well-being and livelihoods of the people who rely on such critical ecosystem services.

Traditional farming practices are now threatened due to increased temperatures and drastic changes to the frequency and volume of precipitation patterns, typically resulting in either extended periods of drought or flash flooding. Changes in the regularity of the rains has been observed and also an increase in pests, diseases and invasive species, reducing crop productivity. Climate change is therefore having a direct impact on food security for the people of Nepal. In 2009, Nepal had a delayed monsoon season and there was no rain during the period farmers normally plant rice crops. Consequently, an estimated half of Nepal's land usually used to grow rice was left barren and government estimates suggest a drastic reduction in productivity. Increased temperatures are also causing disease-carrying insects such as mosquitoes to move to higher altitudes, with an associated health risk increase.

¹ Ageta and Kadota, 1992; Yamada et al., 1996; Fushinmi, 2000.



WWF Responses

Research: Although Nepal is one of the most vulnerable countries in the world to climate change impacts, there has been little investment in research, or in developing a process for systematic nationwide data collection. To play a part in addressing this issue, WWF Nepal is conducting preliminary research on glacial melt of the Ngozumpa and Khumbu glaciers to monitor long term weather patterns and climatic variability, in order to help provide information to predict when freshwater ecosystems might be near to collapse in the Dudh Koshi sub-river basin. Automatic Weather Station (AWS) and Hydrological Station (HS) have been installed at both glaciers. The AWS records data such as solar radiation, relative humidity, air temperature, soil temperature, wind speed and direction, barometric pressure, radiant heat and precipitation while the HS records water discharge in the river. WWF Nepal is working in partnership with the Department of Hydrology and Meteorology (DHM), who are running a Regional Climate Model "PRECIS" to provide future climate scenario analyses in hydrological systems. In order to detect early warning signs of possible collapse, WWF is regularly monitoring Imja Tsho, potentially one of the most dangerous glacial lakes in Nepal.

Awareness Raising and Education: Early in 2009, WWF Nepal launched its internationally focused 'Climate for Life' campaign to highlight how climate change is affecting Nepal and the Himalayan region. One of the first campaign events was an epic 19th ascent of Mt. Everest by Apa Sherpa, a WWF 'Climate Witness'. At the summit, Apa unfurled a banner reminding the world of its responsibility to reduce greenhouse gas emissions. This was followed up during a recent visit by the Nepalese prime minister to the US. The prime minister handed over a WWF memento containing a piece of rock from Everest to the US president, Barack Obama, as a symbol of the changing climate in the Himalayas. Finally, WWF Nepal has collected over 100,000 signatures from young people in Nepal calling for global action, to present to UN Secretary-

General, Ban Ki-moon before the critical climate change meeting in December 2009 in Copenhagen. Domestically, WWF Nepal is supporting the development of the National Adaptation Programme of Action (NAPA) and is also working in partnership with the Curriculum Development Centre (CDC) to incorporate climate change into the national educational curriculum.

Adaptation: WWF Nepal's adaptation programme will initially focus on increasing understanding of the impacts of climate change on both freshwater and terrestrial ecosystems and how it will affect their function, integrity and distribution. This understanding will help to underpin land use and land management strategies and to develop appropriate interventions to build the resilience of the communities and ecosystems.

WWF Nepal has already started working on the ground to make communities and ecosystems more resilient to the adverse effects of climate change. Vulnerability assessments and community based adaptation projects, applying principles of good environmental management, are being undertaken in four areas of Nepal, both in the mountains and the lowland Terai Landscape. Adaptation strategies at the community level are designed to be locally appropriate, and are developed in close collaboration with the target community members. Examples of activities include provision of farmers' climate change management manuals that advise on managing ecosystem services, such as freshwater, crop diversification and choice of agricultural practices under changing climatic conditions. Local community climate change centres are being developed to raise awareness and build capacity on climate change, and community members are playing a role in monitoring climate variability. WWF Nepal is also working with local government to ensure adaptation is integrated into local development planning. In addition, WWF Nepal is undertaking a project on 'Climate Change Impacts on Freshwater Ecosystems in the Himalayas' to enhance understanding of the impacts of climate change in the Himalayas and



initiate adaptation measures in trans-boundary freshwater ecosystems. The aim is to improve management practices and to establish flexible systems to manage freshwater resources under the conditions of uncertainty posed by climate change.

Building Civil Society Networks: Climate Change Network Nepal (CCNN): WWF Nepal is currently member secretary of the CCNN, an informal network of 15 organizations engaged in climate change issues in Nepal. Formed in 2003 to facilitate coordination and partnership among government, non-governmental sector and civil society, the objective of this coalition is to highlight the climate change issue at local, national and international level, devise responses, and thus enable Nepal to better cope with the present and future impacts of climate change.

National Climate Change Policy: WWF Nepal has a close relationship with the Government of Nepal and has recently helped the Ministry of Environment, Science and Technology to formulate the National Climate Change Policy for Nepal. WWF Nepal helped coordinate regional level consultations together with a range of key stakeholders in country (including research organisations, government, and civil society) and is a member of the Government of Nepal's delegation to the United Nations Framework Convention on Climate Change.

