CASE STUDY 2-3

IMPLEMENTING ADAPTATION MEASURES

Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP) in Nepal

Imja glacial lake surrounded by Himalayan glaciers . Photo courtesy of DHM

Lessons Learned and Policy Recommendations

- The Community Based Flood Early Warning System has been installed and operated within the capacity and capability of the communities of the affected area to ensure the sustainability of the project.
- Communication between upstream and downstream communities was promoted to enhance collaboration. Increases in river water level upstream are a good indicator of flooding events downstream.
- Creative use of existing resources and collaboration with NGOs and private-sector companies were important to install a functional early warning system.

Outline

Background[1][2]

Nepal is a highly vulnerable to the impacts of climate change. The country's average temperature is increasing at the rate of about 0.04°C, and the trend is much higher in the High Himalaya region (4,000-8,000m). This contributes to glacial retreat and expansion of lakes, raising the risk of Glacial Lake Outburst Flood (GLOF).

A total of 3,808 glaciers and 1,466 glacial lakes have been identified in Nepal. These lakes include 21 potentially dangerous lakes, out of which six are at very high risk. The rapid accumulation of water in these lakes can lead to a sudden breach of the moraine dam, which may result in catastrophic damage to downstream areas.

At the same time, deforestation and land degradation of Churai region (700-1,500m) have increased flash floods and inundations especially causing severe damage to the downstream Terai region (below 750m). This will only be exacerbated by climate change. Addressing the situation, the National Adaptation Programme of Action (NAPA) has prioritized in its combined profile 4 as GLOF Monitoring and Disaster Risk Reduction. This component is being implemented through Community Based Flood and Glacial Lake Outburst Risk Reduction Project by the Department of Hydrology and Meteorology (DHM) with key government partners engagement in climate risk management, including management for various types of flood, broader consultations with local government line agencies, communities, community-based organizations, and non-government organizations in the target areas. This project, which is contributed by two components aims to mitigate GLOF risk arising from Imja Lake by reducing the lake volume through an artificially controlled drainage system (Component I), and community-based disaster risk reduction and climate-proofing of water sources for the Churia and Terai regions (Component II).

Geographical characteristics[1][2]

The working area of this project is considered to be one of the rapidly growing lakes in the Hindu Kush Himalayan region. Imja Glacial Lake, located in the eastern part of the Sagarmatha region in Solukhumbu district, is surrounded by Himalayan glaciers at an altitude of about 5,010 meters above sea level. Glaciers feeding the Imja Lake are debris covered by, and the lake is dammed by the ice-cored end moraine. The end of the lake-calving glacier is melting

rapidly. As a result, the Imja Lake is widening year by year as the glacier shrinks.

In the Terai regions and Churia regions, flooding is a recurrent problem. Rivers originating from Churia Range are mostly of an ephemeral nature, being devastating during the monsoon season, therefore, posing high flood threats to Terai. Climate change impacts has led to extreme weather conditions like flash floods and landslide events.

Figure 2-3-1 Project Working Areas

●Objectives and Activities

The main objective of this project is to reduce human and material losses from ①GLOF in Solukhumbu district and ②catastrophic flooding events in the Terai and Churia Range (Mahottari, Udayapur, Siraha, and Saptari districts).

The first component of the project focuses on reducing risks from imminent GLOF in high-risk areas (contributes to NAPA Profile 4). The second component is expected to contribute to addressing community-based disaster risk reduction and climate-proofing water sources for disaster-prone communities.

Component I: Minimizing the Risk of Glacial Lake Outburst

Component I focuses on reducing potential losses from GLOF hazard including development of an artificial controlled drainage system combined with installation and operation of an automated and community-based early warning system and strengthening individual and institutional capacities for GLOF risk management.

Table 2-3-1 Expected Output of Component I

Output 1.1	Water level of Imja Lake lowered through controlled drainage
Output 1.2	Protocols for GLOF risk monitoring and maintenance of artificial drainage system of Imja Lake developed and implemented
Output 1.3	Community-based GLOF Early Warning System developed and implemented
Output 1.4	GLOF Risk Management Skills and Knowledge Institutionalized at Local and National Levels

Component II: Minimizing the Risk of Flash Floods from Churia Originating River System

Component II contributes to reducing human and material losses from recurrent flooding events in four flood-prone districts: Mahottari, Siraha, Saptari, and Udayapur. Locally appropriate structural and non-structural measures such as flood-proofed water and sanitation systems, a sediment control program, river bank and slope stabilization, and Community Based Flood Early Warning System were adopted. In addition, the project ensured the capacity-building of stakeholders and local communities across levels.

Table 2-3-2 Expected Output of Component II

Output 2.1	Sediment control and stabilization of hazard-prone slopes and river banks through structural and non-structural mechanism
Output 2.2	Flood-proofing of Water and Sanitation Systems in selected VDCs in the target river basins
Output 2.3	Institutionalization of flood-risk management skills and knowledge
Output 2.4	Flood preparedness training for district and VDC representatives, NGOs, CBOs, and local communities in the four flood-prone districts

Project Structure

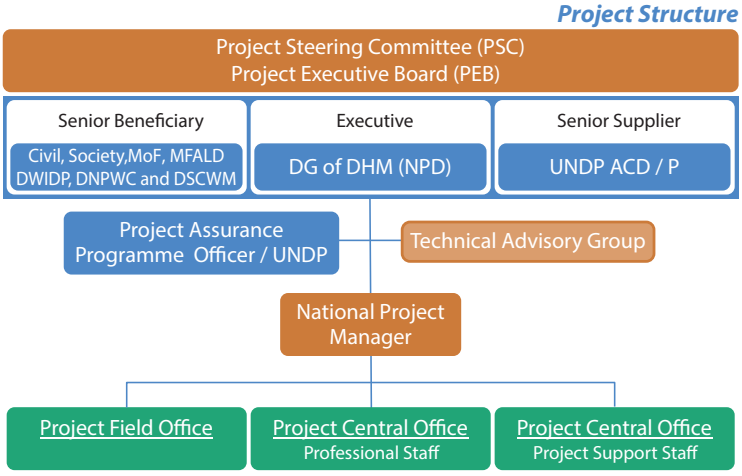

Figure 2-3-2 Project Structure

●Institutional arrangements

The executing agency is the Department of Hydrology and Meteorology (DHM) under the Ministry of Population and Environment (MoPE), which is technically supported by UNDP. The Department of Soil Conservation and Watershed Management (DSCWM), the Department of Water Induced Disaster and Prevention (DWIDP), and the Department of National Park and Wildlife Conservation (DNPWC) are collaborating partners, and responsible for providing inputs to planning, technical oversight, and monitoring of project activities. **(See Figure 2-3-2)**

The project is financed by GEF-LDCF (USD 6,300,000) and UNDP (USD 949,430), and is co-financed by the Comprehensive Disaster Risk Management Programme (CDRMP) of UNDP, The Nepal Risk Reduction Consortium (NRRC), Department of Water Induced Disaster Management of Ministry of Irrigation, USAID-ADAPT ASIA, and International Centre for Integrated Mountain Development (ICIMOD).[2]

Lessons Learned and Policy Recommendations

1 The Community Based Flood Early Warning System has been installed and oparated within the capacity and capability of the communities of the affected area to ensure the sustainability of the project.

Local community members participated in developing this project from the beginning, including the creation of flood maps, identification of evacuation routes, designation of evacuation sites and shelters, and implementation of the Community Based Flood Early Warning System (CBFEWS) in small tributaries for flash flood.

The project also employed community members for the installation, operation and maintenance of the CBFEWS instrument. As a result, the community was able to develop expertise and a sense of ownership for the project, and was able to continue to operate and maintain the CBFEWS by itself.

From the experience gained from the project, communities became proactive in establishing high raised shelter area in their locality, and were capable of handling voluntary evacuations when necessary.

2 Communication between upstream and downstream communities was promoted to enhance collaboration. Increases in river water level upstream are a good indicator of flooding events downstream.

Increases in the river water level upstream are a good indicator of flooding events downstream, which could signal warning several hours prior to a flooding event (depending on the distance between upstream and downstream, as well as other environmental factors). Therefore, collaboration between upstream and downstream communities is a key factor for the success of the project. The project used existing social structure of the upstream and downstream communities, such as family ties, as well as training and awareness programs that foster collaboration between these communities. DHM employed the local monitoring staff from the upstream community, and equipped them with basic river monitoring system (solar powered for communities with no grid connectivity), but most of the activities were carried out by upstream communities themselves.

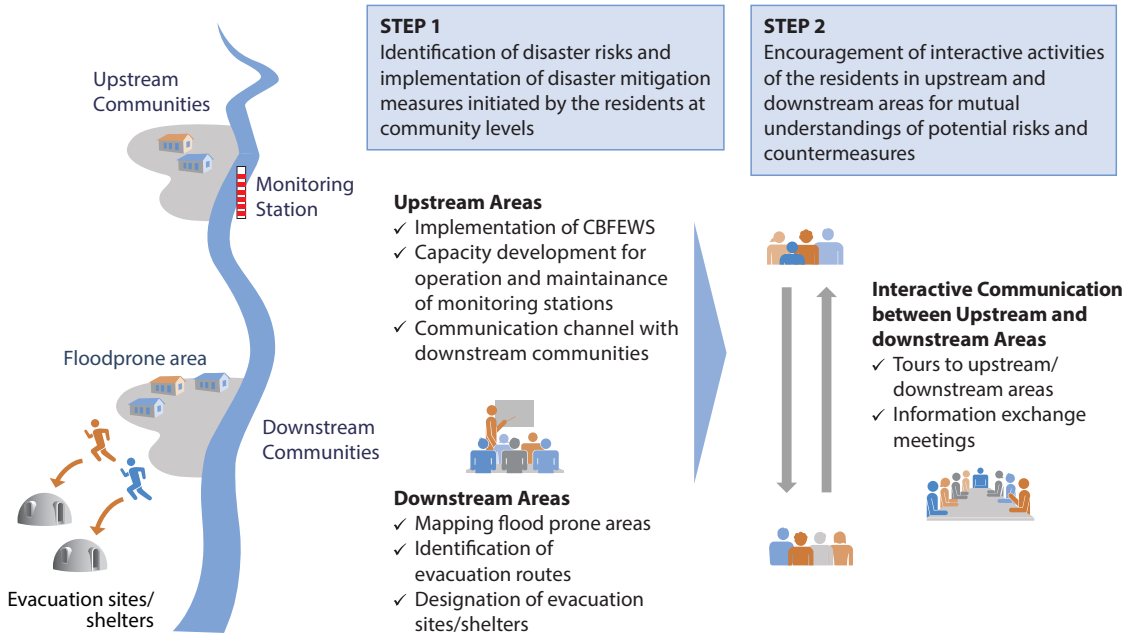

Figure 2-3-3 Project Activities in Upstream and Downstream Communities

3 Creative use of existing resources and collaboration with various Government Agencies, NGOs and private-sector companies were key to deliver the CFGORRP.

For the controlled drainage of Imja lake (Output 1.1), detailed cost calculation revealed that the construction cost would be higher than the initial estimate due to the difficult and unfamiliar work at extreme altitude. As a result, actual cost exceeded the secured budget. However, the project proceeded because the Nepalese Government decided to use the Nepalese Army, which was trained to operate in high altitude and was stationed nearby. This creative utilization of resources brought down the cost of the project to a feasible level.

For the development of the community based GLOF early warning system (Output 1.3), unlike with the development of CBFEWS, there was no nearby communities to monitor the glacial lake and warn of GLOF. Also, there is a risk of mountain trekkers being caught up in the GLOF along the trail. To solve these problems, DHM installed an automated monitoring station at the glacial lake with the collaboration with the Ministry of Home Affairs (MoHA) and telecommunication companies (Nepal Telecom and NCELL) to disseminate warning using SMS. The mobile phone users within the vicinity of the hazard area will automatically receive the warning via SMS.

For the flood preparedness training (Output 2.4) the project shared knowledge and experiences with other ongoing CBFEWS developments including the one developed by ICIMOD through Himalayan Climate Change Adaptation Programme. This ensured there was a basis for coherent and coordinated development of CBFEWS throughout Nepal.

The above creative collaborations enabled the project to proceed and to be scaled up, even in the face of financial technical and human-resource constrains.

A community in downstream areas. Photo curtesy of DHM

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SOURCES

[1] Community Based Flood and Glacial Lake Outburst Risk Reduction Project website: http://cfgorrp.dhm.gov.np/
[2] Project Document of CFGORRP: http://cfgorrp.dhm.gov.np/wp-content/uploads/2016/01/project-document-cfgorrp.pdf

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