

**Goal of Approach:****Glacial Lake Outburst Flood Risk Reduction of Tsho Rolpa Glacial Lake, Nepal**

Objective: To reduce the potential damage due to glacial lake outburst flood (GLOF) from Tsho Rolpa glacial lake in Nepal

Expected Outcome: The experience gained from the implementation of the project is used by the Government of Nepal and other governments of Himalayan countries to formulate and implement other GLOF risk reduction measures

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**Main elements of the implementation strategy**

1. Assessment of the risk. This involved assessment of the potential triggering factors and estimation of the magnitude of the potential GLOF event and assessing the potential damage
2. Detailed geophysical study of the lake and the downstream environment. This will provide necessary information for the selection of mitigation measures.
3. Formulation of the detailed project: In this case the final decision was to construct an open channel through the end moraine. The open channel would release more water compared to the existing natural outlet of the lake and thereby reduce the lake water level by at least 3 m.
4. Detailed engineering design, planning and contracting
5. Implementation of the engineering works: The work started in the summer of 1999 and ended in the summer of 2000
6. The planned lake level reduction was achieved in the middle of July 2000
7. Regular monitoring of the functioning of the engineering structure (The measure implemented at Tsho Rolpa is functioning satisfactorily to date)

**Targeted beneficiaries**

1. Communities living downstream of Tsho Rolpa
2. Khimti Hydropower project and other projects in the pipeline
3. Government of Nepal

**Any significant lessons learned**

1. Community involvement is a must for the success of this project
2. The challenges of working in the harsh high Himalayan environment should be accounted in the planning process
3. Pro-activeness of the government, cooperation of scientific community, positive role of media and support of donor led to the success of the project

**Resource requirements**Information/data needs:

1. Detailed geophysical information about the environment surrounding the glacial lake, particularly the lake damming moraine
2. Bathymetric information of the glacial lake
3. Detailed topographic information of the river valley

4. Human resources availability
5. Logistical information
6. Material costs

Capacity needs:

1. Geophysical investigation
2. Bathymetric survey
3. Topographical survey
4. Engineering construction
5. High altitude survival

Financial resources:

~US\$ 3 million per lake for risk assessment

**Potential for replication or scaling-up**

1. Potential for replication but adequate site specific customization needed

**Any additional information**

A GLOF risk mitigation project is being developed by Ministry of Environment, Nepal with support from UNDP to lower the lake level of Imja glacial lake in Nepal



**Figure 1: Top picture shows the end moraine before construction. The middle picture shows the site during construction and the bottom picture show after lake lowering. The picture in the right shows details of the control structure.**