

Reducing Climate Change-Induced Risks and Vulnerabilities in Mountain Regions

South-South Cooperation and Knowledge transfer on the prevention of Glacier Lake Outburst Floods (GLOFs)

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1. The Climate Change-induced Problem

Key Climate Change effects in mountain regions are water-related:

- Increasing trend in overall rainfall (more very wet days)
- Higher rainfall variability
- Stronger monsoon rains with earlier onset dates
- Drier dry periods, with irrigated crops requiring more water
- Earlier melting of snow cover → Shifting times of peak discharge in river systems
- Increased river flow during monsoons and reduced river flows in dry season
- Short-term risk of stronger flooding, long-term risk of water shortages
- Increasing risk of **Glacier Lake Outburst Floods**



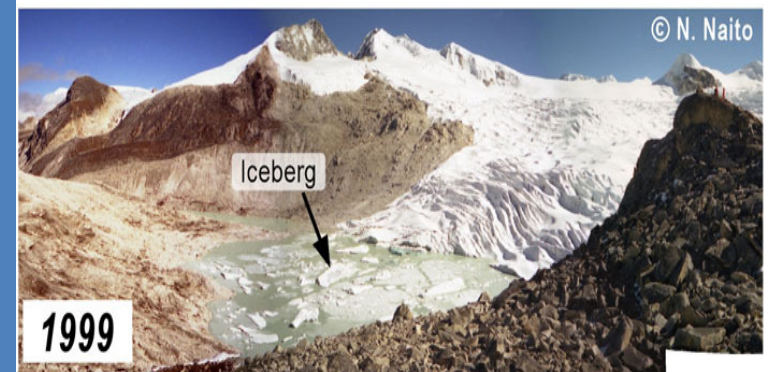
There are 203 potentially dangerous glacier lakes in Bhutan, China, India, Nepal and Pakistan (ICIMOD, 2010)

2. Adaptation Action:

What can Countries do to address the
GLOF problem?

1) Learn how to **assess risk** emanating from potentially hazardous Glacier Lakes:

- Geophysical studies of moraine dams
- Modeling of glacier lake growth
- Modeling of GLOF events
- Hazard and vulnerability mapping



2) Learn how to design/install GLOF Early Warning systems

- Which type of sensors to trigger a GLOF alert?
- Which type of warning signal/communication?
- High tech vs. low-tech?
- Backup systems?



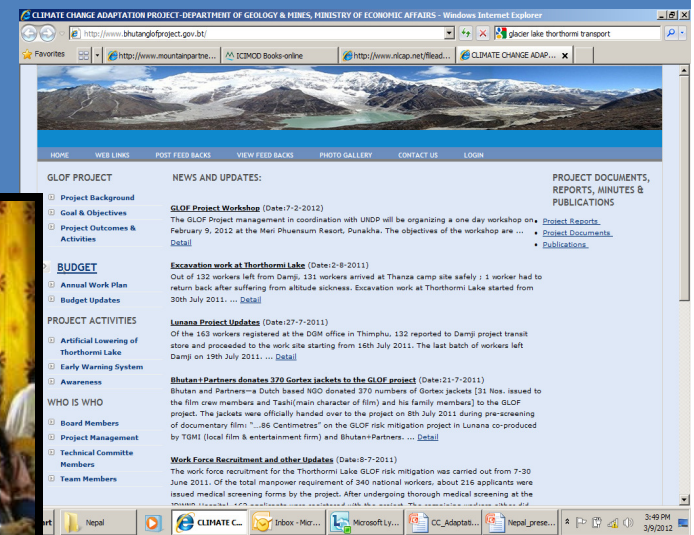
3) Learn how to **mitigate** growing pressure on thinning moraine dams

- How to design & conduct controlled drainage/excavation actions
- How to plan logistics of a high altitude engineering project
- How to ensure workforce health & safety in challenging conditions



4) Learn how to engage communities, create awareness and manage **knowledge** on GLOF risk issues

- How to communicate GLOF risk issues to communities & the public
- How to share GLOF risk information between government entities
- How to make GLOF-related knowledge widely accessible
- How to codify lessons learned



<http://www.bhutanglofproject.gov.bt>

3. South-South Cooperation

How do countries share knowledge
between each other?

UNDP is supporting 3 GLOF risk management projects in Asia:

Country	Status	Financial Scope	Implemented by
Bhutan	Implementation (since 2008)	3,5 mill US\$ (LDCF)	<ul style="list-style-type: none">- Dept. of Geology & Mines- Dept. of Energy- Dept. of Disaster Management
Pakistan	Implementation (since 2011)	3,6 mill US\$ (AF)	Ministry of National Disaster Management (NDM)
Nepal	Project Preparation	6,3 mill US\$ (LDCF)	tbd

Pathways of South-South knowledge transfer:

- Regional GLOF knowledge events
- Global GLOF knowledge events
- Technical documentaries/Outreach
- Exchange of technical reports
- Exchange of resource persons
- Technical referrals
- (- Joint analysis of common questions)
- (- Staff exchanges)

Lessons Learned:

- Face to Face vs. Web-based
- Sharing mistakes vs. sharing successes
- Role of facilitating/supporting organisations
- Complementary financing
- Looking beyond regional issues