

# Monitoring and Assessment of Changes in Glaciers, Snow, and Glacio-hydrology in the Hindu Kush Himalayas with a Special Focus on Strengthening the Capacity of Nepalese Organizations (HKH Cryosphere Monitoring Project; CMP)

## Himalayan Cryosphere, Climate and Disaster Research Center (HiCCDRC)

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### Introduction

- Snow and glaciers of the HKH region supply fresh water to the great river systems in Asia providing water for drinking, irrigation, and other uses for about 1.3 billion people.
- In recent decades, climate change impacts on the HKH region have been observed visibly, tangibly, and measurably (Beniston, 2003; Cruz et al., 2007). Hence, detailed and reliable data from this region and on impacts on the cryosphere are essential.
- In this regard, International Centre for Integrated Mountain Development (ICIMOD) in collaboration with partners from Nepal – Kathmandu University (KU), Department of Hydrology and Meteorology (DHM); Water and Energy Secretariat, Tribhuvan University (TU) – and with the support of the Norwegian Ministry of Foreign Affairs through the Royal Norwegian Embassy in Kathmandu is implementing this project. The main responsibilities of HiCCDRC, KU are to run a M.S. by Research in Glaciology course at KU, to carry out glacier mass balance of Yala and Rikha Samba glaciers, and help other partners of the project.

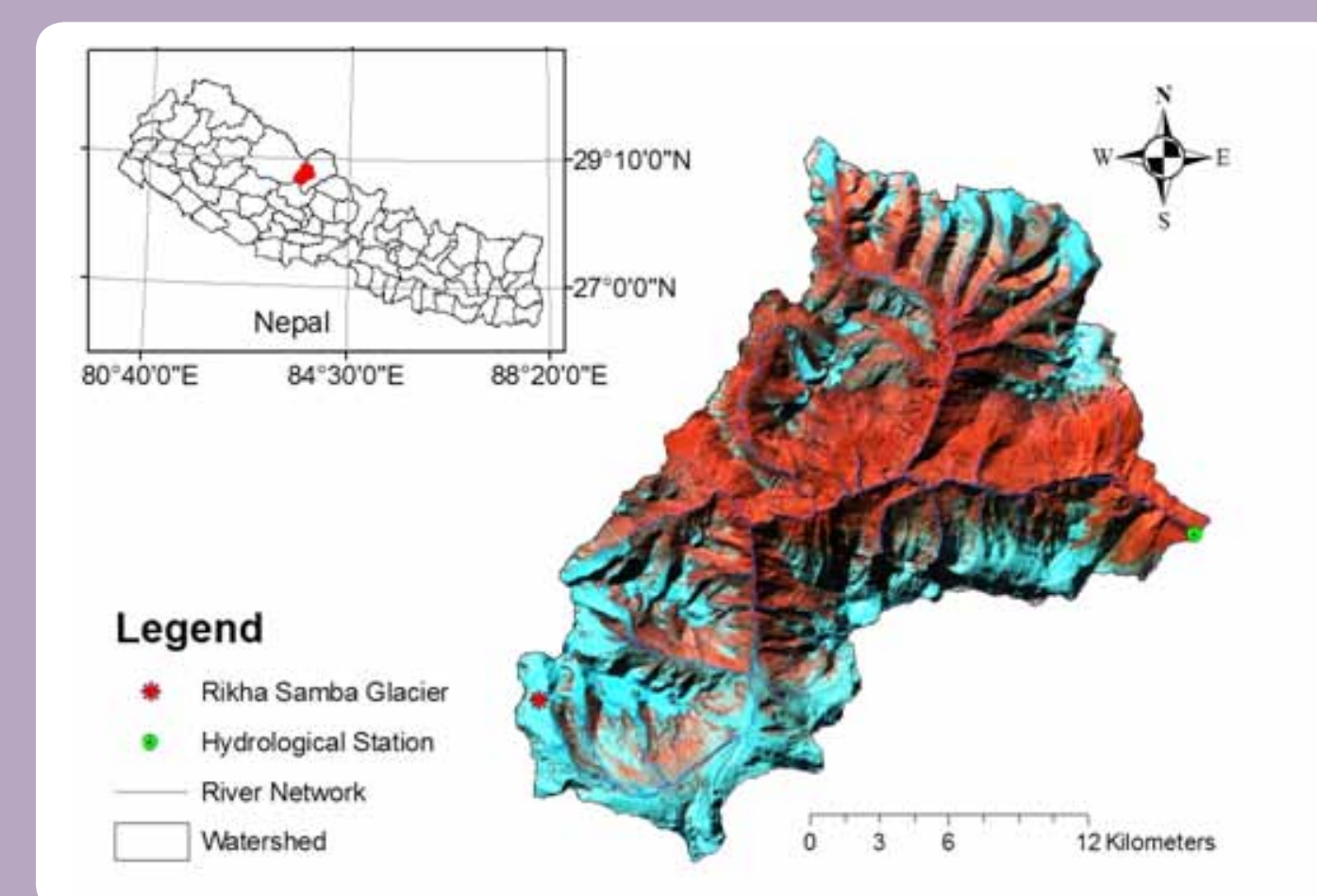
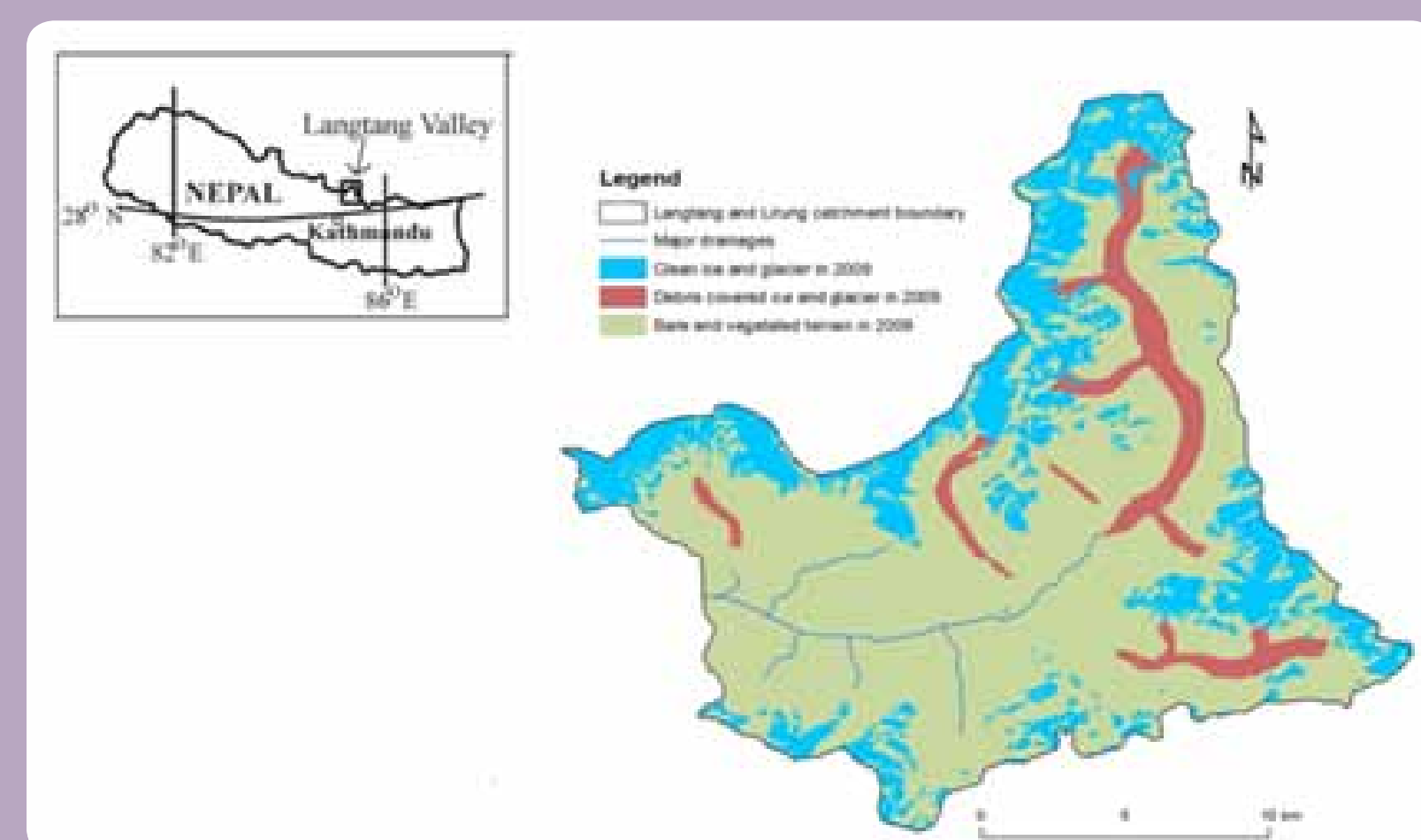
Project duration: 5 years from August 2011 to July 2016

### Main goal of the project

To improve knowledge and understanding on cryosphere by analysing changes in glaciers, snow and glacio-hydrology in relation to impacts of climate change for water resource management in the HKH region.

### Glaciers studied under CMP

- Yala Glacier (Langtang Valley, Rasuwa District)
- Lirung Glacier (Langtang Valley, Rasuwa District)
- Rikha Samba Glacier (Hidden Valley, Mustang District)



### Project activities

M.S. by Research in Glaciology course

#### Duration

- 2 years (4 semesters)
- Started from September 2011
- In total 11 students are undertaking their Master's degree course

#### CMP: 2012 batch students

- Achut Parajuli
- Lakshman Lama
- Mohan Bahadur Chand
- Sanjaya Gurung

#### CMP: 2013 batch students

- Tika Ram Gurung
- Sonam Futi Sherpa
- Gunjan Silwal
- Roshan Dahal

Student support from Contribution to High Asia Runoff from Ice and Snow (CHARIS) project funded by USAID through the University of Colorado, USA

#### CHARIS: 2012 batch students

- Hafizullah Resouli (Afghanistan)
- Hedayatullah Arian (Afghanistan)

#### CHARIS: 2013 batch students

- Rakesh Kayastha (Nepal)

### Project activities

#### Cryospheric field expedition to Langtang Valley, Rasuwa District

- 3 – 17 Nov. 2011
- 16 – 28 Mar. 2012
- 29 Apr. – 16 May 2012
- 25 Jun. – 9 Jul. 2012
- 31 Aug. – 9 Sep. 2012
- 26 Oct. – 10 Nov. 2012
- 24 Feb. – 4 Mar. 2013
- 15 Sept. – 5 Oct. 2013
- 8 Nov. – 23 Nov. 2013

#### Hidden Valley, Mustang District

- 2 – 17 Sept. 2011
- 25 Sept. – 11 Oct. 2012
- 24 Sept. – 10 Oct. 2013

#### Tiri, Mustang District

- 29 Apr. – 16 May 2012
- 11 – 19 Jan. 2013



Glacier terminus survey at Yala Glacier



Snow density measurement on Rikha Samba Glacier



Stake measurement on Yala Glacier

### Project Outcome

#### Graduated Students in September 2013 (CMP 2011 batch)



Bikas (KU)



Niraj (DHM)



Sonika (ICIMOD)



Prashant (ICIMOD)

#### Establishment of AWS and Hydrological Stations



Automatic weather station at Kyangjing



Automatic weather station at Yala Glacier Base Camp



Automatic Weather Station at Rikha Samba Glacier Base Camp

#### Publications

- Four Master's level dissertations
- Preliminary results of mass balance observations of Yala Glacier ... Baral, Kayastha,.... in Annals of Glaciology, 2014
- Three other papers are in the review process.

### Acknowledgments

We are grateful to ICIMOD for implementing this project and Norwegian Ministry of Foreign Affairs for providing financial support. Similarly, we are really thankful to our national partners DHM, WECS, TU for their cooperation and continuous support.

### Literature cited

- Beniston, M. 2003. Climatic change in mountain regions: a review of possible impacts. ClimaticChange 59:5-31.
- Cruz, R., et al. 2007: Asia. Pages 469–506 in M. Parry, et al. editors. Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth assessment report of the Intergovernmental Panel on ClimateChange. Cambridge University Press, Cambridge, United Kingdom



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