

2007



Photography: David Breashears, GlacierWorks

2007

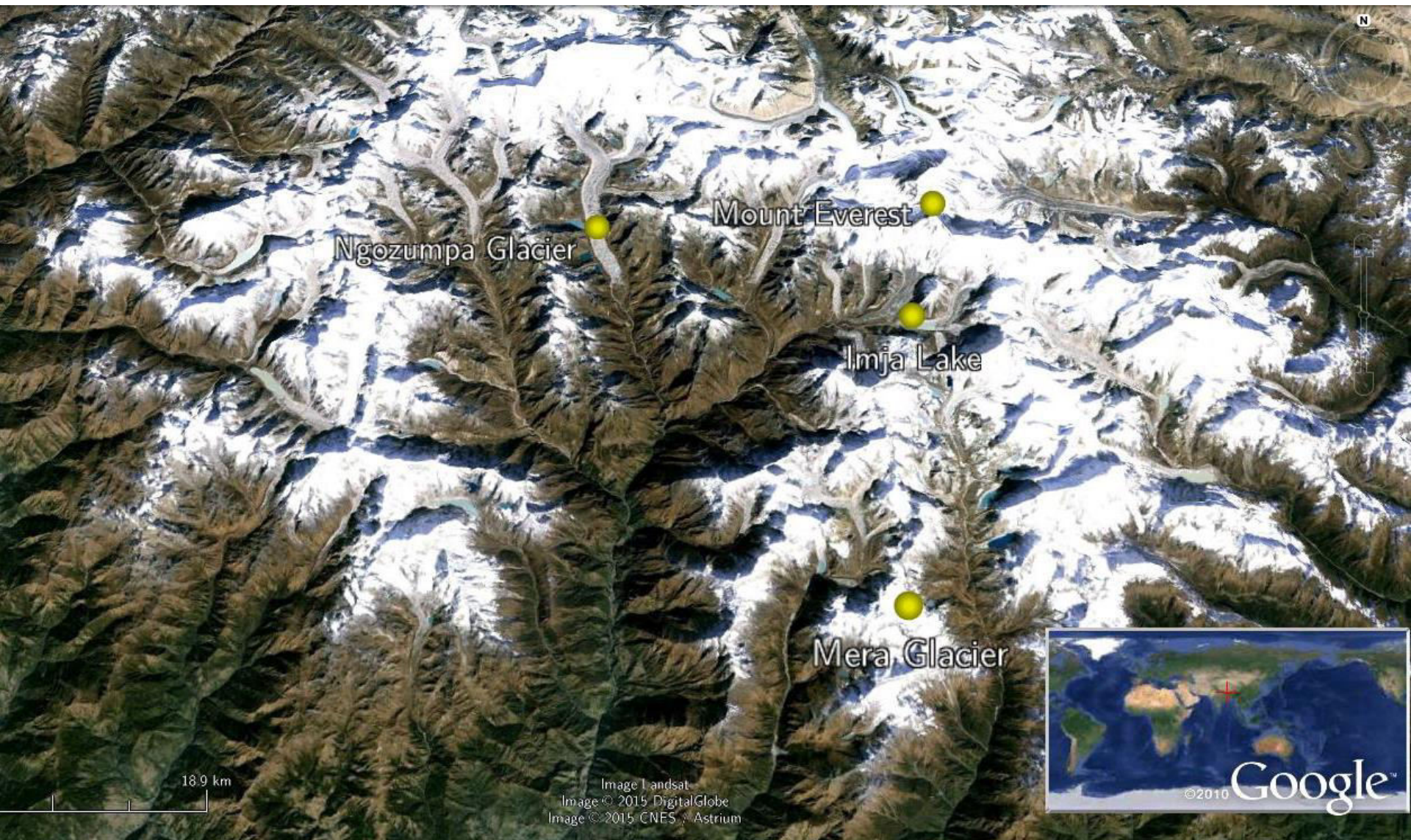


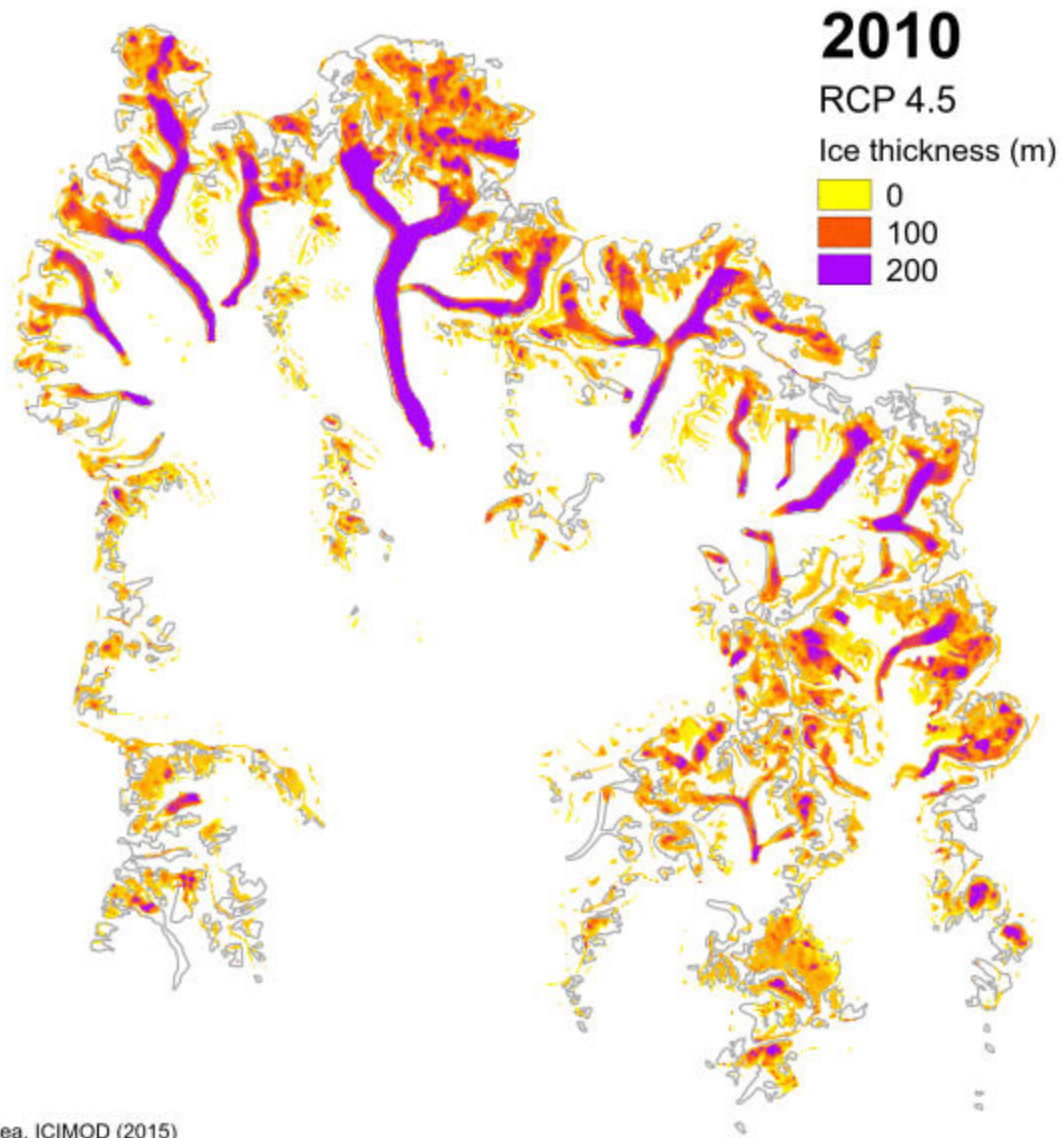
Photography: David Breashears, GlacierWorks



Photography: Jimmy Chin

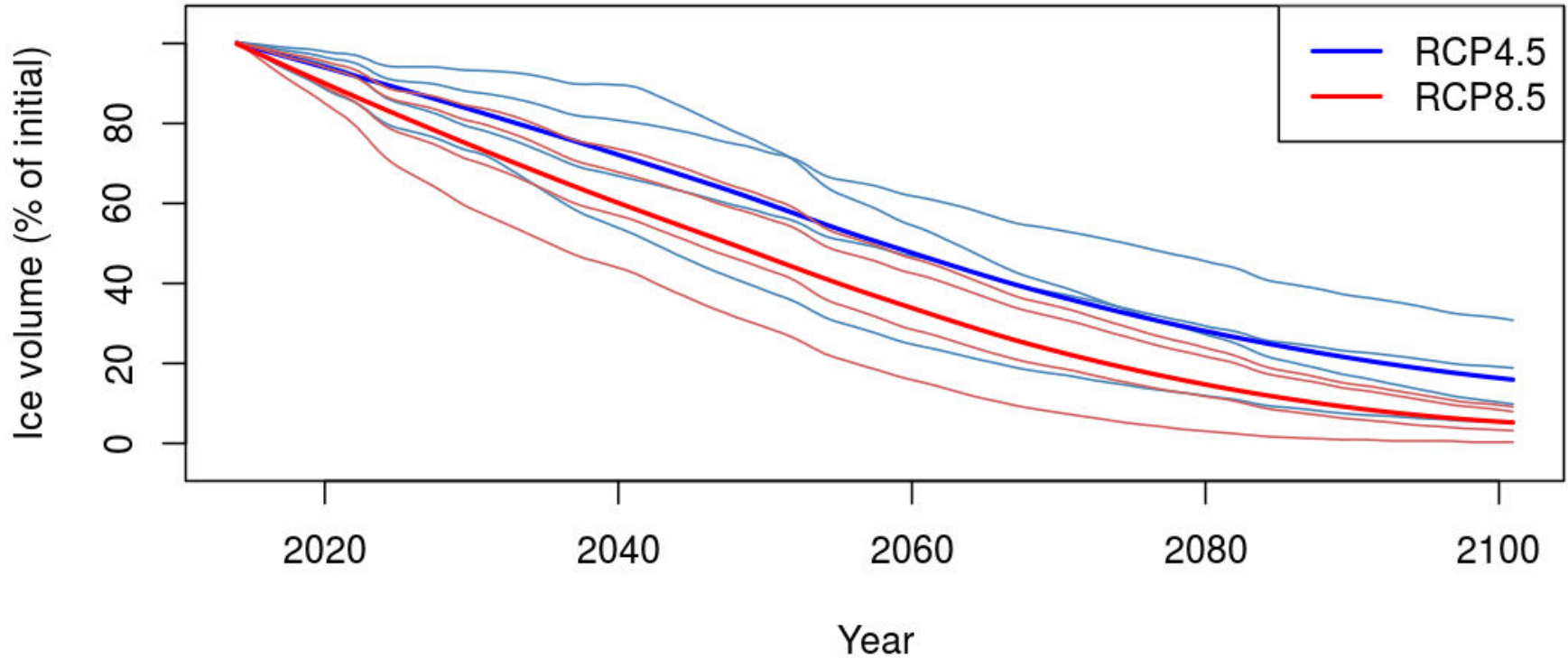
# Glacier Change in the Everest Region





J. Shea, ICIMOD (2015)

Changes in ice depth in the Dudh Koshi Basin  
*Middle of the road realization (RCP4.5)*



- **Sustained glacier loss in all scenarios, but sensitive to temperature rise**
- **What is the impact on flows downstream?**

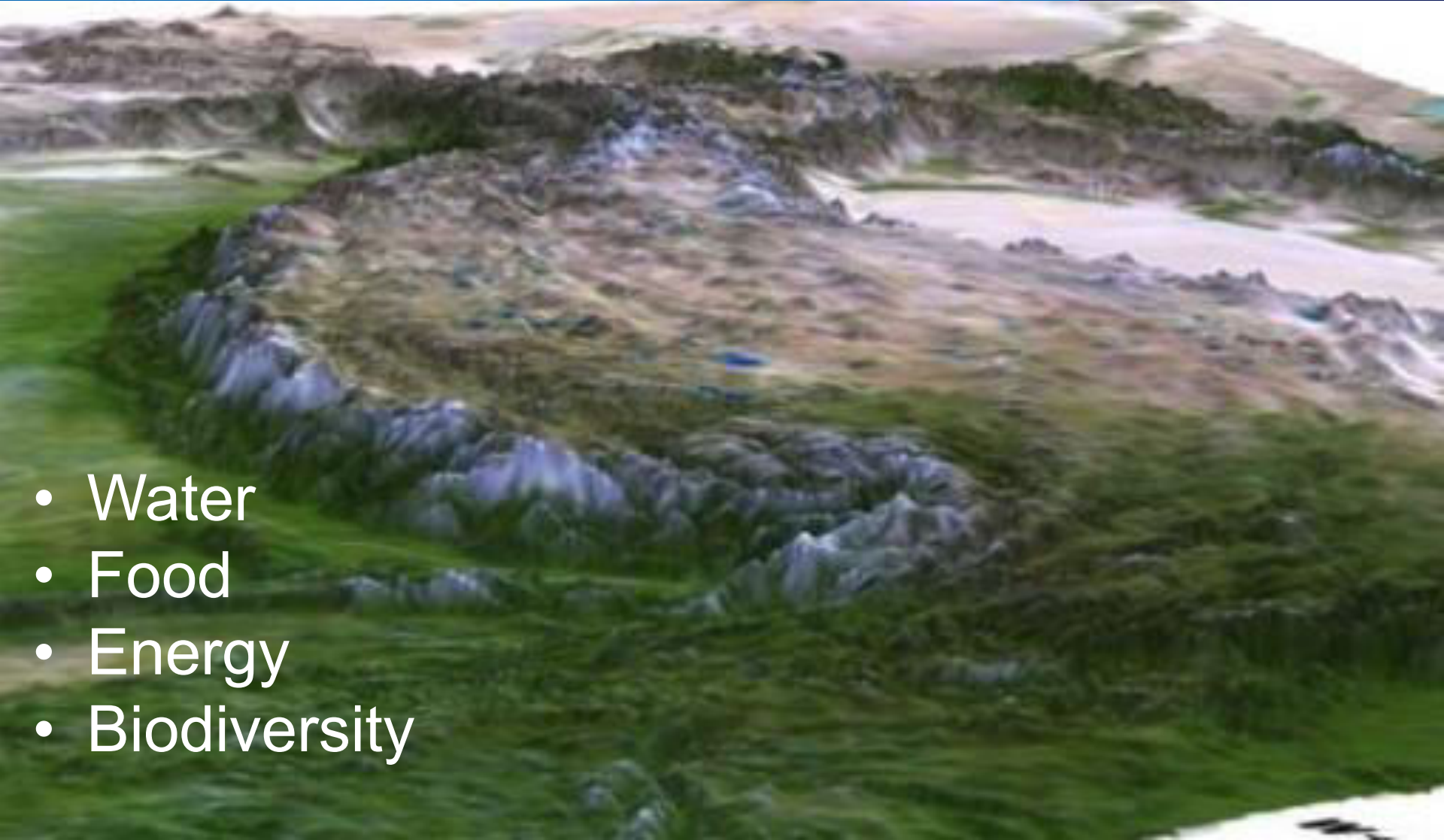
Shea et al., *The Cryosphere* [2015], Basin-scale study of historical and future glacier change

# The Hindu Kush Himalayan Region: A Global Asset

ICIMOD

FOR MOUNTAINS AND PEOPLE

- Water
- Food
- Energy
- Biodiversity



# Regional Intergovernmental Learning and Knowledge Centre

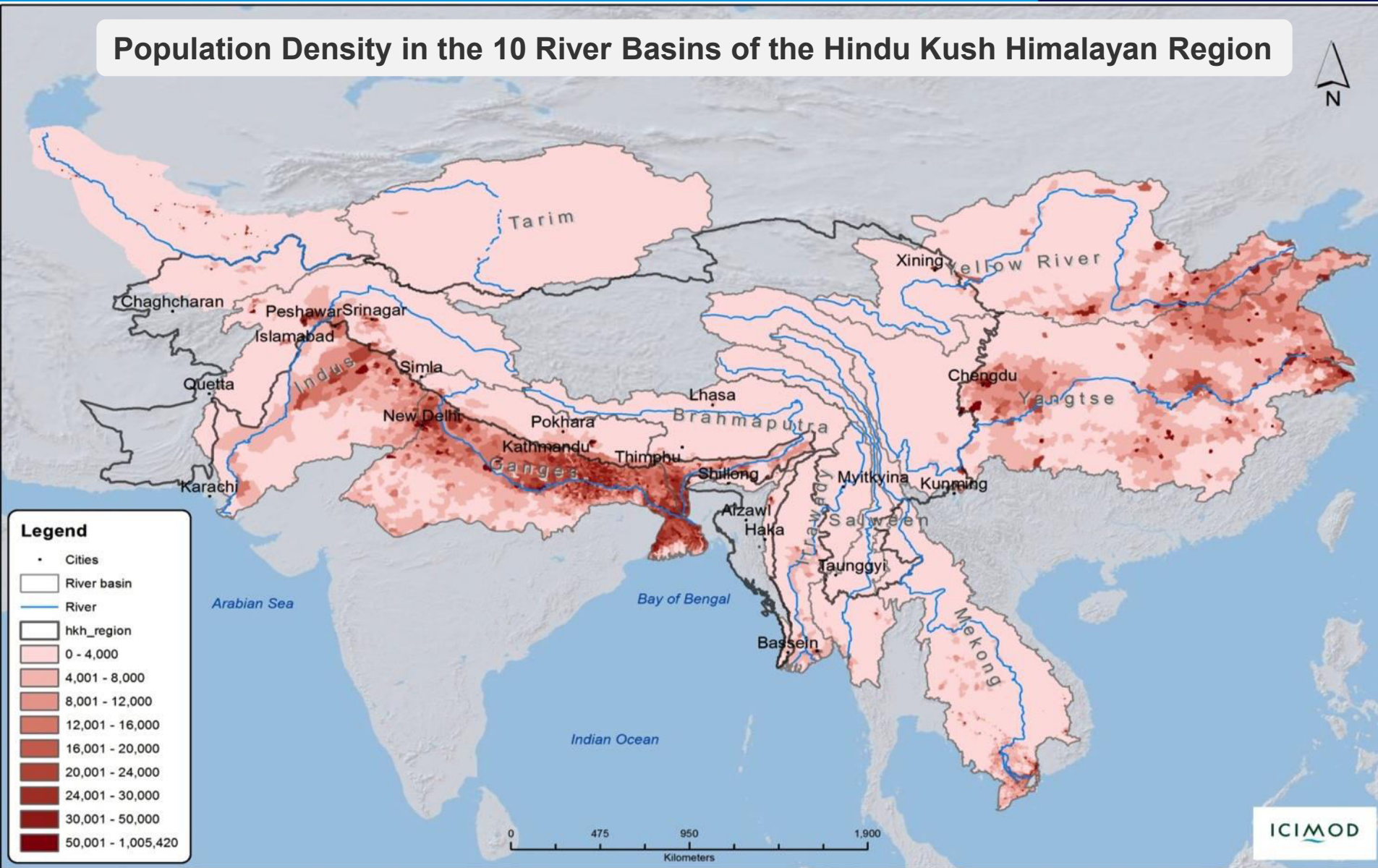
ICIMOD



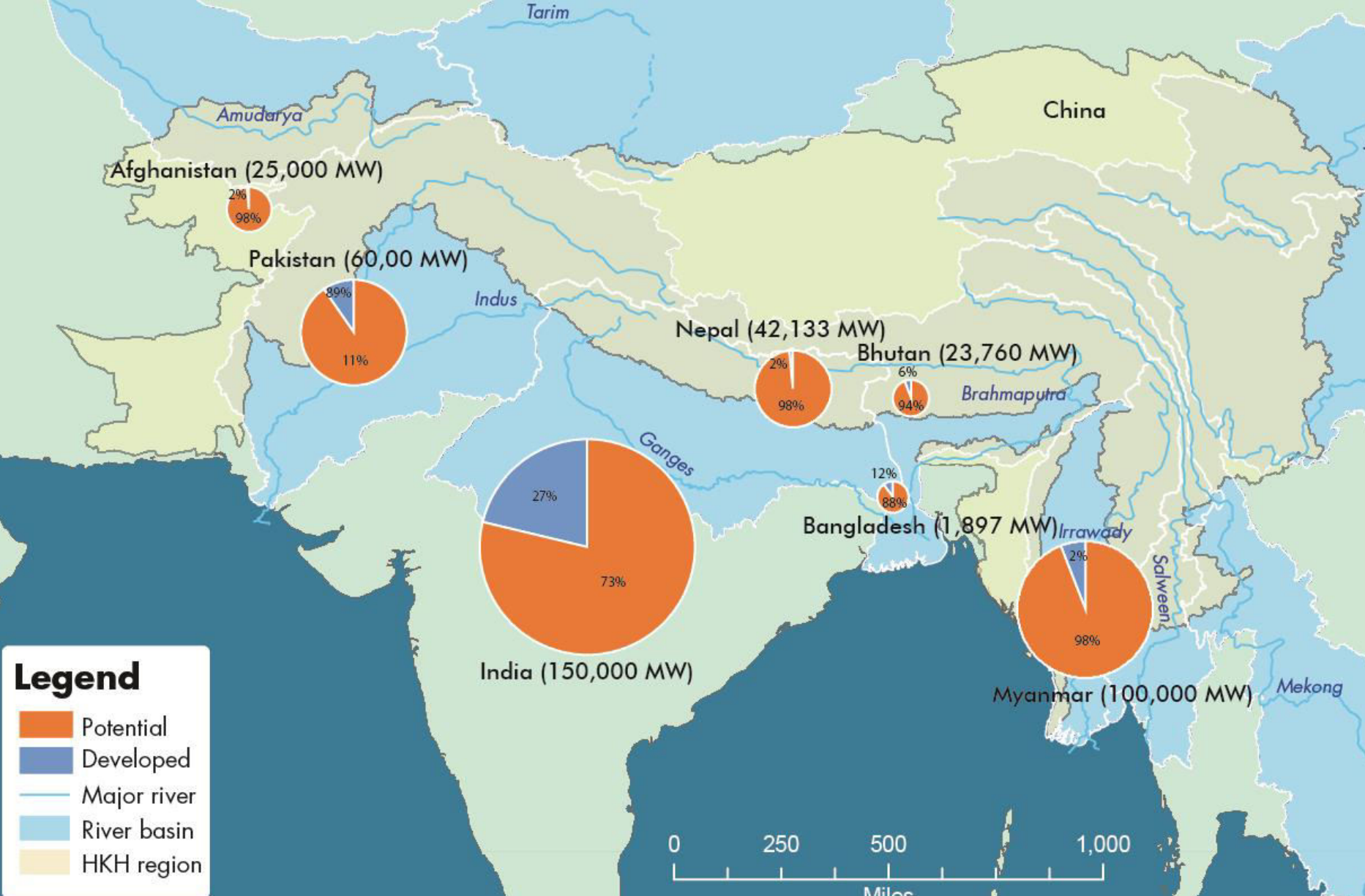


# Basins support some of the most populated areas on the globe

Population Density in the 10 River Basins of the Hindu Kush Himalayan Region



# Hydropower Development: Large unmet potential



# Water Towers of Asia: 1.3 billion people downstream



# Tracking changes in the glaciers

ICIMOD

FOR MOUNTAINS AND PEOPLE

## Significant Data Gaps Exist:

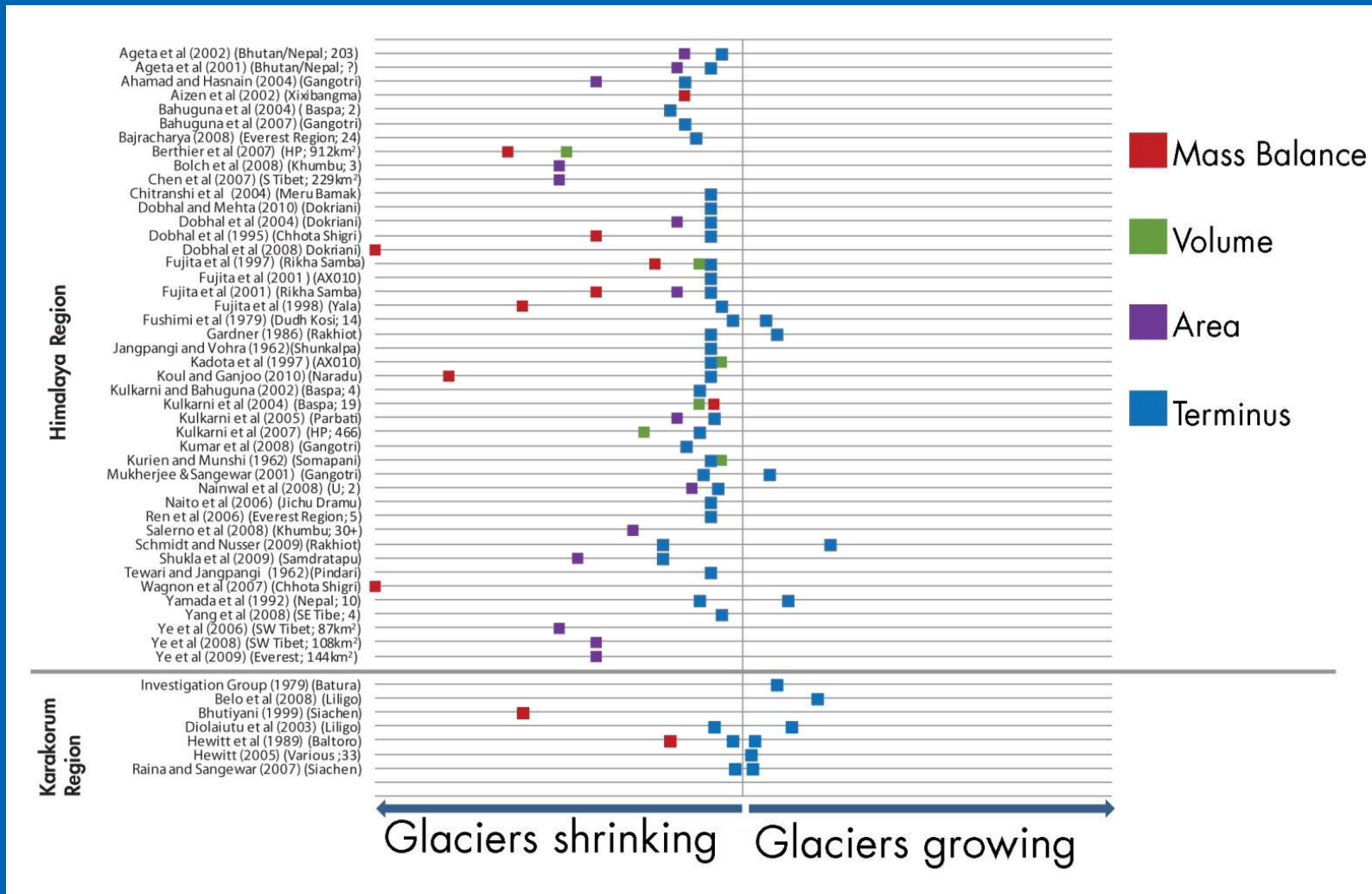
Snow, ice, permafrost,

High elevation, ppt, black carbon,





# Himalayan glaciers are shrinking according to many studies

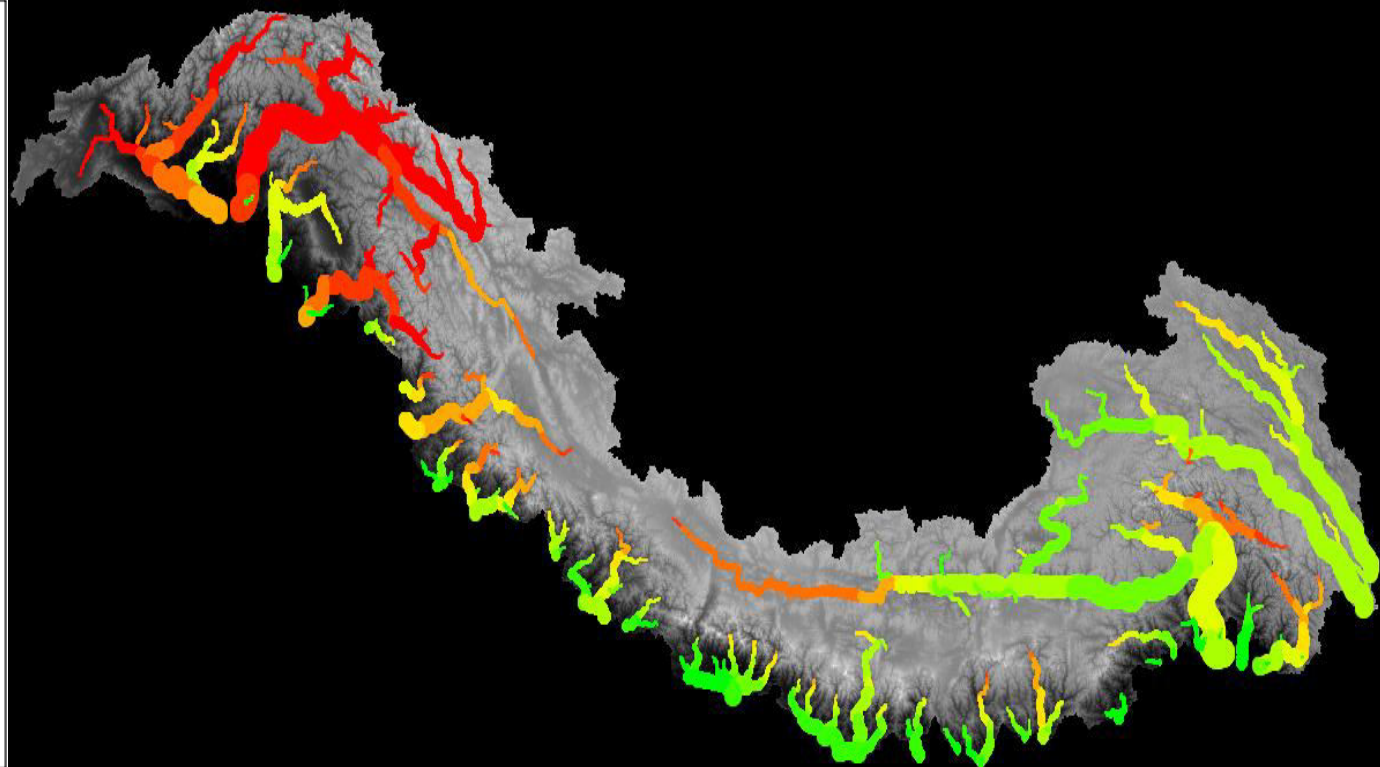


# Contributions of Glacier and Snow Melt to Runoff (1998-2007)

## Legend

Contrib. of glac. + snow melt to total flow (%)

- 0.0 - 10.0
- 10.1 - 20.0
- 20.1 - 30.0
- 30.1 - 40.0
- 40.1 - 50.0
- 50.1 - 60.0
- 60.1 - 70.0
- 70.1 - 80.0
- 80.1 - 92.0



Source: Lutz, Immerzeel, Shrestha, Bierkens, Nature Climate Change, 2014

# Water Towers of Asia: 1.3 billion people downstream



What will happen to  
water resources?

- Predicted annual flow volume— no significant change
- Loss of storage
- Closer to glacier, more impact
- Changing precipitation and flow patterns – more floods and droughts; high uncertainty



# Impacts on Local Communities: Loss of water source


ICIMOD

FOR MOUNTAINS AND PEOPLE



Passu, Pakistan

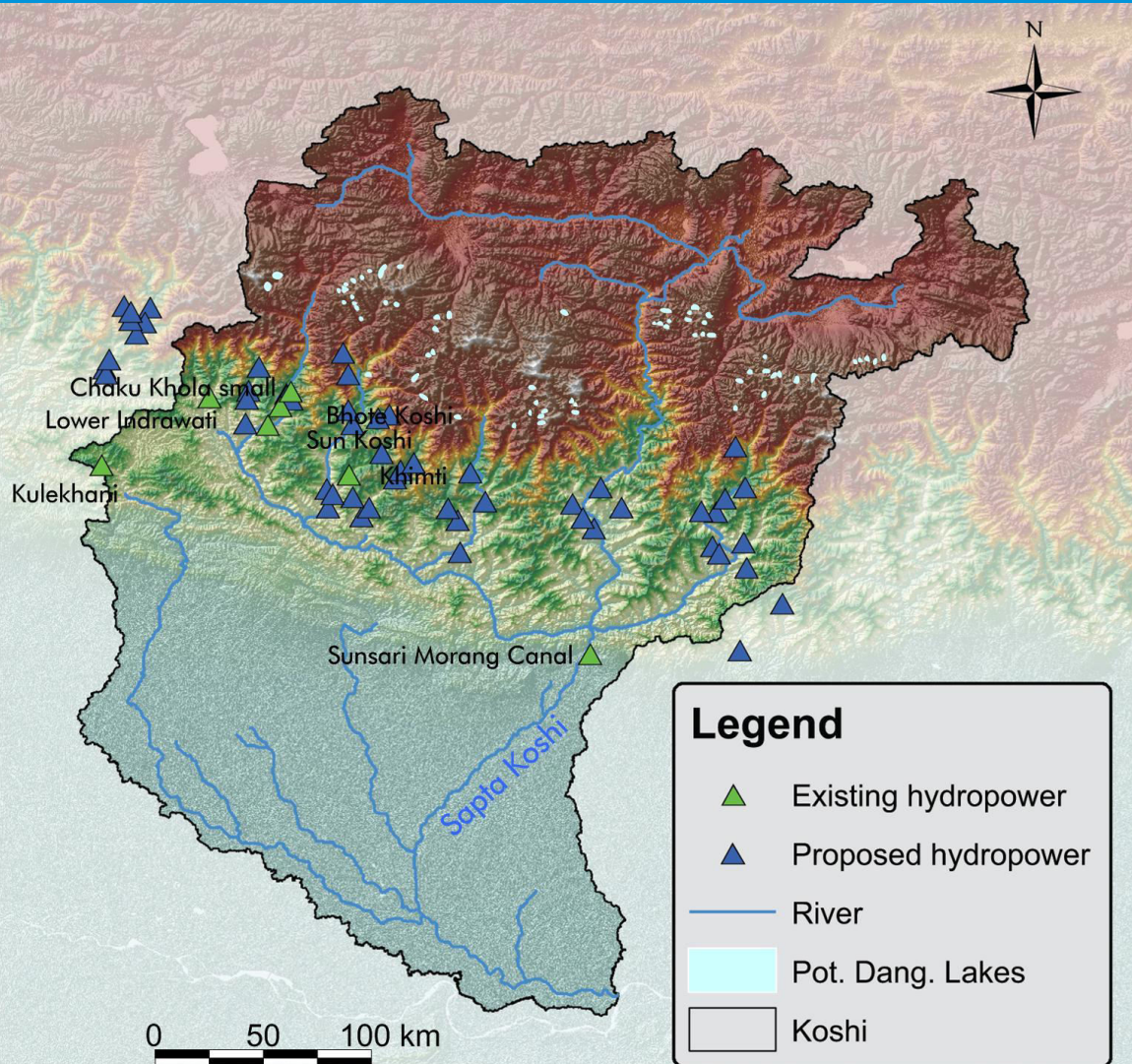
2009

A photograph of a high-altitude mountain range with snow-capped peaks and a turquoise glacial lake in the foreground. The sky is blue with scattered white clouds. The foreground is a rocky, brownish slope.

In Nepal:  
1,466 glacial lakes  
21 GLOF events  
24 dangerous lakes

Photography: David Breashears, GlacierWorks

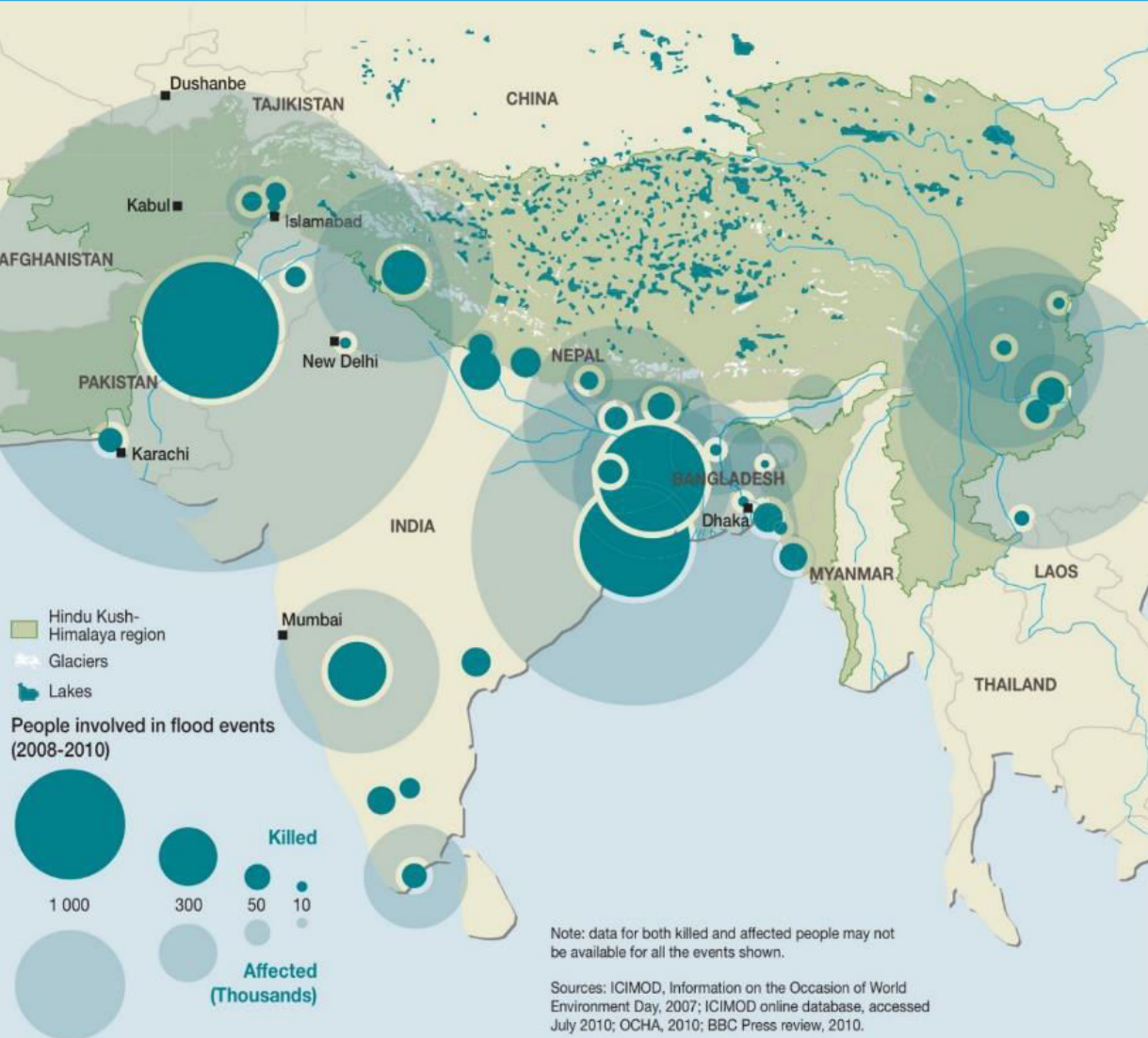
# Koshi River Basin: GLOFs and hydropower



China, Nepal, India

Transboundary  
Approaches are  
Critical!

# Disaster risk increasing with more extreme events



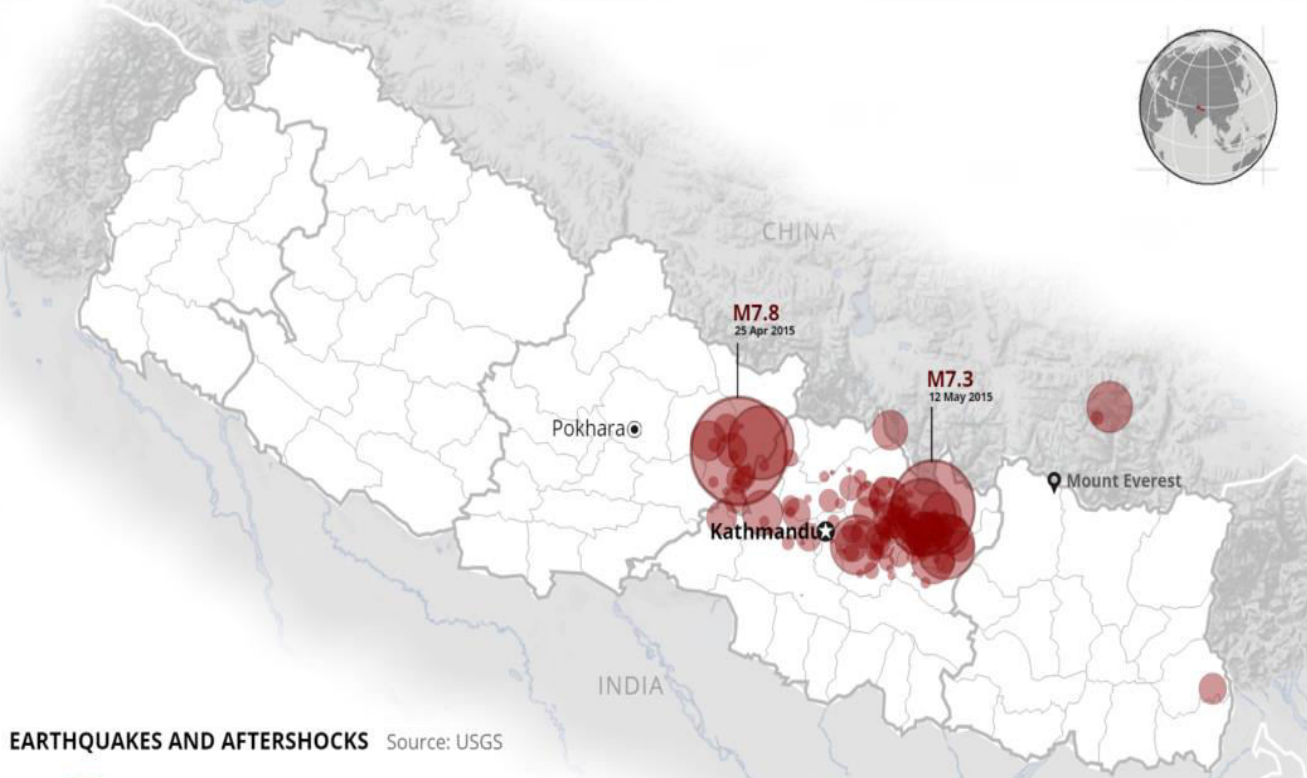
# Nepal: 2015 Earthquakes

Nepal experienced two major earthquakes on April 25 and May 12, 2015 at magnitudes of 7.8 and 7.3 respectively.

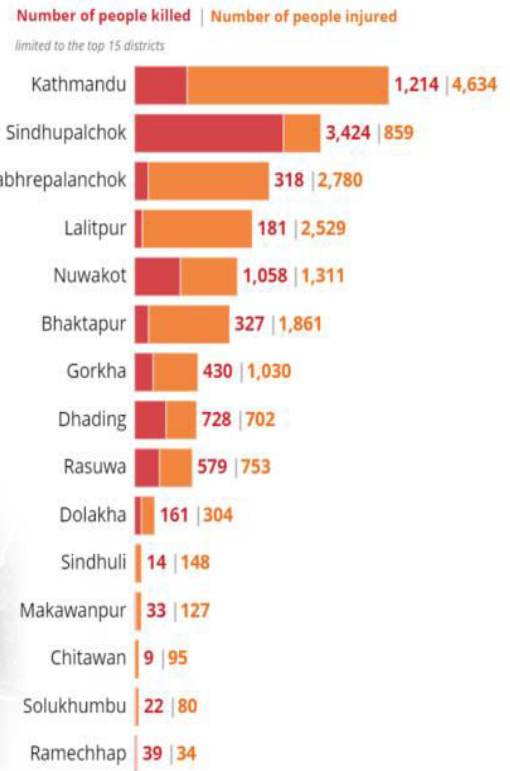
Number of people killed **8,604**  
As of 18 May 2015

Number of people injured **17,838**  
Source: UNRCO/Gov. of Nepal

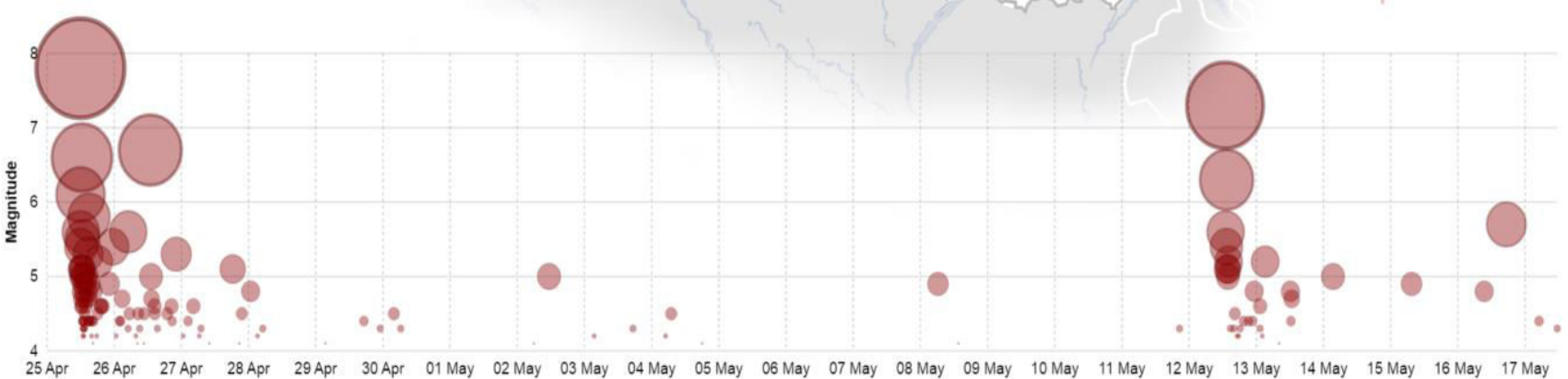
- INTERACTIVE MAP
- EARTHQUAKES AND AFTERSHOCKS**
- PEOPLE KILLED BY DISTRICT
- PEOPLE INJURED BY DISTRICT

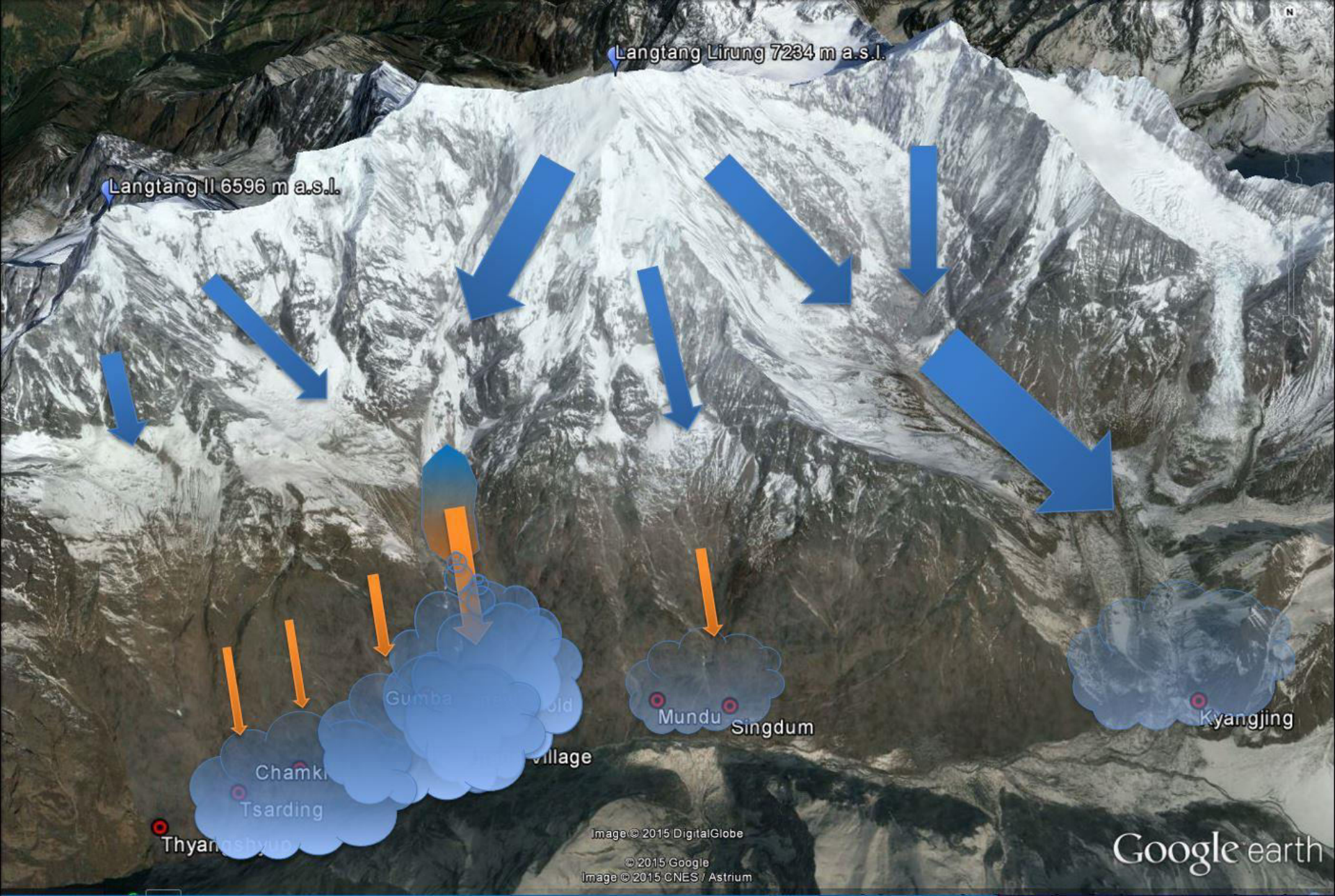


## PEOPLE KILLED AND INJURED BY DISTRICT



## EARTHQUAKES AND AFTERSHOCKS Source: USGS





# Disaster in Langtang Valley

- Stripped trees and knocked them down



# Landslide buries majority of Langtang Village

ICIMOD





Sun Koshi Landslide 2 August 2014

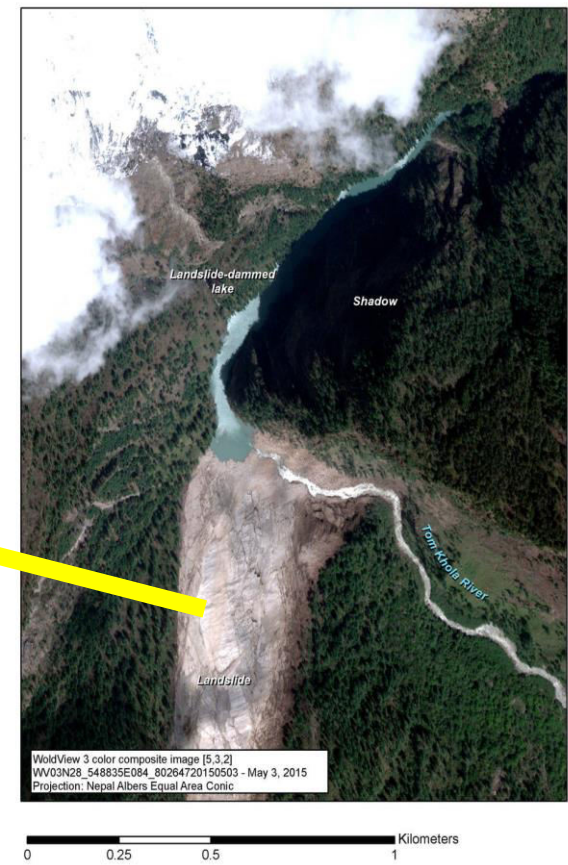
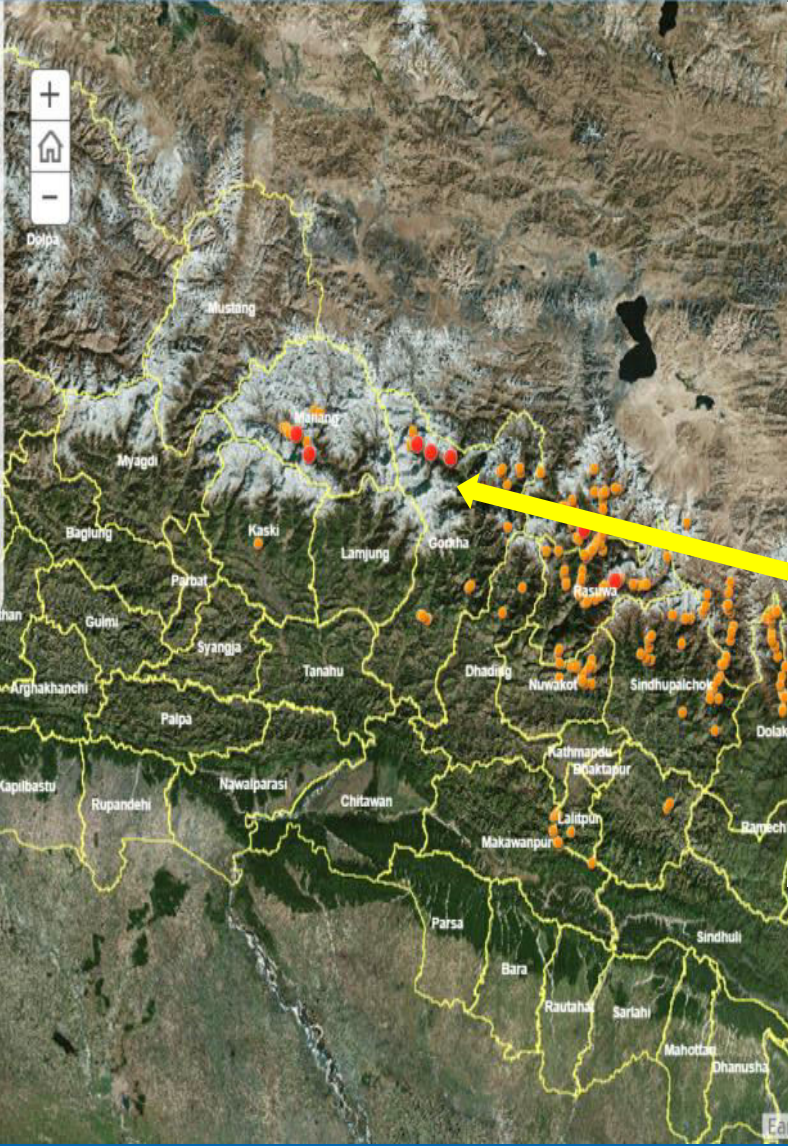
ICIMOD



# The Location of Major Landslide occurred after the Earthquake

1 2

To date, the response teams have identified over 3,000 landslides, and assembled a database of over 250 identified landslides and other large mass movements, focusing specifically on those that were generated by the earthquake and its aftershocks or other secondary effects.



WorldView 3 color composite image [5.3.2]  
WV03N28\_548835E084\_80264720150503 - May 3, 2015  
Projection: Nepal Albers Equal Area Conic



For more information visit: <http://arcg.is/1FlvKnt>



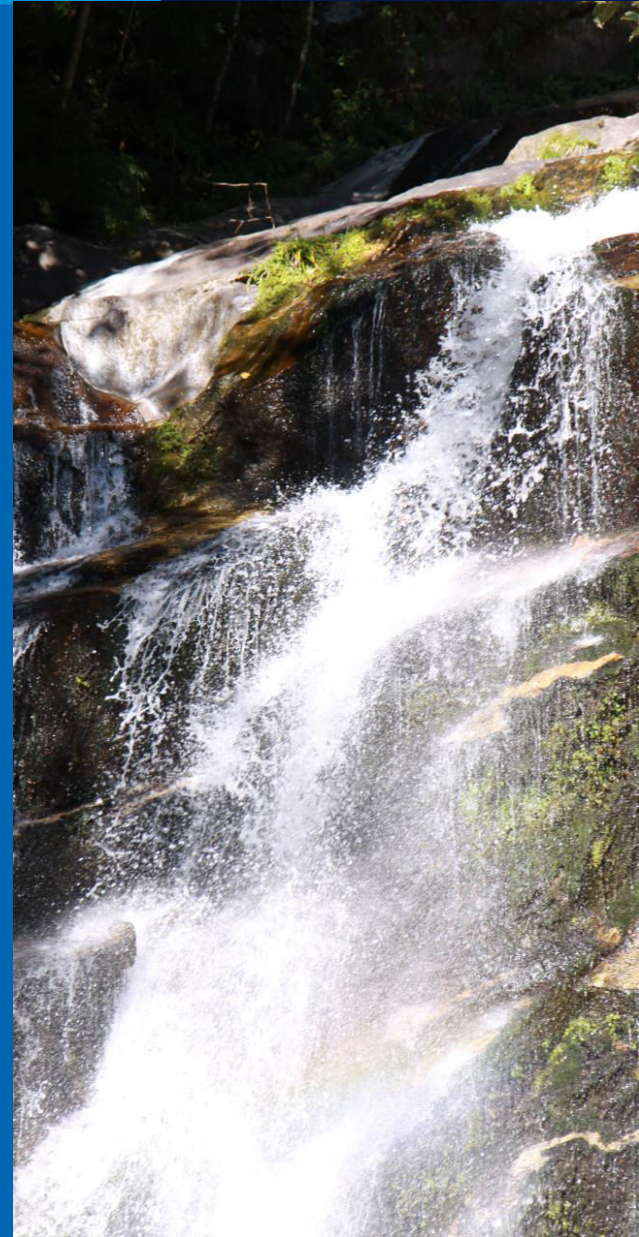


Emerging issues:  
Sanitation  
Clean water  
Spring Sources



# Change Brings Opportunities

- Transformative reconstruction
- Diversified livelihood options - high-value products and value chains, ecotourism, remittances
- Upstream-downstream linkages
- Sustainable energy
- Benefit sharing
- Cross border scientific collaboration



- UNFCCC – funding for adaptation, loss and damage
- SDGs – water and mountains cross cutting
- Sendai Disaster Risk Reduction Framework

# Thank You

ICIMOD

FOR MOUNTAINS AND PEOPLE

