Glacier Change in the Everest Region
Changes in ice depth in the Dudh Koshi Basin
Middle of the road realization (RCP4.5)
Study findings

- 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

- Water
- Food
- Energy
- Biodiversity
Regional Intergovernmental Learning and Knowledge Centre

210 million people in the HKH

1.3 billion people downstream
Basins support some of the most populated areas on the globe.
Hydropower Development: Large unmet potential

- Afghanistan (25,000 MW)
- Pakistan (60,000 MW)
- Nepal (42,133 MW)
- Bhutan (23,760 MW)
- Bangladesh (1,897 MW)
- Myanmar (100,000 MW)

Legend:
- Potential
- Developed
- Major river
- River basin
- HKH region
Water Towers of Asia: 1.3 billion people downstream

What is happening to the cryosphere?
Tracking changes in the glaciers

Significant Data Gaps Exist:
Snow, ice, permafrost,
High elevation, ppt, black carbon,
Himalayan glaciers are shrinking according to many studies. Note: Brackets include the name of glacier or region with associated number/area (km²) of glaciers studied if more than one single glacier; U=Uttarakhand, HP=Himachal Pradesh.

Source: Miller et al. (2011)
Contributions of Glacier and Snow Melt to Runoff (1998-2007)

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

Passu, Pakistan
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

Source: IndiaLookUp.in

Note: data for both killed and affected people may not be available for all the events shown.

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
As of 18 May 2015

Number of people injured
Source: UNOCHA/Gov. of Nepal

17,838

EARTHQUAKES AND AFTERSHOCKS

Source: USGS

INTERACTIVE MAP

PEOPLE KILLED BY DISTRICT

PEOPLE INJURED BY DISTRICT

PEOPLE KILLED AND INJURED BY DISTRICT

Number of people killed | Number of people injured

Kathmandu | 1,214 | 4,634
Sindhupalchok | 3,424 | 859
Kabhrepalanchok | 318 | 2,780
Lalitpur | 181 | 2,529
Nuwakot | 1,058 | 1,311
Bhaktapur | 327 | 1,861
Gorkha | 430 | 1,030
Dhading | 728 | 702
Rasuwa | 579 | 753
Dolakha | 161 | 304
Sindhuli | 14 | 148
Makawanpur | 33 | 127
Chitwan | 9 | 95
Solukhumbu | 22 | 80
Ramechhap | 39 | 34
Pressure blast from avalanche

- Stripped trees and knocked them down
Landslide buries majority of Langtang Village
The Location of Major Landslide occurred after the Earthquake

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.

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
Global Opportunities - 2015

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