Climate change impacts on future water availability and disaster risks

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The Hindu Kush Himalaya

Largest mass of snow and ice after 2 poles
Source of 10 major river basins
Monsoon dominated climate

The Climate Context

Rapid warming (0.2/ decade) comparable or higher than global average warming

Precipitation extremes increasing- extreme and erratic rainfall

Both warming and precipitation extremes to increase in the future:

- 2.2–3.3˚C for RCP 4.5 and 4.2–6.5˚C
- Rainfall to increase by upto 25% BEC
- Elevation dependent warming

1.5 degree too hot for HKH !

1.5 degree world- 1/3 glacier volume loss

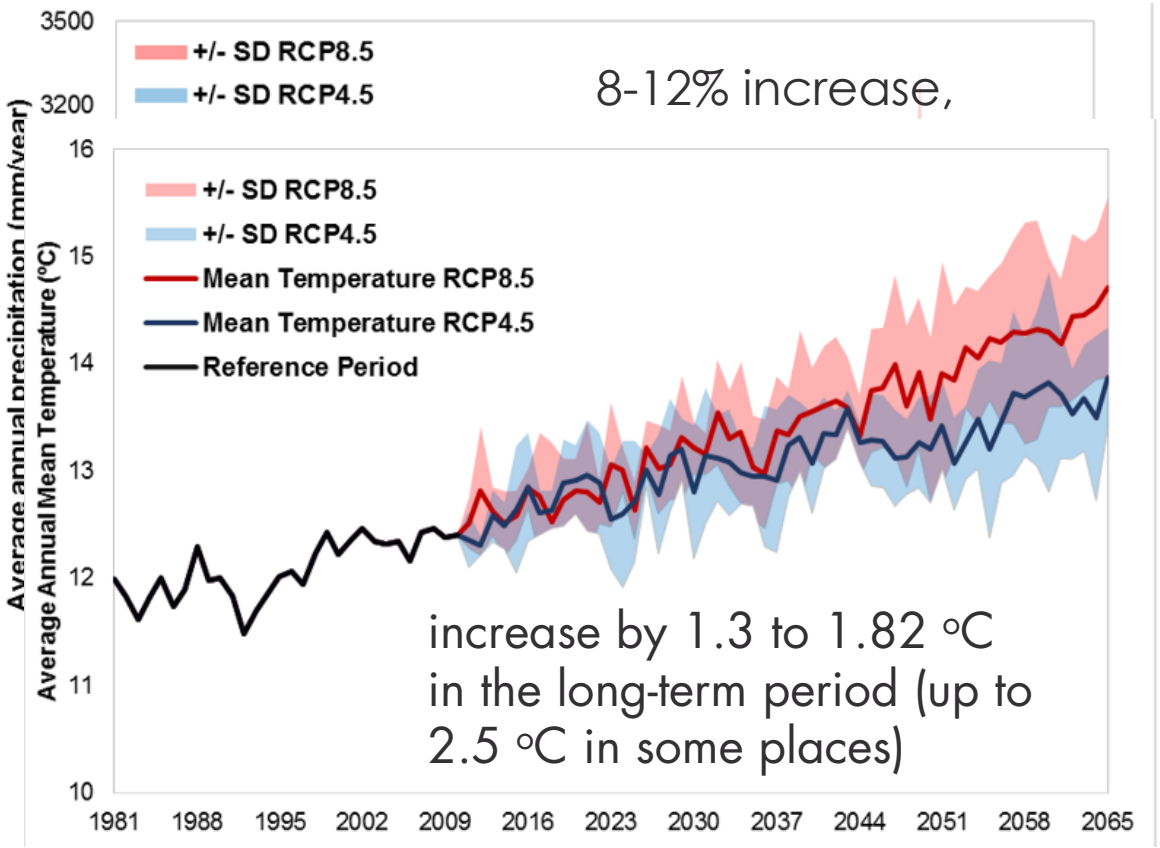
Current emission – 2/3 glacier volume loss

Climate change in Nepal

Increasing temperature trend

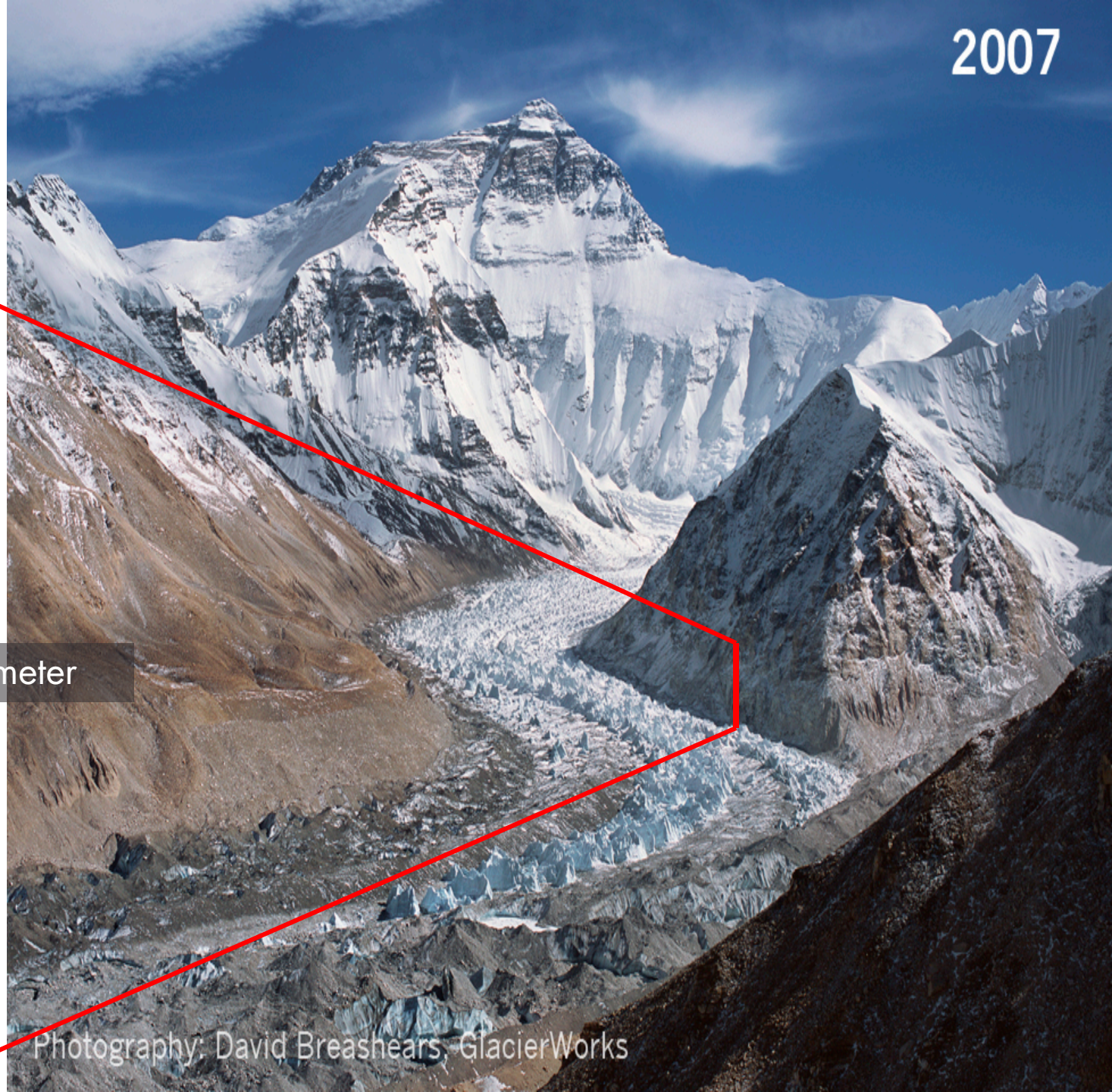
- Maximum temperature was increasing at the rate of 0.06°C/year (Shrestha et. al. 1999 DHM, 2017)
- Elevation dependent warming: Mountains are warming more than the Plains

Rising precipitation extremes across Nepal (Karki et al. 2017)

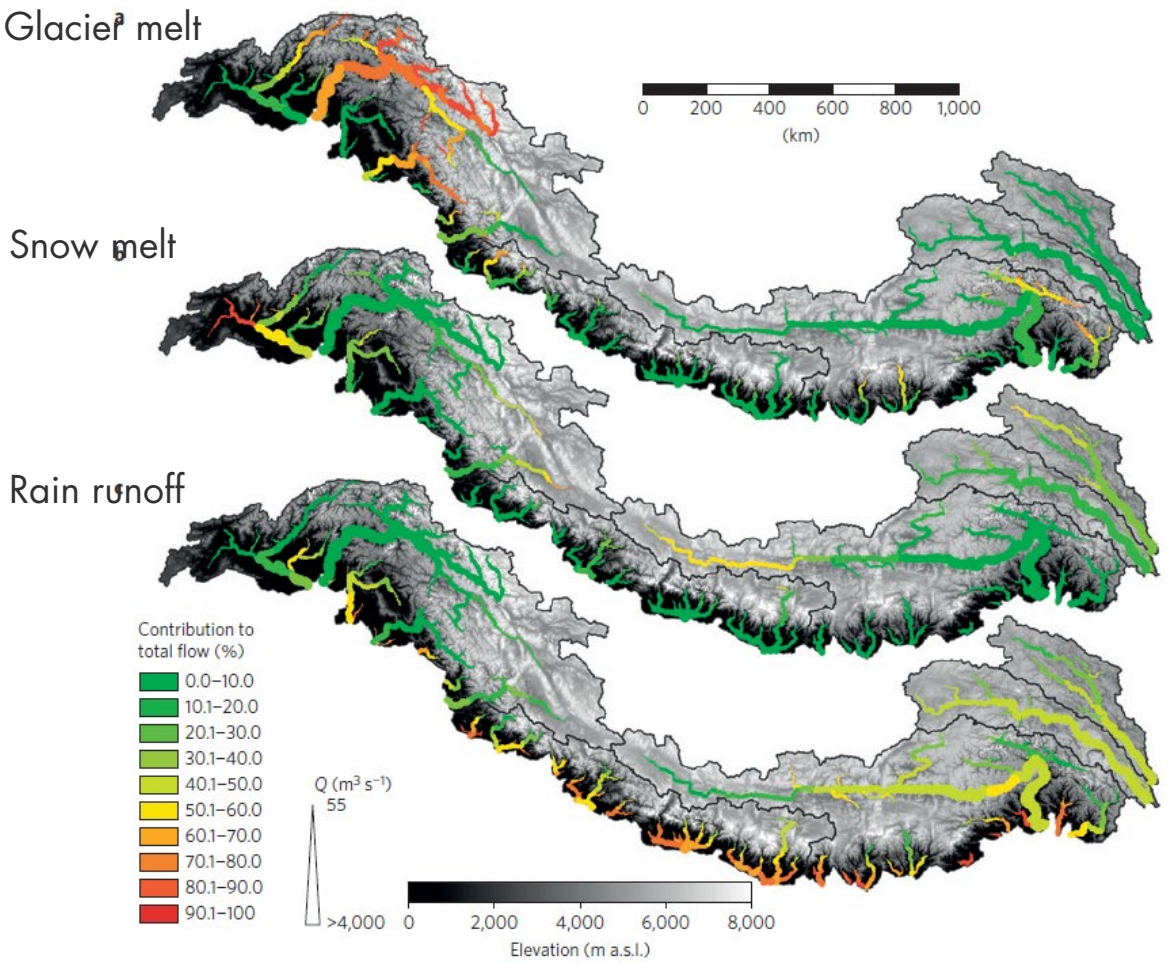


Changes in glaciers

Changes in glaciers



Water availability scenarios



Indus: Glacier melt dominates

Brahamputra: Snowmelt in the upper reach, rain runoff in lower reach

Ganges: Rain runoff dominates the streamflow

Water availability will be a challenge in Indus and head waters of other river basins

Shrestha et al., 2015; HKH Climate and Water Atlas, ICIMOD; Lutz et al. 2014

More impacts in the headwaters

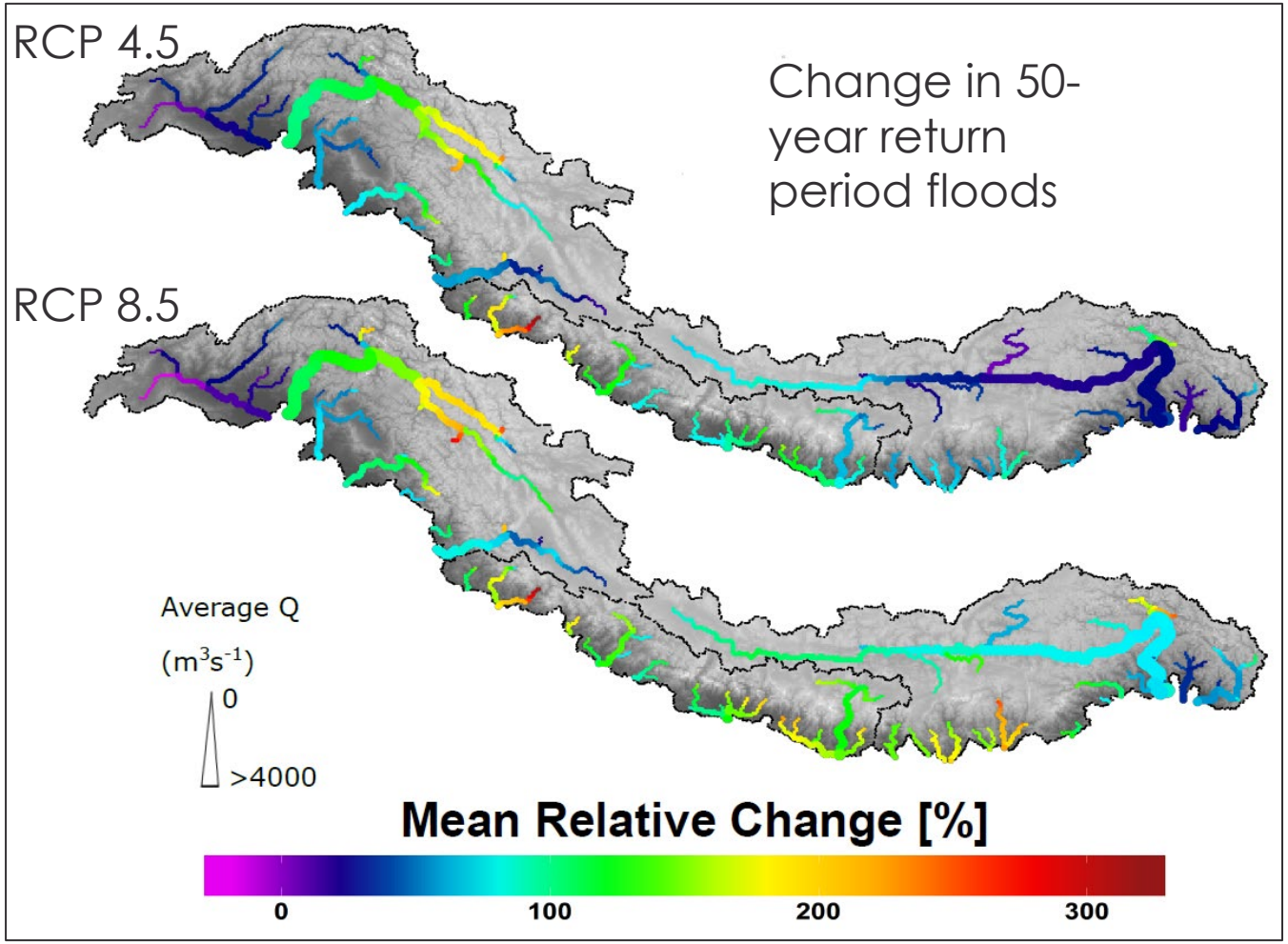
Passu glacier, Pakistan

Floods of different types are common in HKH

GLOF in TAR, China

Dead: ~1800
Loss: $43 billion

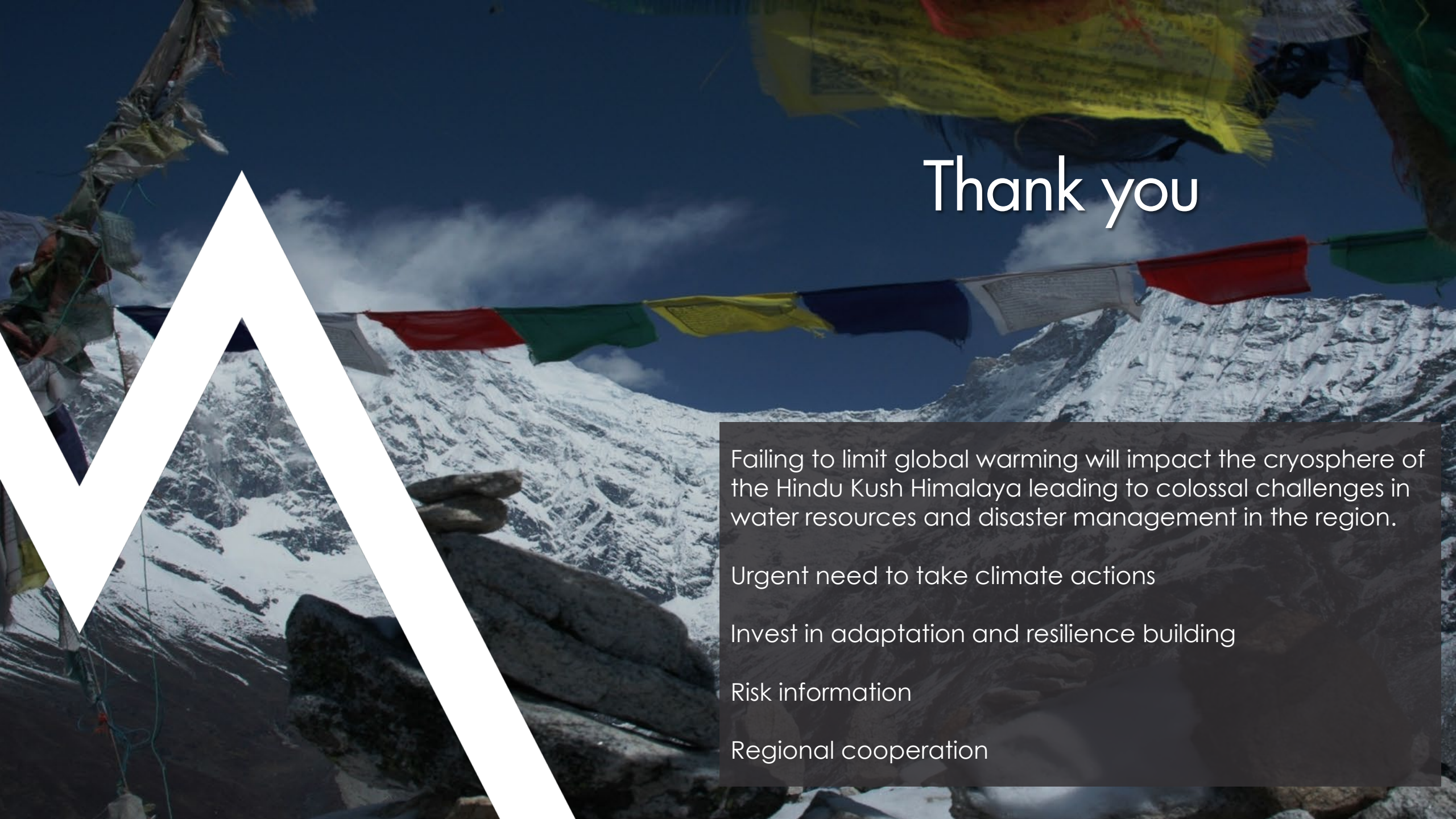
Changes in extremes: Floods



Extremes will increase strongly during the 21st century, almost doubling in magnitude by the end of the century

Bigger and frequent floods !

Source: Wingaard et al. 2017, PlosOne



Thank you

Failing to limit global warming will impact the cryosphere of the Hindu Kush Himalaya leading to colossal challenges in water resources and disaster management in the region.

Urgent need to take climate actions

Invest in adaptation and resilience building

Risk information

Regional cooperation