Managing Water & Climate Risks in the Himalayan Region.

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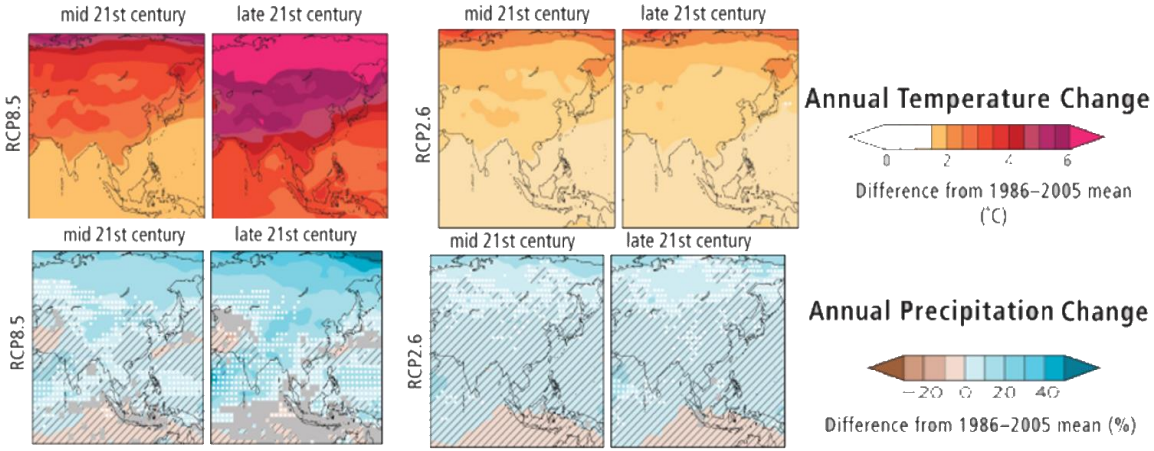
International Water Management Institute

- Climate Change Impacts
- Solutions for Managing CC Risks

Asia's Vulnerability to Climate Change

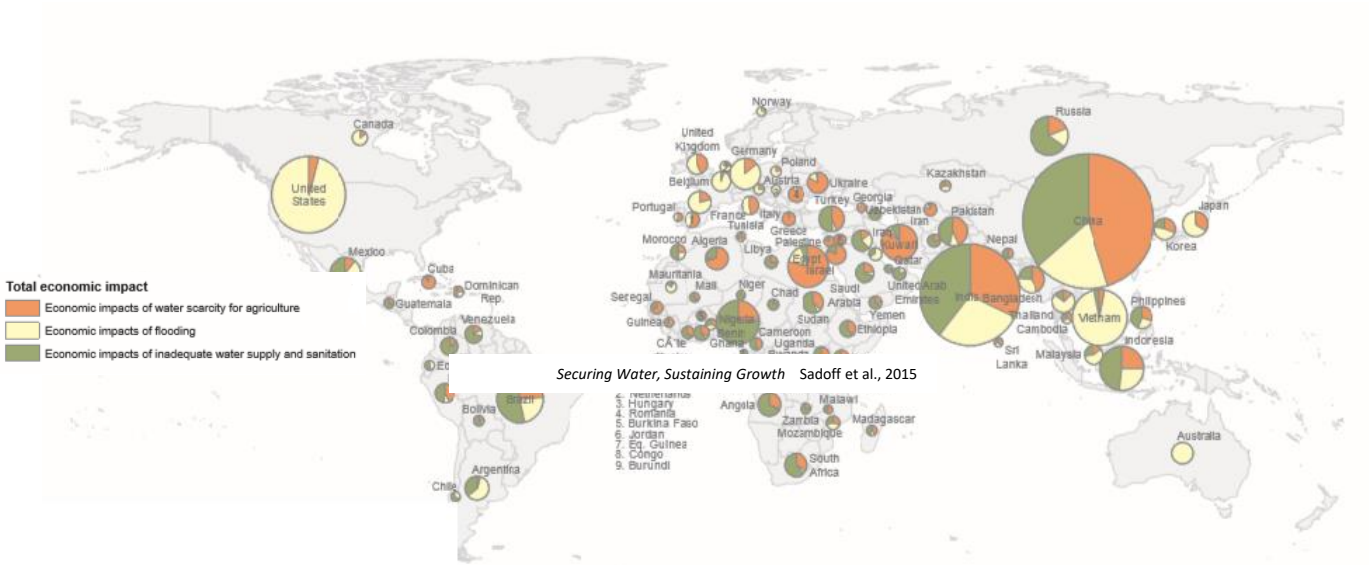
- IPCC 5th Assessment Report observes **climate change** is already happening in Asia and **impacts are already being felt**
- Average annual temperatures could rise by **more than 2°C** and more rainfall likely at higher latitudes by mid 21st century
- **More likelihood of extreme rainfall events** related to monsoons
- **Increased water related risks** -drought, flood, hails, cyclones and related water and food shortages.



ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

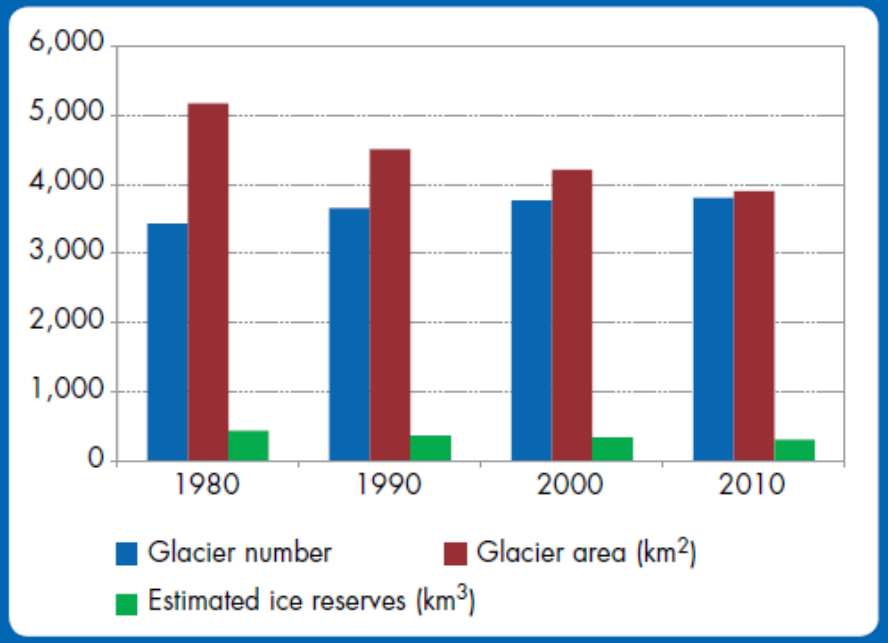
Asia: Concern over water

- Asia has the largest global concentration of water-related risks ($)
- 25% more people by 2050 in Asia
- Domestic water demand to triple & industrial to double by 2050
- By 2050, 40% of Asia's population in severe water scarcity



25% decrease in glacier area in Nepal in between 1980 and 2010

Figure 4.1: **Glacier number, area, and estimated ice reserves in Nepal in ~1980, 1990, 2000, and 2010**



- Glacier area decreased from
  - ~1980: 5168 km^2
  - 2010: 3902 km^2 (25%)

Glaciers impact the immediate downstream communities but the monsoon is the is the bigger hydrological driver

(Bajracharya et al. 2014, ICIMOD)

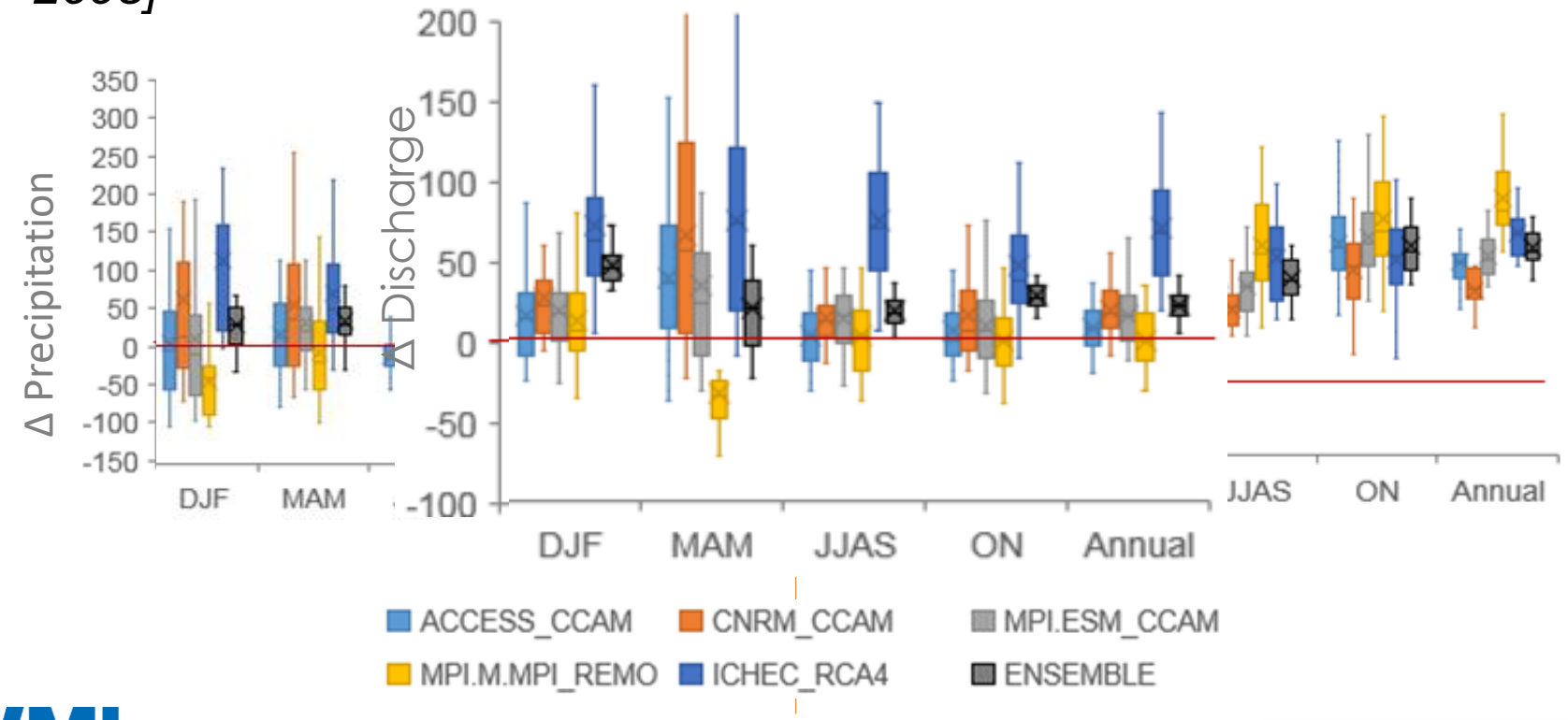
The Future is Still Uncertain

But:

- Application of RCM at local scale is difficult to make conclusions at high confidence
- The multitude of GCM and RCMs do always agree on the magnitude or even the direction

Chamelia Climate Assessment

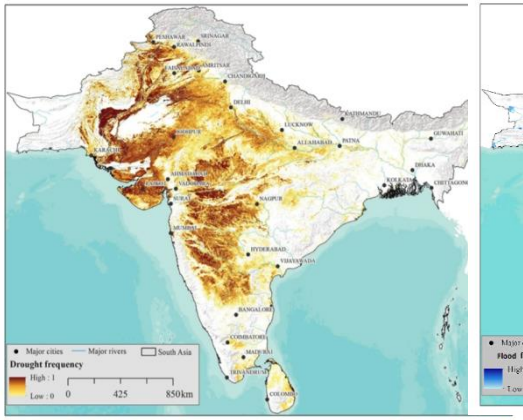
- Modeling with RCMs for the consensus CF for *RCP 8.5, far future [2070-2095]*



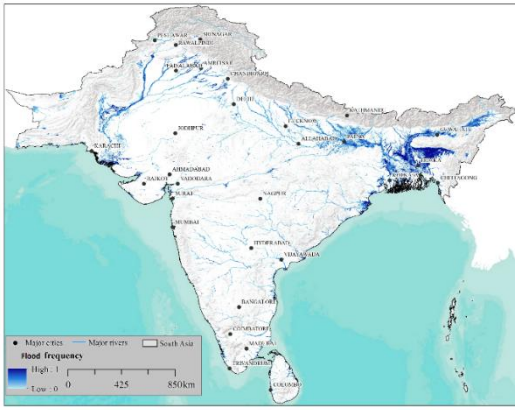
Multiple hazard risks in South Asia

- Very high vulnerability to disasters and agriculture particularly
- 20.8 Mha and 78.6 Mha agricultural area affected by Flood and drought
- 820 million people exposed to multiple hazards (Drought, flood, extreme rainfall & temperature, sea level rise)

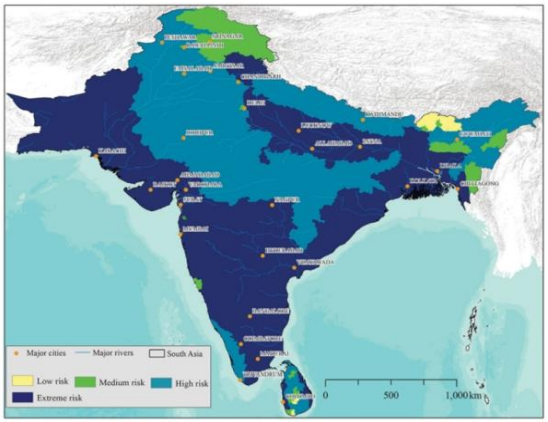
Spatial distribution of drought frequency based on 13 years' time series of MODIS imagery



Spatial distribution of flood frequency based on 13 years' time series of MODIS imagery

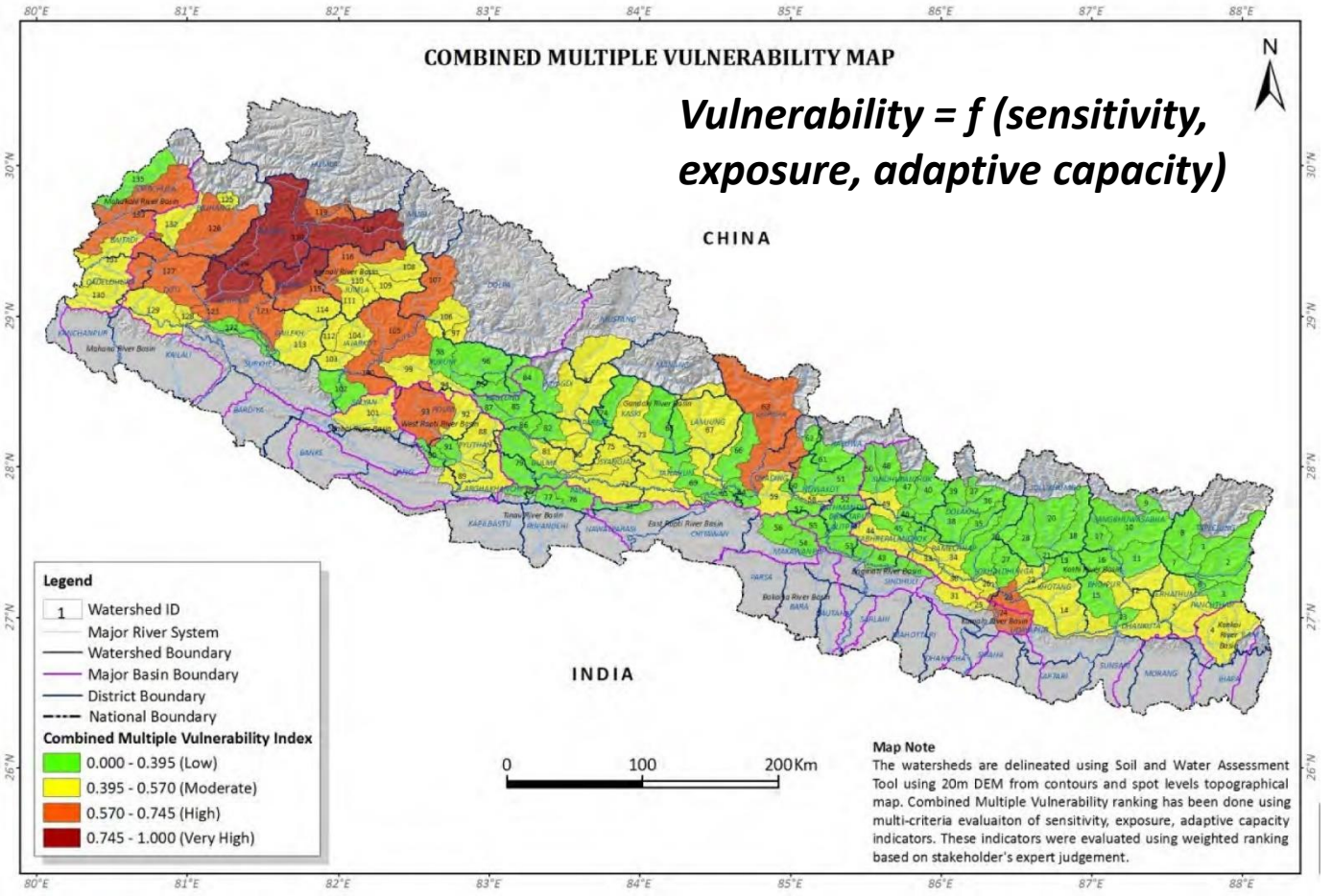


Climate change vulnerability map of SA based on exposure, sensitivity and adaptive capacity to multiple hazards

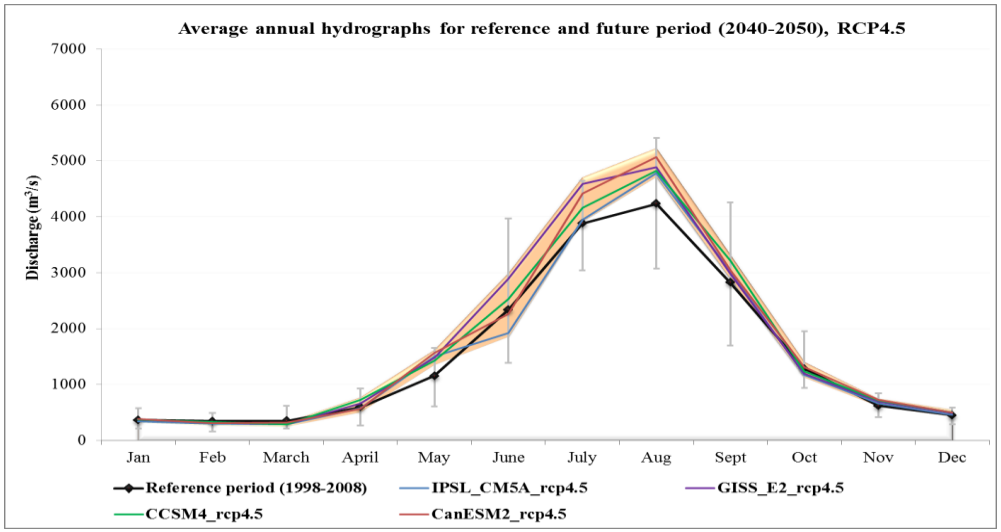


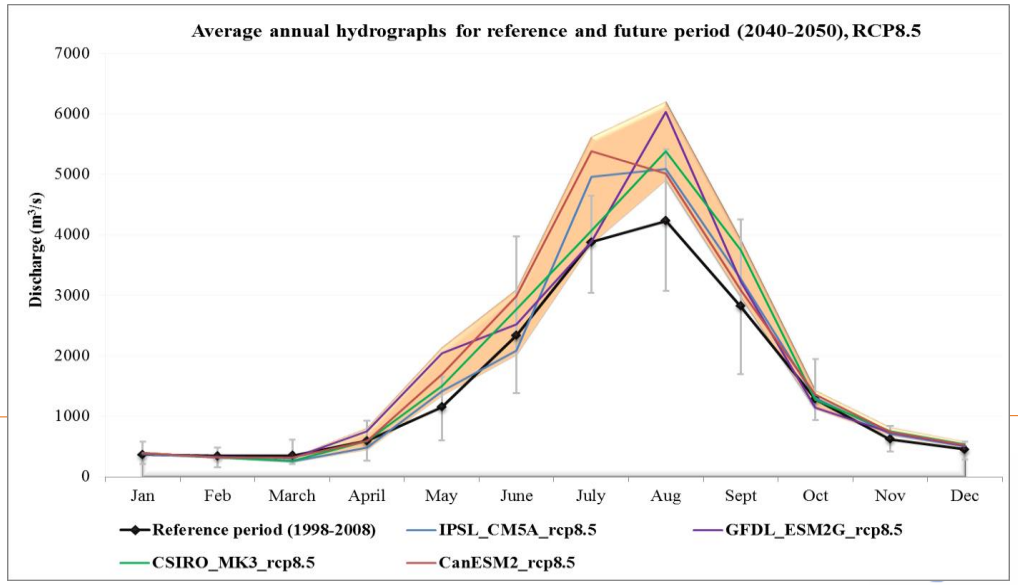
Amarnath, G.; Alahacoon, N.; Smakhtin, V.; Aggarwal, P. 2017. Mapping multiple climate-related hazards in South Asia. IWMI Research Report 170, 41p. doi: 10.5337/2017.207

- Impact of Climate Change depends on not just bio-physical sensitivity but also socio-economic contexts which impacts adaptive capacity.



Better analysis of CC data is needed





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Conclusions: CIDA Funded-Storage Project

- Understanding of and adapting to existing climate variability as well as the changes in variability is critical for adaptation to future climates
- There is still high level of uncertainty in future Climate Change projections
- Instead of planning for averages and certain trends, adaptation strategies need to plan for uncertainty as well as variability…
- In terms of bulk water resources, there is no problem therefore investments in systems which reduce risk such as storage and distribution systems, which transfers water from surplus to deficit areas both spatially and seasonally are good ideas
- Adaptation strategies outside the water realm- e.g.. crop insurance schemes or index based insurances, linkages to markets etc.

Interventions to inform managing climate-irrigation risks

Canal operation	Storage	AWM and demand management	ICTs
			

Managing Climate Risks: Ecosystems based Adaptation (EbA)?

- “Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change.” CBD 2009

- A new approach to advance natural solutions for climate change adaptation across different sectors

Case Study Nepal: Core Issues in landscape management

- Upland agricultural systems are mainly rain-fed so vulnerable to CC
- Mountain springs are drying up
- Existing watershed management programs in Nepal focus primarily on land degradation and forest management.
- Most water management interventions (DOI) focus on irrigation systems in the plains (downstream)
- Surface and Groundwater systems are managed separately

New Landscape Approach (Building Climate Resilience in Mountain Ecosystems- BCRWME)

- Integrate management of all natural resources, including land, trees, water and people-move awa from sectorial management

- Slowing down and storing water in the upland systems will allow communities to have access to water all year –by storage we mean the whole storage continuum.

- Reducing peak discharge will reduce floods downstream

- Management of both surface and groundwater is also important especially in the management of spring systems.

Adopted Interventions in the Study

Suitable interventions selected based on a scoping survey of individual sites, e.g.:

- *Afforestation*
- *On-farm Conservation*
- *Infiltration Recharge Ponds*
- *Small Storage Tanks*
- *Bioengineering for Gully Protection*
- *Social Fencing*

Thank you

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