Regional Conference
Climate Change: Challenges and Opportunities for South Asia

Climate Change Impact and Adaptation in South Asia

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Objectives

Reviewed South Asian diversity and potential impacts on water

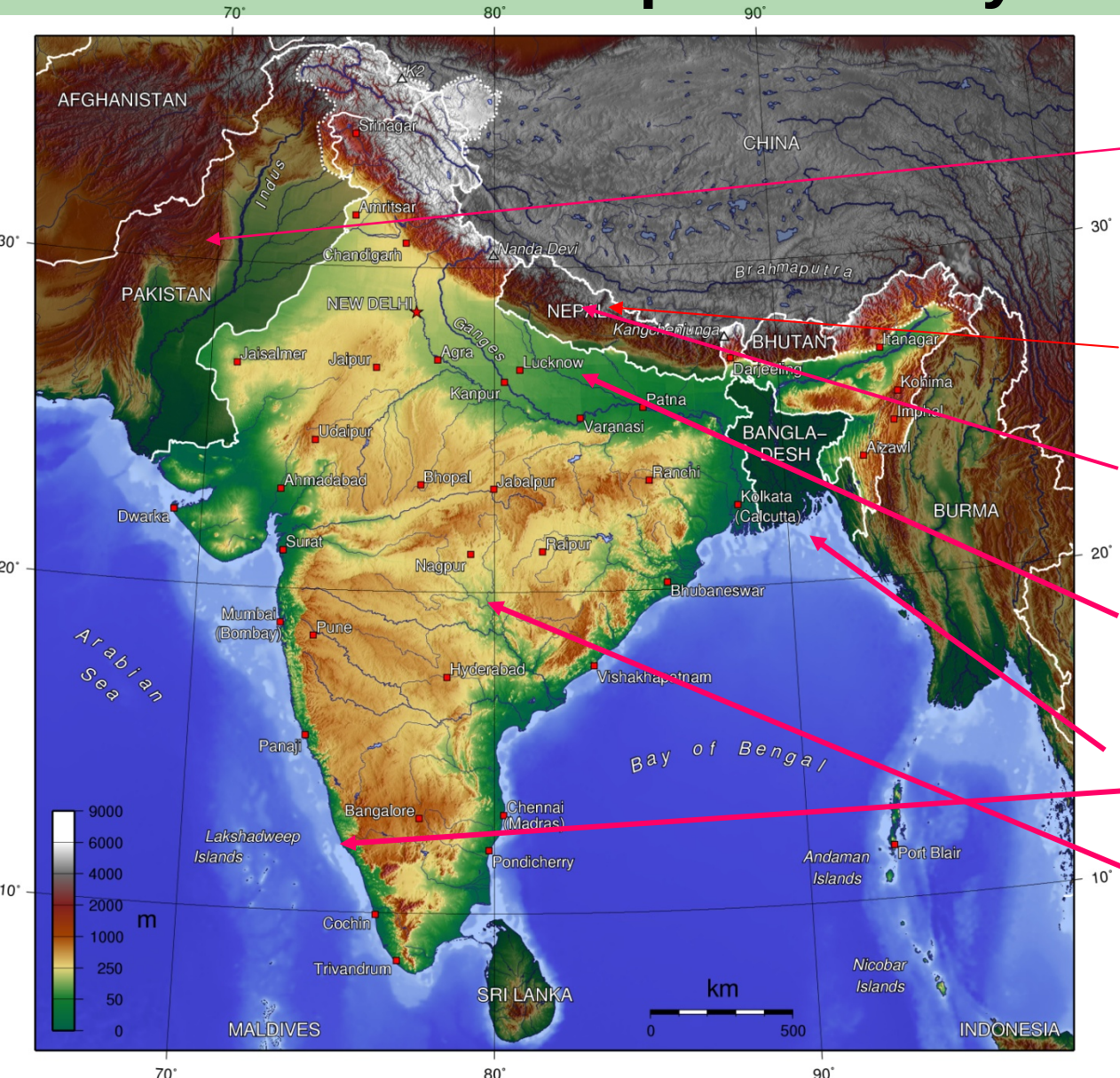
Discussed uncertainty in projections

Mentioned IPCC Himalayan gap

Posed few questions

The South Asian Region:

A hot spot or many hot spots



Arid Zone Pakistan, Afghanistan and Western India

Himalaya

The Middle Hills

Ganga Plains:

Coastal regions

Deccan Plateau

Development indicator in Ganga Basin

Country	State	Population 10^6	Population (%) without access to			
			Latrines	Electricity for lighting	Banking Services	Improved drinking water
India	Uttar Pradesh	190.9	68.6	68.1	55.9	12.2
	Bihar	93.8	80.8	89.7	78.7	13.4
	Jharkhand	30.01	80.3	75.7	69.9	57.3
	Uttarakhand	9.5	54.8	39.7	40.2	13.3
	West Bengal	87.9	56.3	62.5	63.2	11.5
Nepal		25	60	60	40	18
Bangladesh		41	85.74	68.8	75	3.3

- Untimely Rainfall: Heavy rainfall February damaged all Rabi crops. Also affects drainage system of cities

- Short term heavy rainfall. 350 mm in 6 hours, even 10 mm/hour causes drainage problem and urban flooding. Climate is becoming more erratic. The farmers recognize anomalies.

- Flash floods. common in upland areas of Nepal and India and during monsoon. In Nepal flash flood induced by landslides falling in a river, creating a dam and its breach are common

- Increasing magnitude and frequency of main rivers flooding.

- Instances of droughts are frequent. Even during the monsoon rainfall is deficient.

- Changes in regional Hydrological systems

Himalayan glaciers retreating very fast…

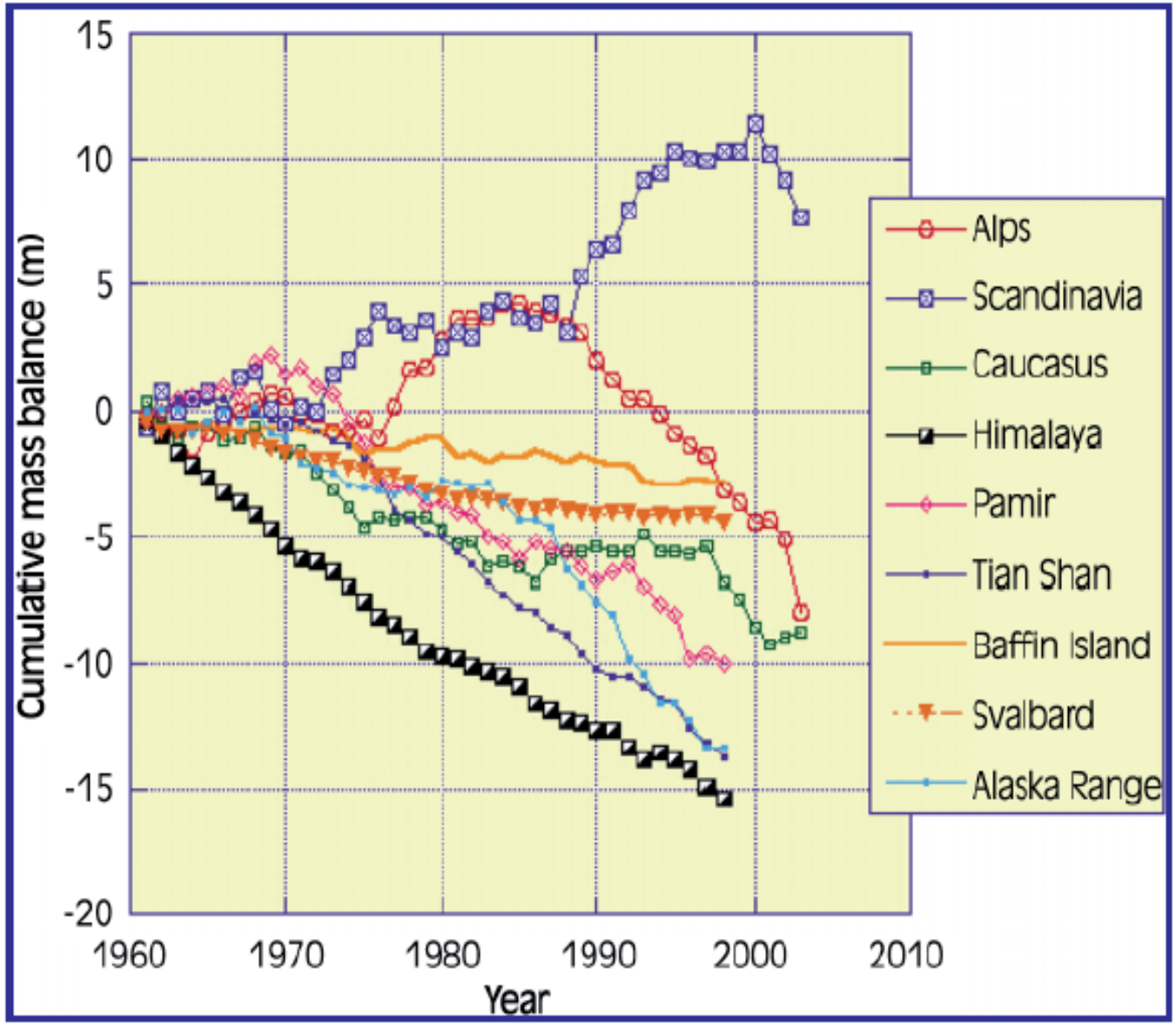
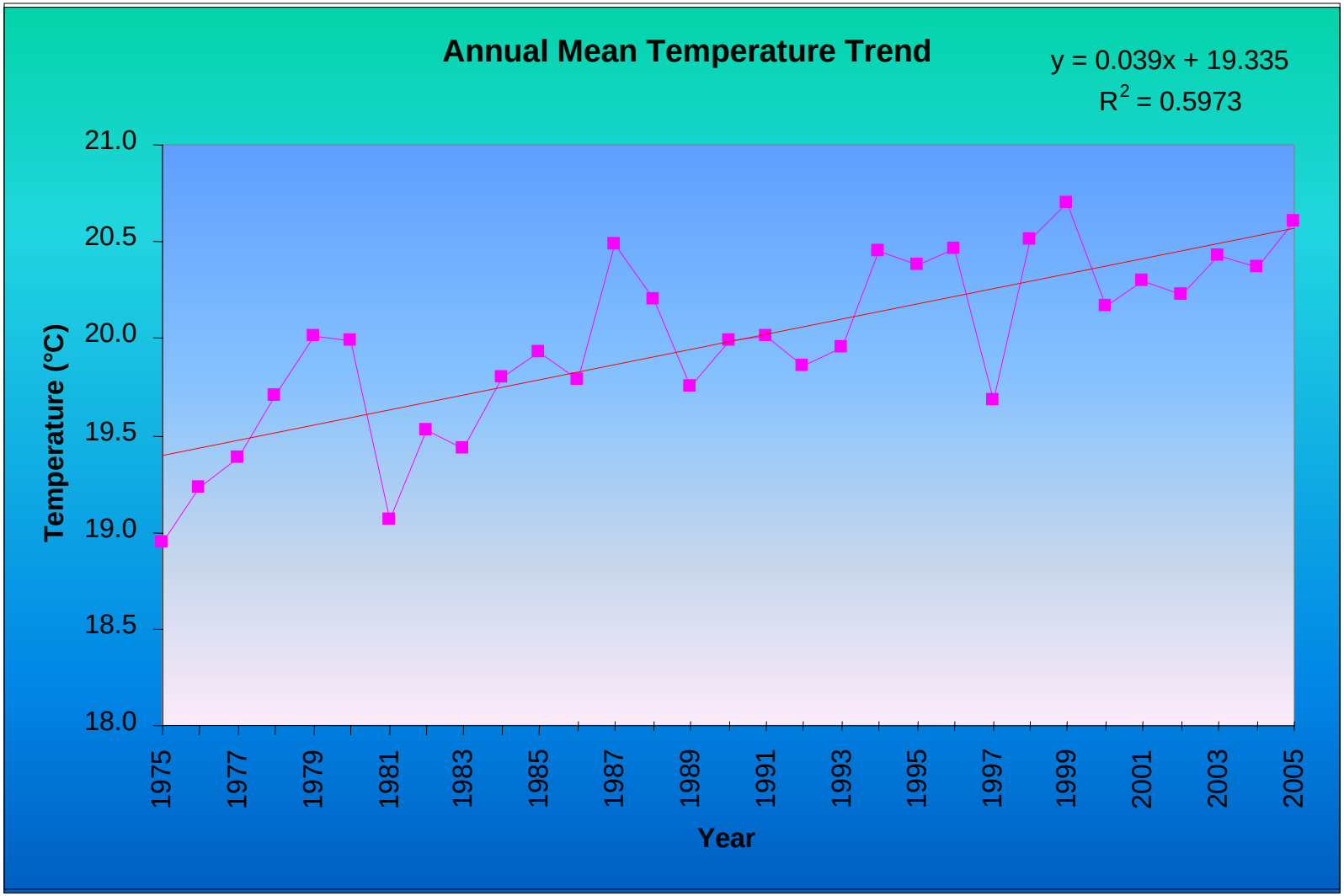


Figure 2: Rapid retreat of greater Himalayan glaciers in comparison to the global average (Dyurgerov and Meier 2005)

After ICIMOD, 2007

- Storm surge/cyclone is increasing. It is the energy of storm that is serious.
- Sea level rise: increasing salinity
- Rise in temperature will affect food production and impact food security

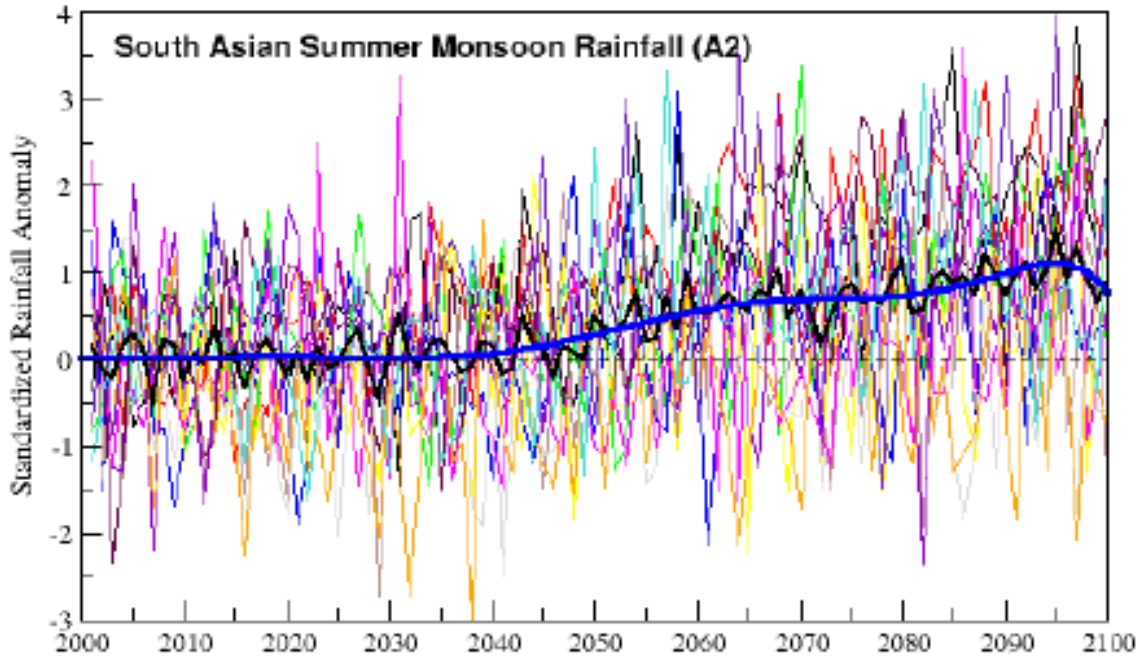
Temperature Trend

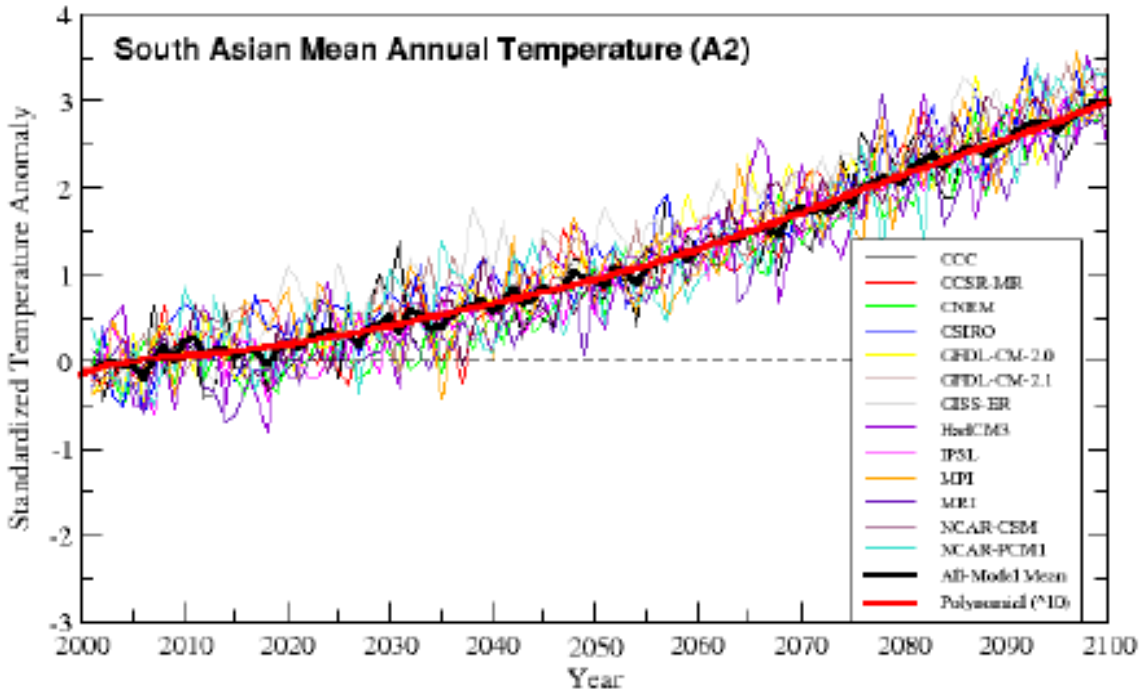


All Nepal Temperature is increasing steadily.

1.7°C increase between 1975 and 2005vv

Source: Shrestha, 20a0





Future scenario for summer monsoon rainfall and annual temperature over south Asia under scenario (high emission) based on AR4 simulation of AOGCMs (anomalies to current period)

Source Goswami, 2008

Instead of Indian monsoon being stronger and wetter, there is a potential for monsoon to go to a mega-drought state with high frequency of severe drought through nonlinear feedback within the climate system.

Goswami (2008)

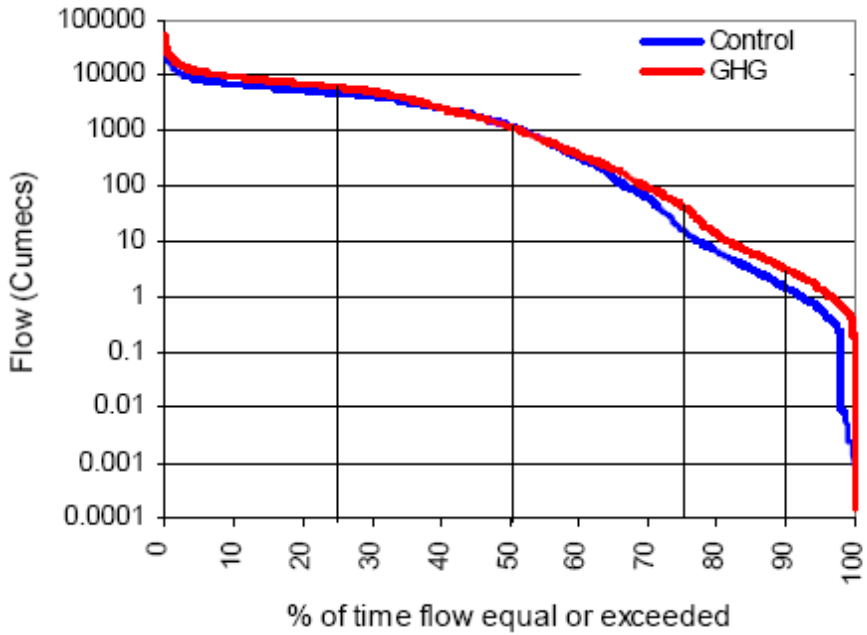
Meaning

- Uncertainty in model scenario
- Confidence in increase in temperature: mean, minimum and maximum.

Scenario development example (after Gosain, 2008)

Flow Duration Curve For Mahanadi River for Control and CGH scenario

Flow for all the dependable levels has increased for the CGH scenario over the corresponding current flow For the 50% level of dependability, at which the flow has marginally reduced



Dependable Flow (cumecs)	25%	50%	75%	90%
PRESENT	4716	1206	15.9	1.468
FUTURE	6103	1168	43.39	3.182

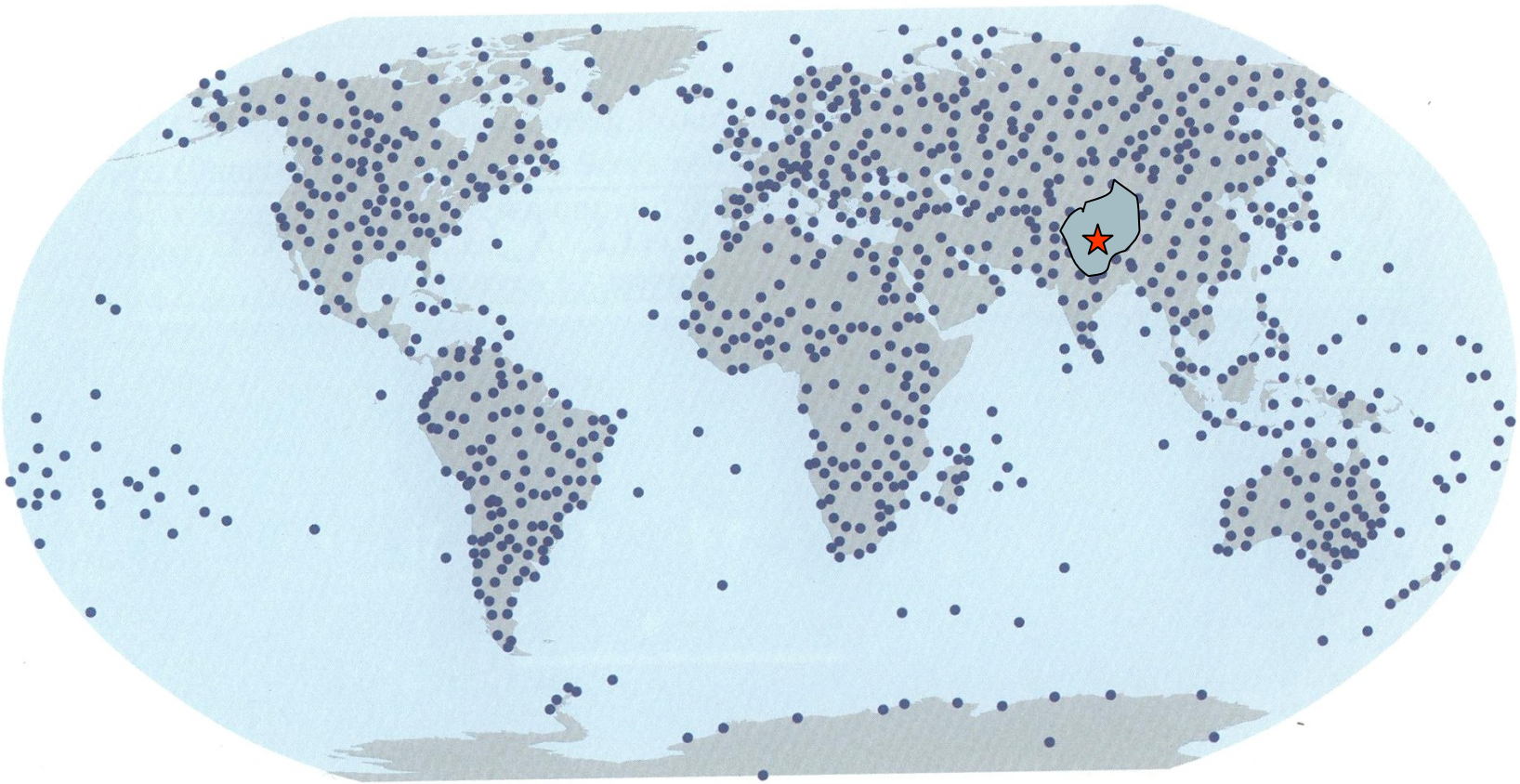
Three Scenarios for hydrology

One higher river flow

Other dry monsoon

Increased snow melt causes flow to increase then decrease

IPCC GAP



GCOS Surface Station Network

What do we do,
where do we begin and
how?

What helps adaptation

- **Communications – the flow of knowledge, early warning, ideas, etc…between regions;**
- **Mobility – the ability to access markets, institutions, etc…outside affected areas**
- **Transformable resources – the ability to use assets for different purposes (cash vs. land)**
- **Asset protection**
- **Skills and capacities that have multiple applications**
- **Access to basic environmental resource services, drinking water supply and sanitation**
- **Condition of resource base: overdraft, drainage congestion and forests**
- **Prevailing social context: exclusion, gender**
- **Financial mechanisms: access to banking, micro-credit/insurance services before, during and after a disaster event:**
- **Diversification to low vulnerability livelihoods;**

Source; Moench and Dixit (2003)