US-India Partnership for Climate Resilience
Workshop on Development and Application of Downscaling Climate Projections

A PERSPECTIVE ON ACTION PLANS ON CLIMATE CHANGE AND VULNERABILITY & RISK ASSESSMENT

Manish Kumar Shrivastava
Fellow, TERI (New Delhi)

Indian Institute of Tropical Meteorology, Pune,
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WHY VULNERABILITY AND RISK ASSESSMENT?

Climate Risk Zones	Probable Risks	Key economic activities/assets/Resources				
		Agriculture	Water	Industry	Supply chain	population
Zone 1	Fresh Water availability					
	Flood					
	Cyclone					
Zone 2						

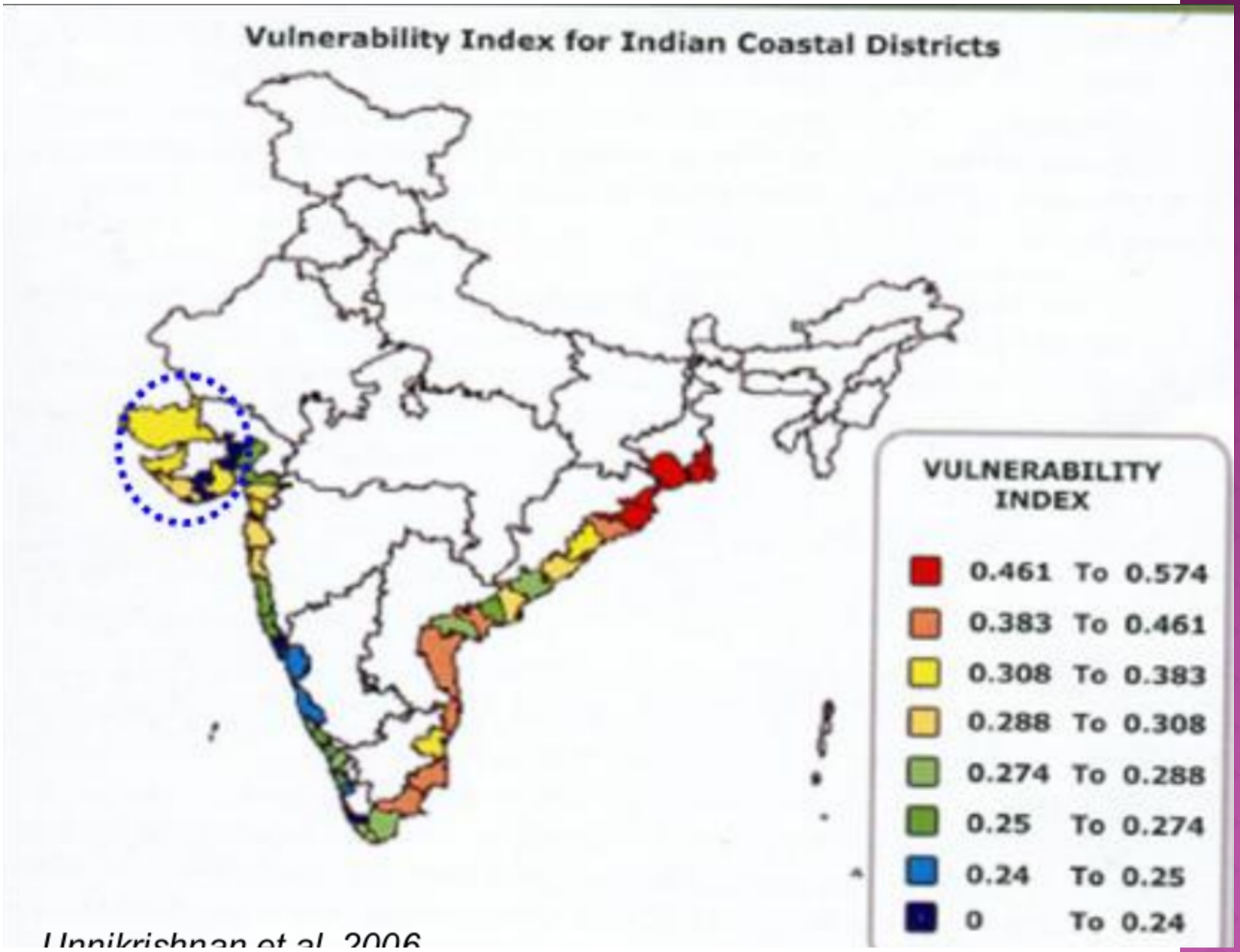
Potential CLIMATE RISKS and Intensity

PREPAREDNESS

Vulnerability hotspots	Location 1	Location 2	Location 3	Location 4	Location 5
Agriculture					
Water					
Industry					
Supply chain					
Human population					

Adaptation options

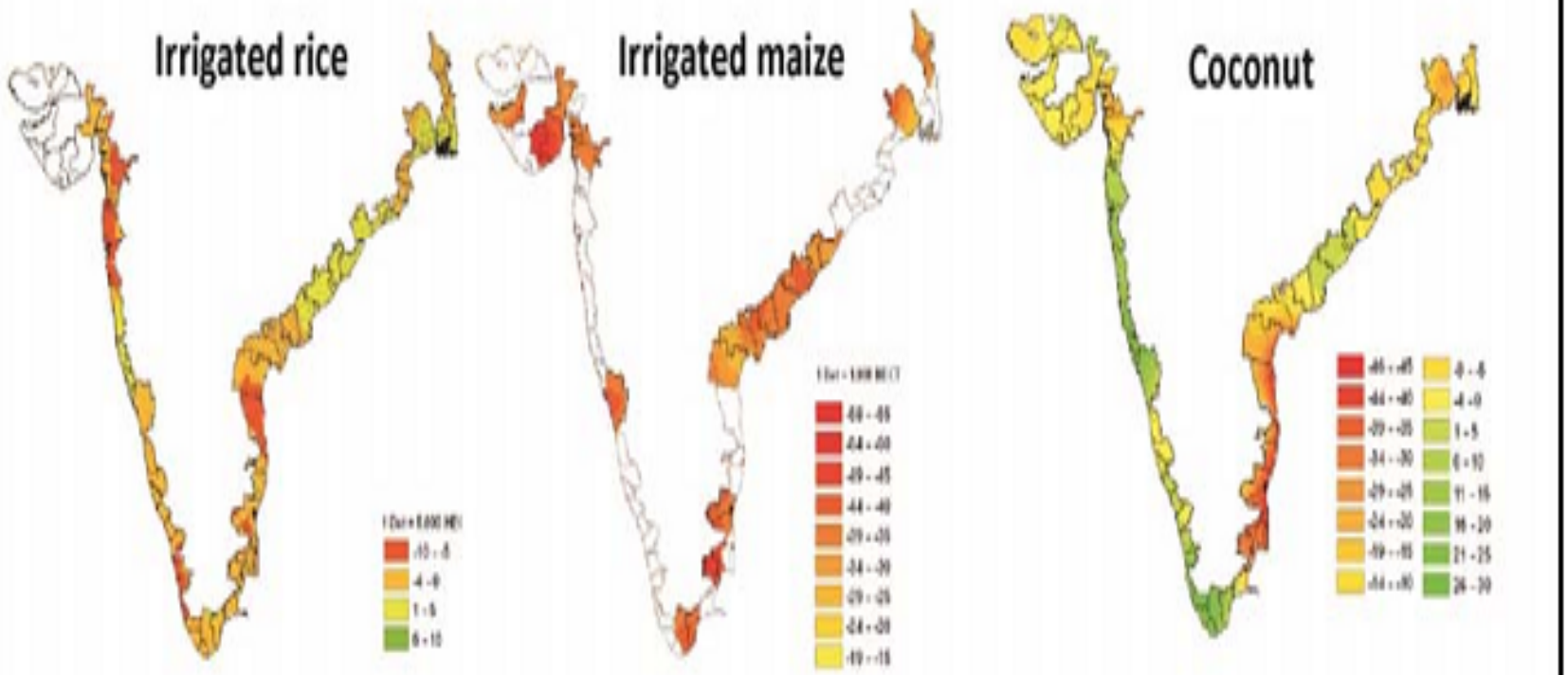
Indicative cost of adaptation / Loss and damage



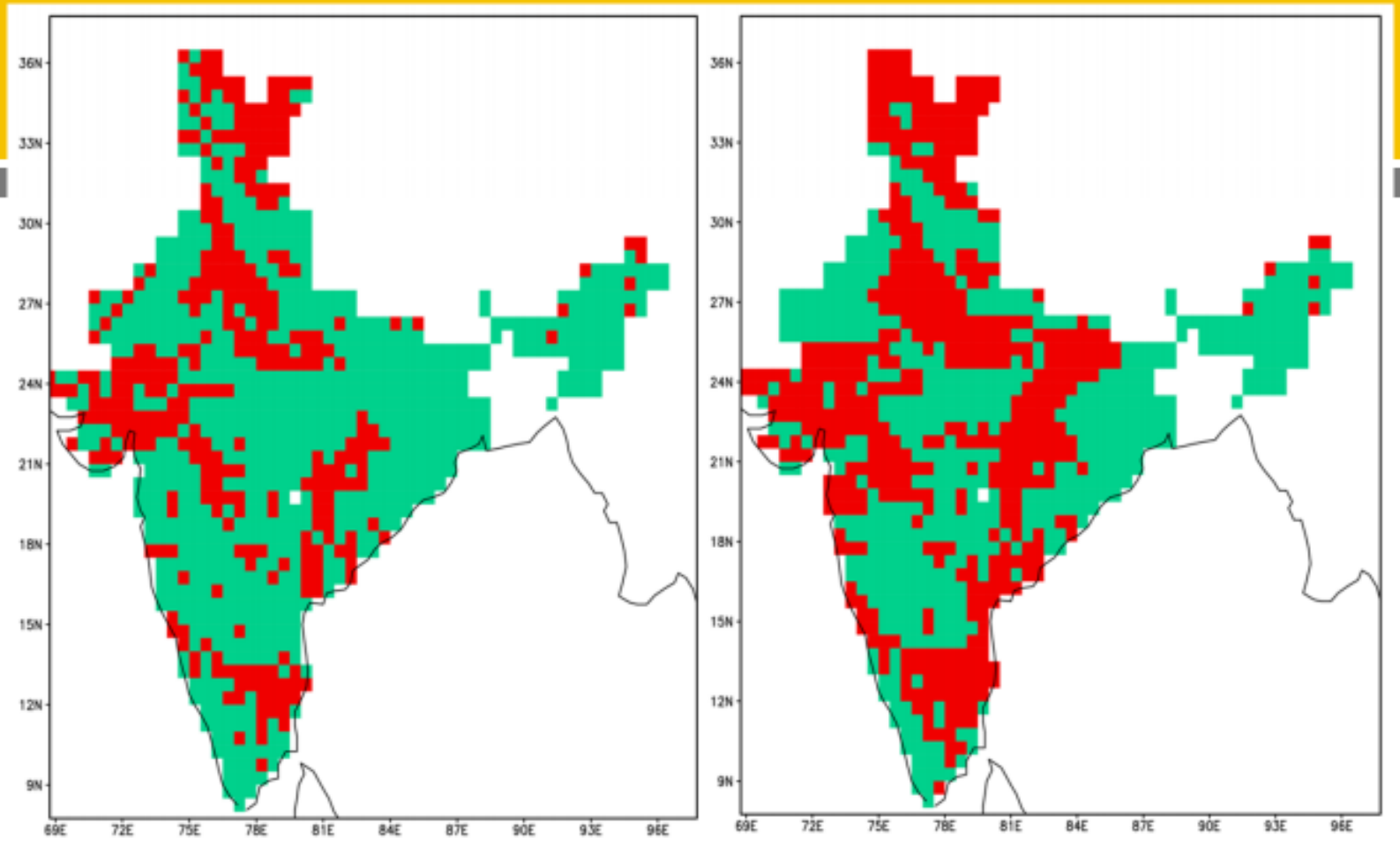
Unnikrishnan et al. 2006

In Gujarat, irrigated rice yields are expected to decline in certain regions by 2030. In the southern regions, including Saurashtra, there will be a decline in irrigated wheatyield. The coast is projected to lose up to 40 per cent of its coconut yield and this can be attributed to existing high summer temperatures which are projected to increase relatively more than in the west coast region (MoEF, 2010).

Figure 16: Projected impacts (PRECIS)



Source: INCCA, 2010

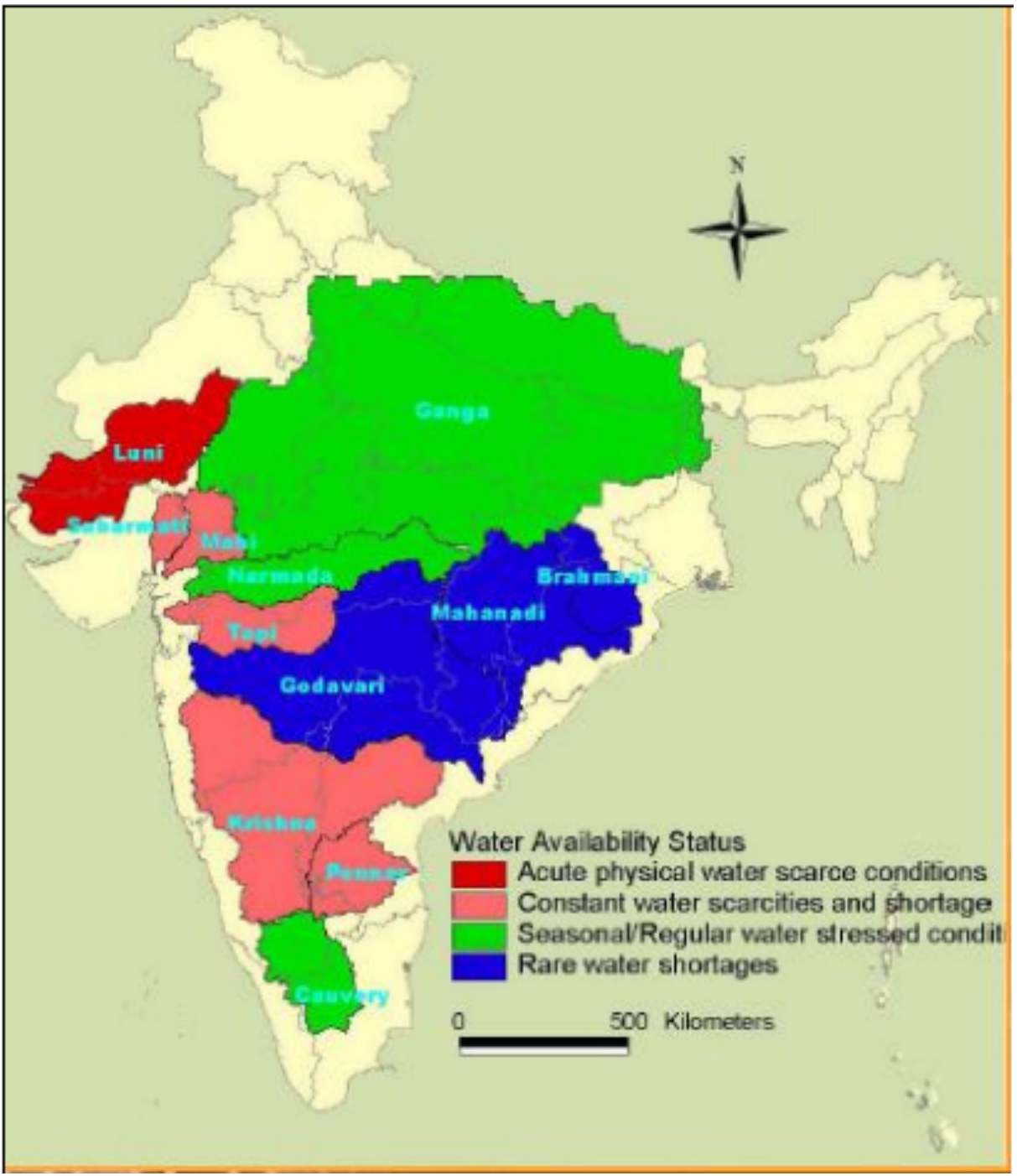


Vulnerable grids (marked red) in the A1B scenario.

Left panel: timeframe of 2021-2050; 326 (30.6%) out of a total number of 1064 grids are projected to be vulnerable.

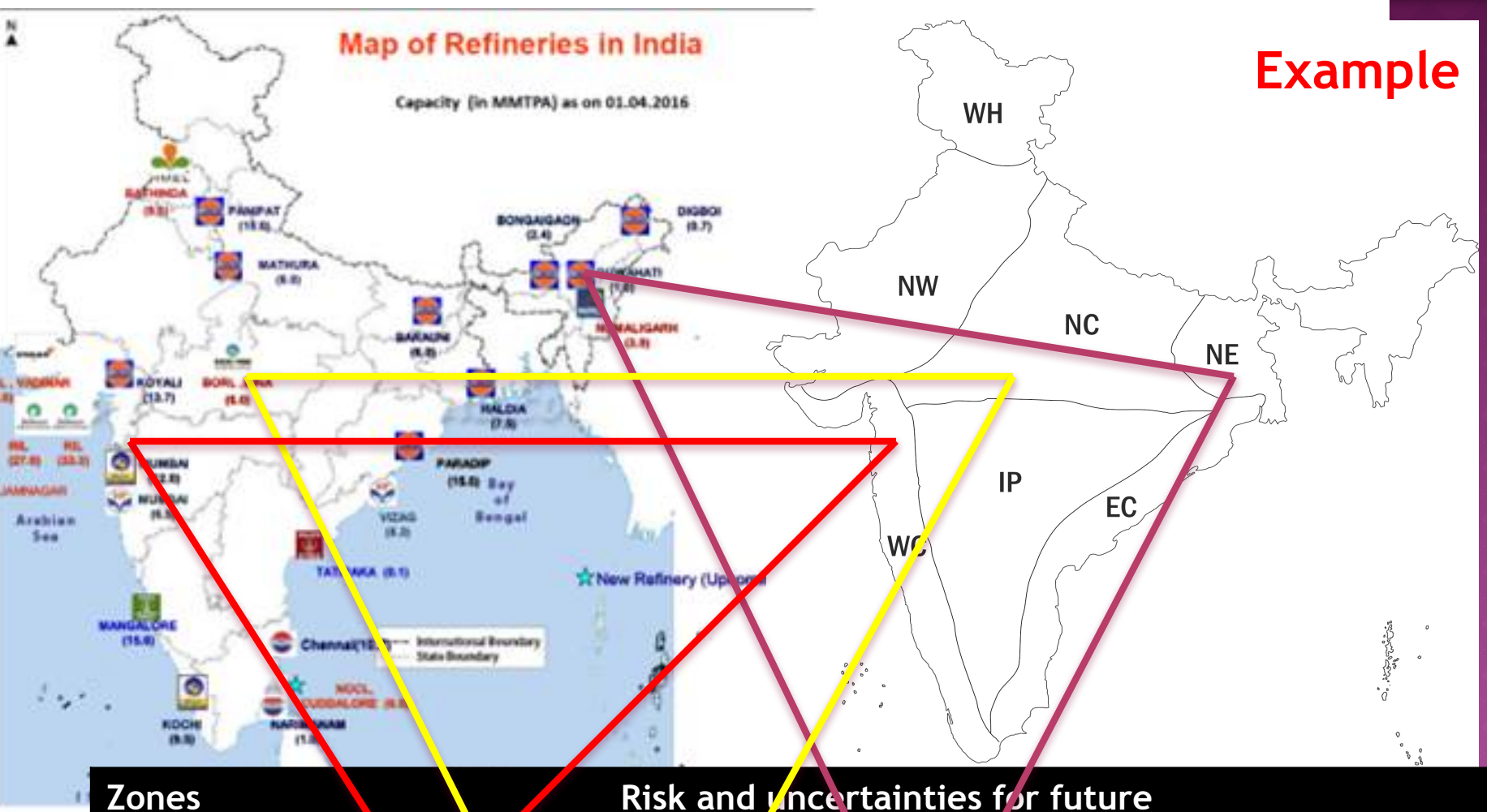
Right panel: timeframe of 2071-2100;489 (45.9%) grids are projected to be vulnerable.

All forest areas in such vulnerable grids are projected to be vulnerable to climate change.



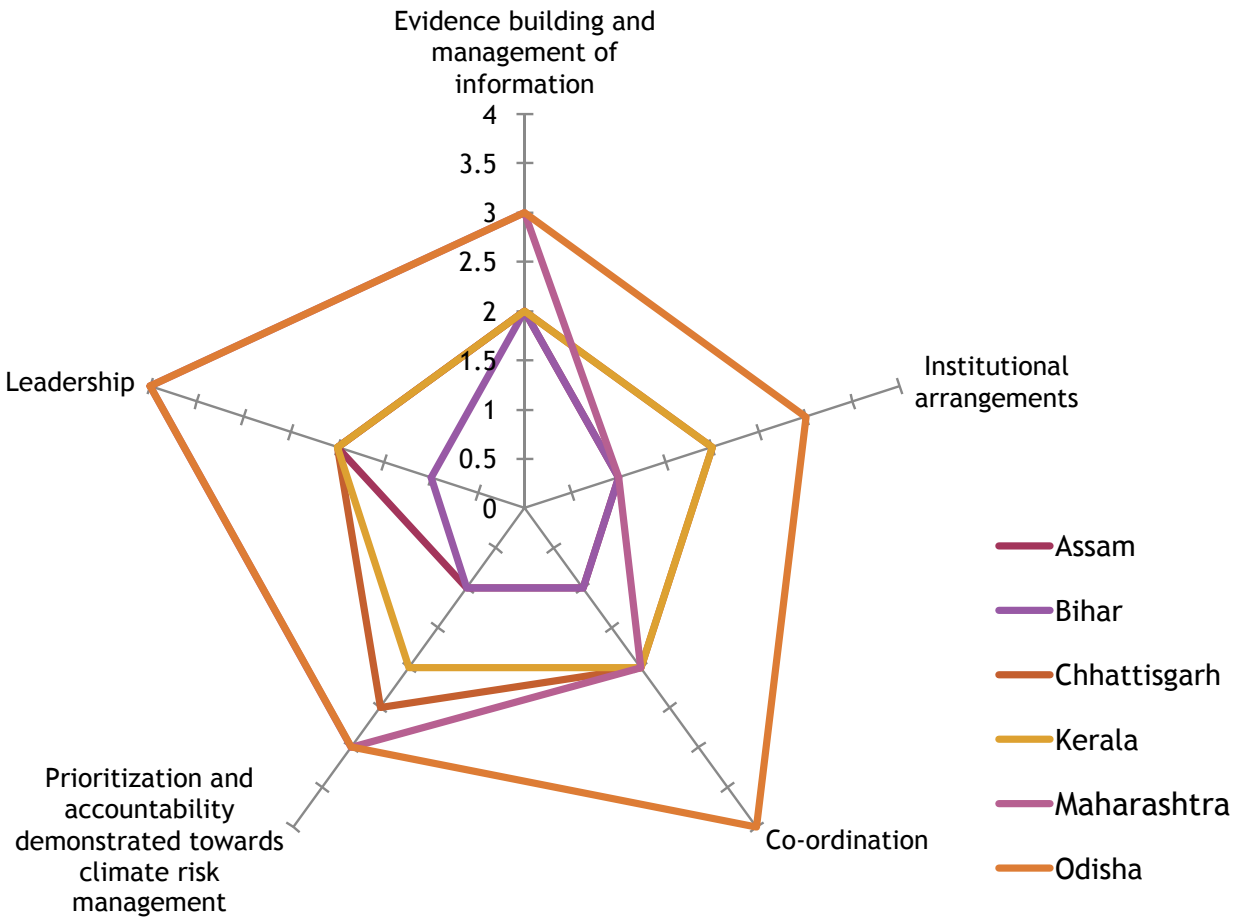
Luni, the west flowing river of Kutchh and Saurastra occupying about one-fourths of the area of Gujarat is likely to experience acute physical water scarce conditions (Gosain et al. 2006).

Example



Zones	Risk and uncertainties for future
West Coast (WC) and East Coast (EC)	Storm surges and cyclones and heavy rainfall events due to depressions and cyclones
North East (NE)	Intense rainfall events, thunderstorms, flooding
North West (NW)	Heat waves, extreme rainfall events
North- Central (NC)	Heavy rainfall events, heat waves, droughts
Interior Peninsula (IP)	Flood, droughts, heat waves and intense rainfall events

RESPONSES IN SIX STATES



INPUTS FOR GOVERNANCE REFORMS

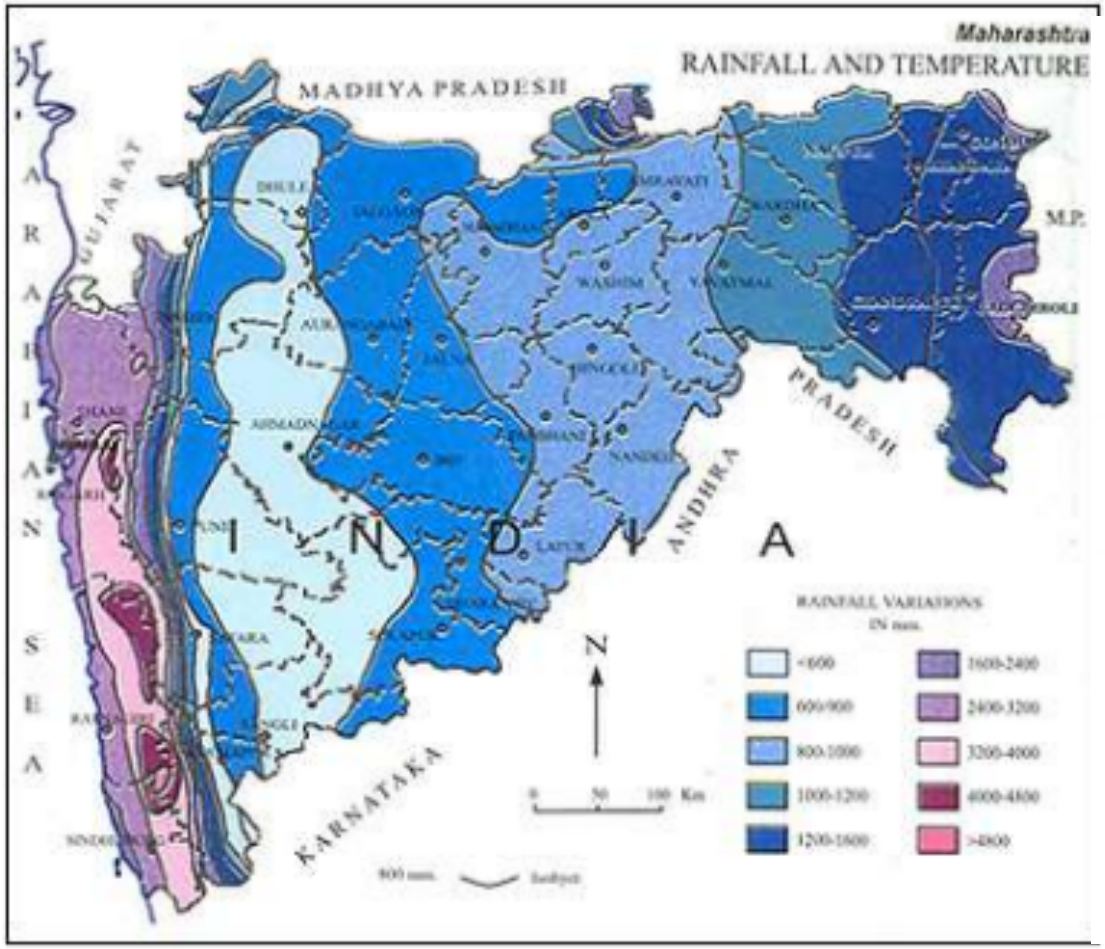
- Food – Water – Energy – Climate Change Linkages
- Governance of each sector is different
- Integrated downscaled analysis

➔ Integrated and effective cross-sectoral governance strategies

MAHARASHTRA SAPCC: METHODOLOGY

- High resolution climate change modelling
- Sector-specific assessment and adaptation strategies
- District-level vulnerability index and identification of six vulnerability hotspot districts
- Household-level surveys with farming and fishing households in six vulnerability hotspot districts
- Stakeholder consultations and preparation of district-level adaptation action for six vulnerability hotspot districts and Mumbai Metropolitan Region
- Validation of findings and discussion of adaptation strategies with state line departments and district administration.

RAINFALL VARIATIONS IN MAHARASHTRA



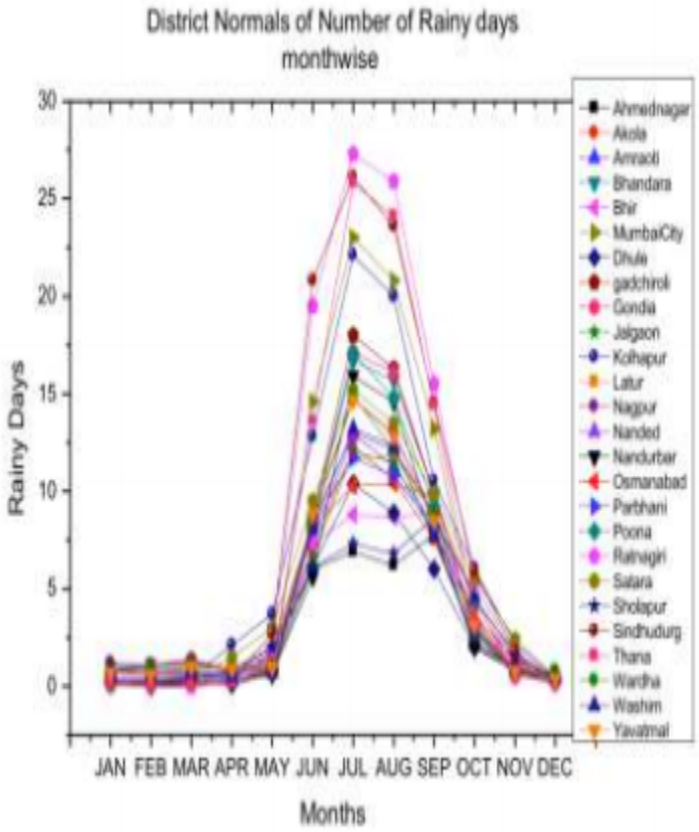


Figure 2: Variation of Temperature and Rainfall in Maharashtra

DIVISION WISE CLIMATE CHANGE PROJECTIONS

Administrative division	IMD climate normal: annual mean temperature (°C)	Projected increase in annual mean temperature (°C)			IMD climate normal: monsoon rainfall (mm)	Projected increase in monsoon rainfall (%)		
		2030s	**2050s**	**2070s**		**2030s**	**2050s**	**2070s**
Amravati	27.21	1.44-1.64	2.2-2.35	3.06-3.46	785.3	17.5-30	22.5-32.5	15-27.5
Aurangabad	26.46	1.44-1.56	2.15-2.3	3.14-3.38	708.8	12.5-27.5	15-30	20-40
Nashik	26.79	1.4-1.68	2-2.4	2.82-3.3	567.5	17.5-40	15-40	15-52.5
Nagpur	27.19	1.18-1.4	1.95-2.2	2.88-3.16	1124.7	12.5-20	12.5-30	15-27.5
Pune	25.22	1.15-1.28	1.65-1.95	2.46-2.74	852.2	10-32.5	10-32.5	12.5-37.5
Konkan	26.99	1.1-1.28	1.5-1.8	2.18-2.6	2578.2	10-30	10-30	10-32.5

Note: The projection for the 2030s is the average of projections for the period 2021-2040. Similarly, the projection for the 2050s in the average of projections for 2041-2060 and that for the 2070s is the average of projections for 2061-2080.

TEMPERATURE/ RAINFALL PROJECTIONS

HadRM3P model in the PRECIS Regional Climate Modelling System

Figure 4. Projected increase in heat index in 2030s relative to baseline (in degree Celcius)

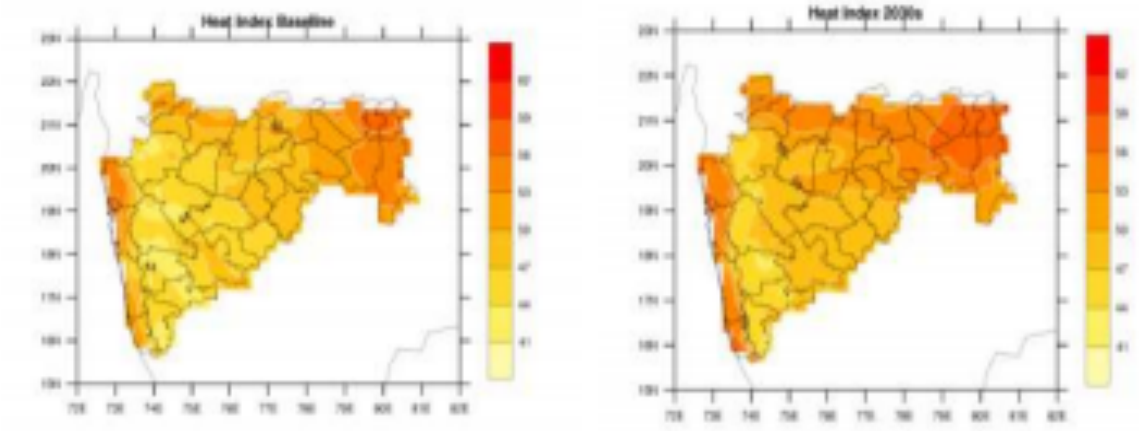


Figure 5. Increase in extreme rainfall in 2030s relative to baseline (in %)

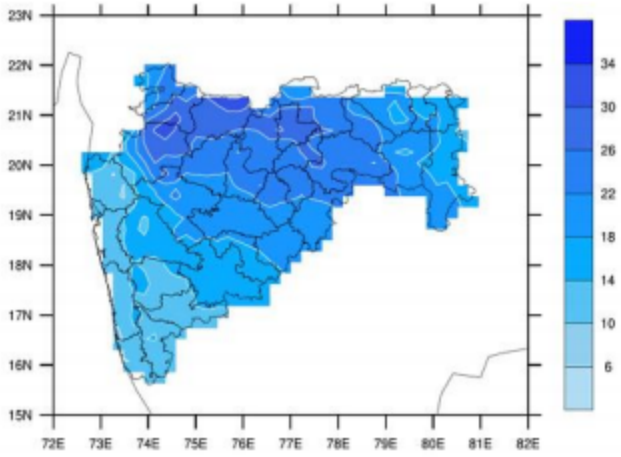
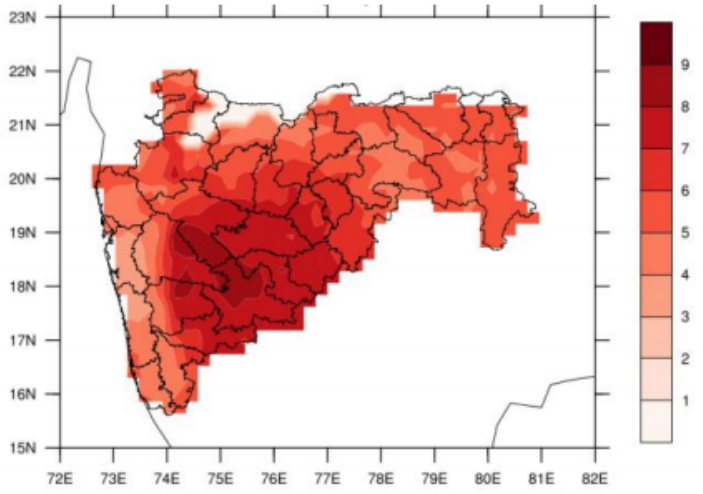


Figure 6. Number of low rainfall days in the 2030s relative to baseline



MAHARASHTRA: IMPACTS

- Increase in temperature leads to decline in yield
- Increase in CO2 concentration leads to improvement in yield but get nullified due to temperature rise
- Likely increase in pest incidents due to increased rainfall
- Increased rainfall if managed properly can be beneficial
- Increase in average number of days that are conducive to malaria transmission
- Faster rate of parasite development at higher temperatures
- Increased risk of water borne diseases
- Reduced availability of fresh water due to saltwater intrusion

THANK YOU