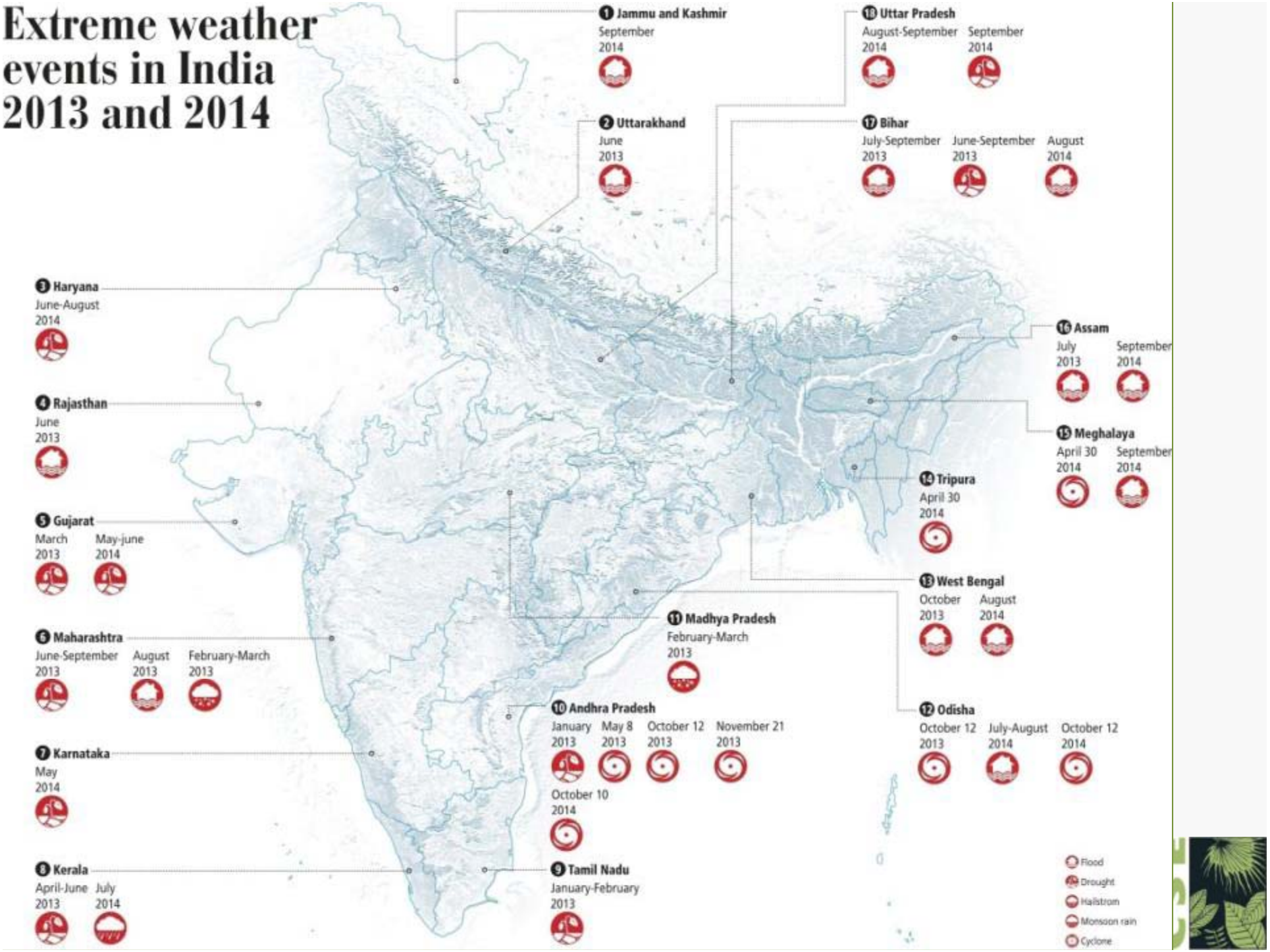
Extreme weather events and adaptation to climate change in India

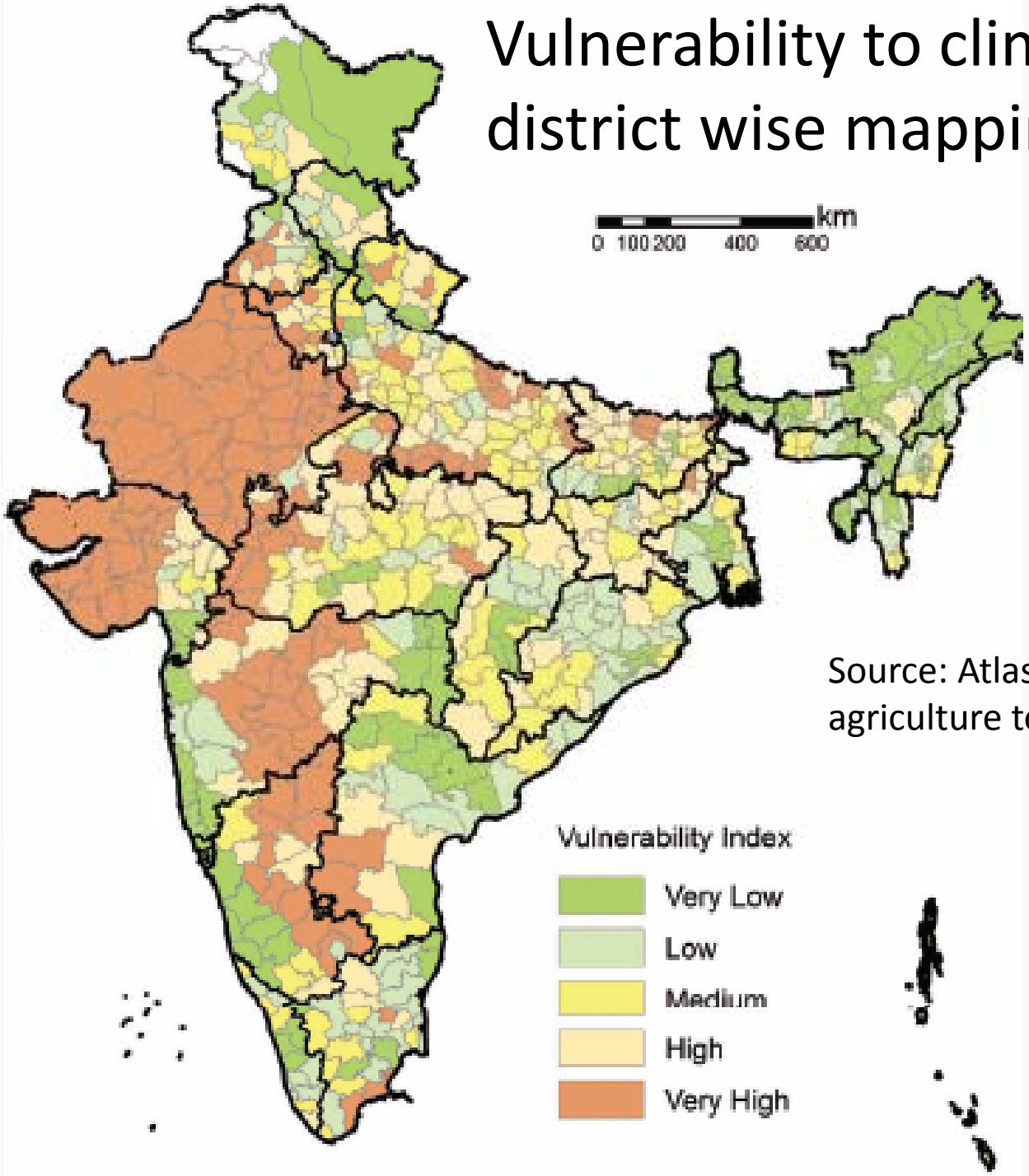
Arjuna Srinidhi

EXTREME WEATHER EVENTS

Extreme weather events in India 2013 and 2014



Vulnerability to climate change – district wise mapping



Source: Atlas on Vulnerability of Indian agriculture to Climate Change, CRIDA (2013)

2015 update…

- 2nd major flood in Kashmir in 6 months
- Wettest March in 48 years, rains continued in April
- 11 million ha of farms devastated

STATE	TOTAL AREA AFFECTED (LAKH HECTARES)	MAJOR DAMAGE-AFFECTED CROP AREA (LAKH HA)
Rajasthan	45.527	Wheat (17.04), mustard (15.05), pulses (5.3), barley (2.64)
Uttar Pradesh	26.79	Wheat (21.18), pulses (3.93), mustard (1.52)
Haryana	18.75	Wheat (1.2), mustard (1.2)
Madhya Pradesh	5.7	Wheat (2.4), barley (2)
Maharashtra	3.95	Coarse cereals and fruit
Punjab	2.94	Wheat (2.6)
Himachal Pradesh	1.52	Wheat (1.5)
J&K	0.85	Wheat
West Bengal	0.485	Crop affected in 6 districts
Gujarat	0.114	Cumin, Isabgol
Uttarakhand	0.091	Wheat
Telangana	0.006	Paddy
Kerala	0.006	Harvested paddy crop & banana
Andhra Pradesh	0.002	Paddy
Total area in which crops were damaged	106.73	Affected Area under Rabi Crop from end of February to March 26

Effect of unseasonal rains in Uttar Pradesh – Feb - April, 2015

Relief estimates in different states

- 7500 Crores for Uttar Pradesh
- 8252 crores by Rajasthan
- 1135 crores by Haryana
- 7000 crores relief for 2014 drought in Maharashtra. Already facing over 1000 Cr losses from recent rains
- Damage assessment from 10 other states yet to come in

Estimation of relief

Total Sown area in the district (in lakh ha)	126.30
Total Crop area affected (in lakh ha)	89.01
Out of total affected area, Area where crop loss has been more than 33% (in lakh ha)	58.60
Loss to crops of the Farmers having upto 2 hect. Land (Rs. in Lakh)	**622823.04**
Loss to crops of the Farmers having more than 2 hect. Land (Rs. in Lakh)	**126847.31**
Estimated value of damage to houses as per updated GOI norms (Rs. In lakh)	**21.49**
Human lives lost	93
Ex-gratia payment to families of deceased persons (Rupees 4 lakh per deceased) (Rs. In lakh):-	**372.00**
Animals loss (Milch animals- Buffalo/Cow/Camel/Yak etc.@ Rs, 30000/- and Sheep/Goat/Pig @ Rs. 3000/-) (Draught Animals- Camel/Horse/Bullock etc @ Rs. 25000/-& Calf/Donley//Pony/Mule @ Rs. 16000/- (Rs. In lakh):-	**25.65**
Demand for livestock sector (Rs. In lakh):-	**3057.62**
Estimated total damage to Crops, Houses, Animal loss, Ex-gratia payment (Rs. In lakh)	756089.49

As of 24th April, 2015

Issues with relief calculation

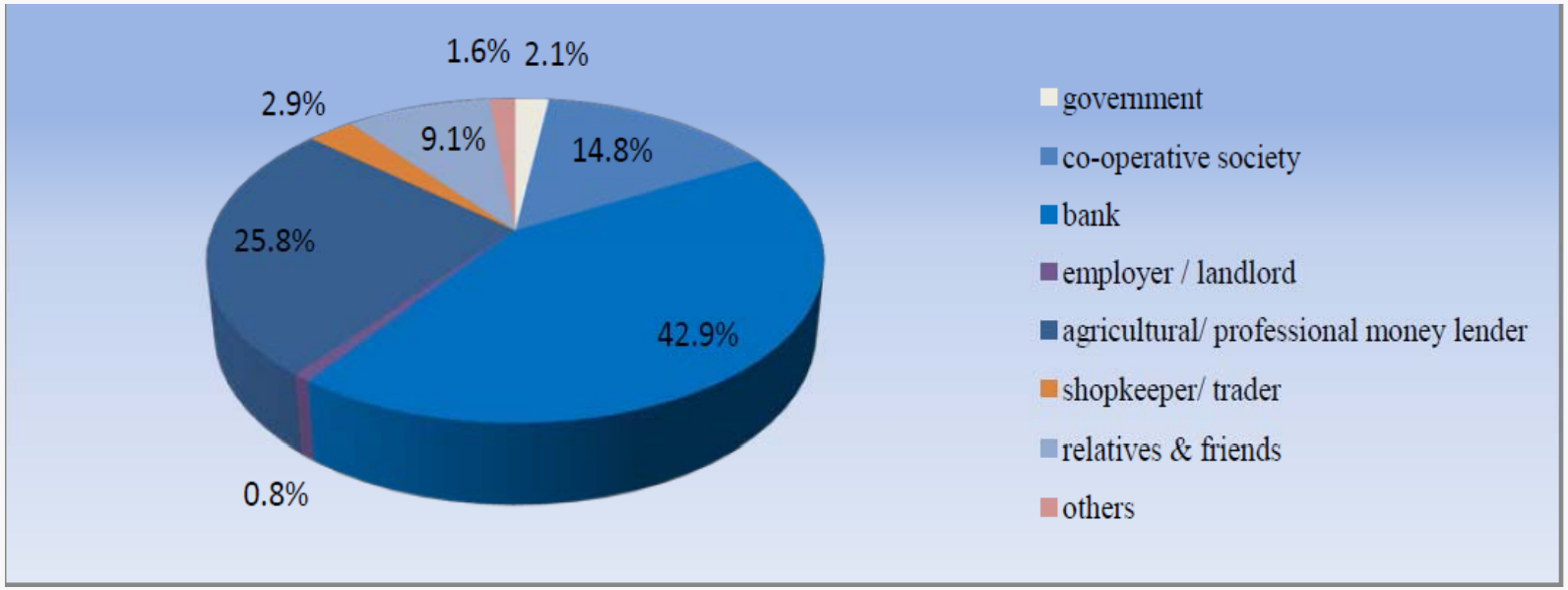
- Estimation of losses is essentially done by Patwari – quick eye estimation
- Report prepared by Patwari is submitted to the Tehsildar, then compiled at District level and onward to State Revenue department
- State Revenue Department submits final report to Ministry of Agriculture at the Centre.
- Based on the report submitted, the Union Government sends a Central Team to the state to verify the assessment made by the state Revenue Department.
- This Central team report goes to Ministry of Agriculture, Ministry of Finance and Ministry of Disaster Management to make the funds available to the state government for disbursement among the farmers.

How about compensation against losses?

- Relief is just temporary respite and covers input costs for next cropping cycle
- The only form of compensation available to farmers is insurance
- Access to agriculture insurance - national average is about 19% - UP even lower – about 3.5 %
- Of the remaining 81% - 46% unaware, insurance not available for about 24% , only 11% said they couldn't pay for it
- How does payout happen – 25% on account, rest on crop cutting
- Impractical clauses for those who have access - to report damage due to hailstorm within 72 hours
- Linked to loans – default on loans during extreme events can mean insurance policy goes void!

Loans and farmer suicides

- about 52 percent of the agricultural households in the country were estimated to be indebted
- average amount of outstanding loan per agricultural household was Rs.47000/-



Distribution of loans by source (NSSO 2014 data)

Its not just about big budget schemes

- In 2012-13 a budgetary allocation of 5,75,000-crore has been made, up from 4,75,000 crore in 2011-12
- less than 6 per cent of the total institutional credit is made available to small and marginal farmers
- Cases of loans in excess of farmer paying capacities
- Cases of loans being tied to purchase of farm equipment (at higher than market prices)
- nexuses operating between banks, insurance companies and equipment manufacturers

Connecting the dots...

- Kedar Singh Tomar, Village Dignair, Block Barauli, District Agra. Age 35, 2 daughters, a son and his wife. 2 bighas land on rent @ Rs 20,000 per bigha. Input cost for potato - Rs 45,000 to 50,000 per bigha.
- Approximately Rs 2 lakhs loan from moneylenders at 60 % rate of interest.
- Faced a bumper Potato crop this year, and was left with no place to store crops. All 235 cold storages of Agra were full. Waited in queue for 3 days outside cold storage in vain. Returned and put crop back in field
- Sudden hailstorm and rain – damaged entire potato crop. Filled with anxieties about loans, he succumbed to a heart attack.
- Underlying reasons for desparation:
  1. not being a landowner makes it very difficult to establish credit worthiness and get loans from banks.
  2. Since current farmer insurance schemes are linked to loans from banks, Kedar Singh Tomar didn't have any insurance cover either
  3. As per UP state norms, Government relief is only for landowners and not for people leasing land. This meant he was not entitled to any government relief package.

Rising losses and costs of adaptation

- GOI estimates: 2.6% of GDP on adaptation ~ 300,000 Crores (US$ 60 billion)
- ADB estimates that climate change could cost India as much as 9% of GDP by the end of the century

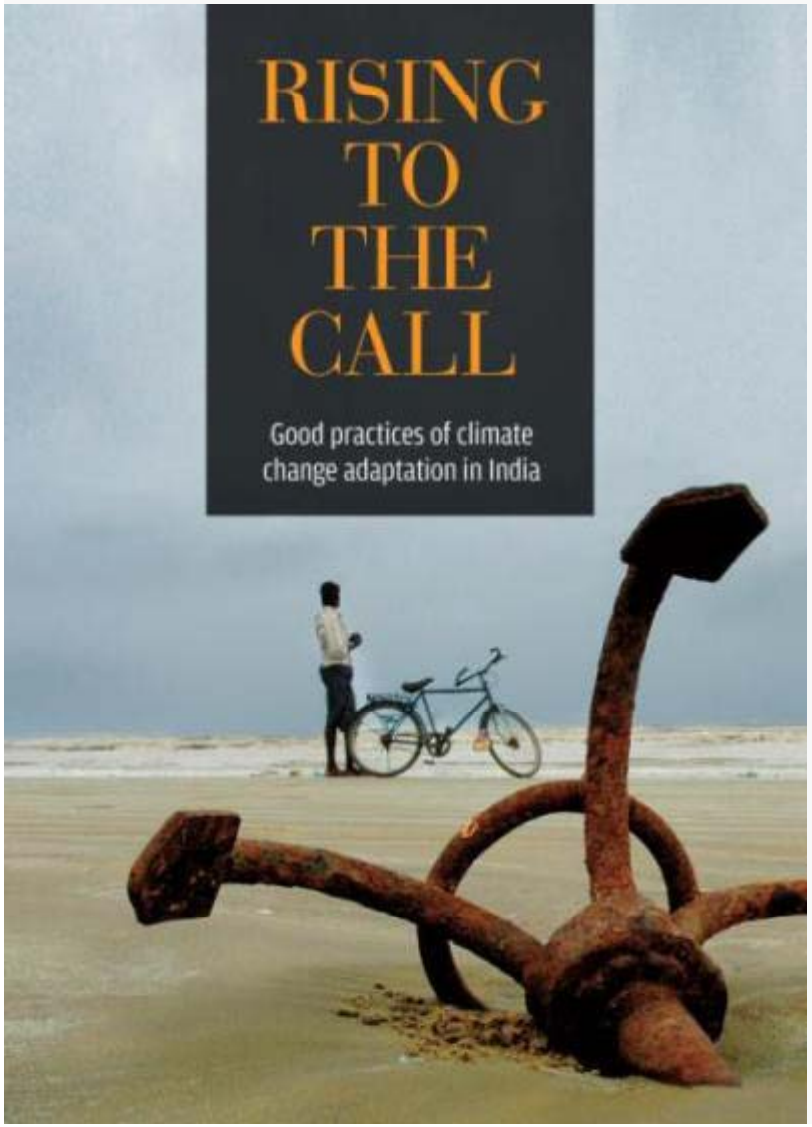
Loss and Damage:

- UNISDR recently published estimate of loss and damage as part of their 2015 GAR on Disaster Risk Reduction. Average Annual Loss is expected to be US$ 10 billion per year in India
- Cyclone Hudhud in 2014 is estimated to have caused damages of about Rs 100,000 crore and so did the 2014 J&K floods
- 14th Finance commission has made a total outlay of about US$ 9 billion for over 5 year period for Disaster management in country

Recent negotiations suggest – not much international support for L&D and Adaptation. We have to be proactive and integrate climate change concerns into development planning…

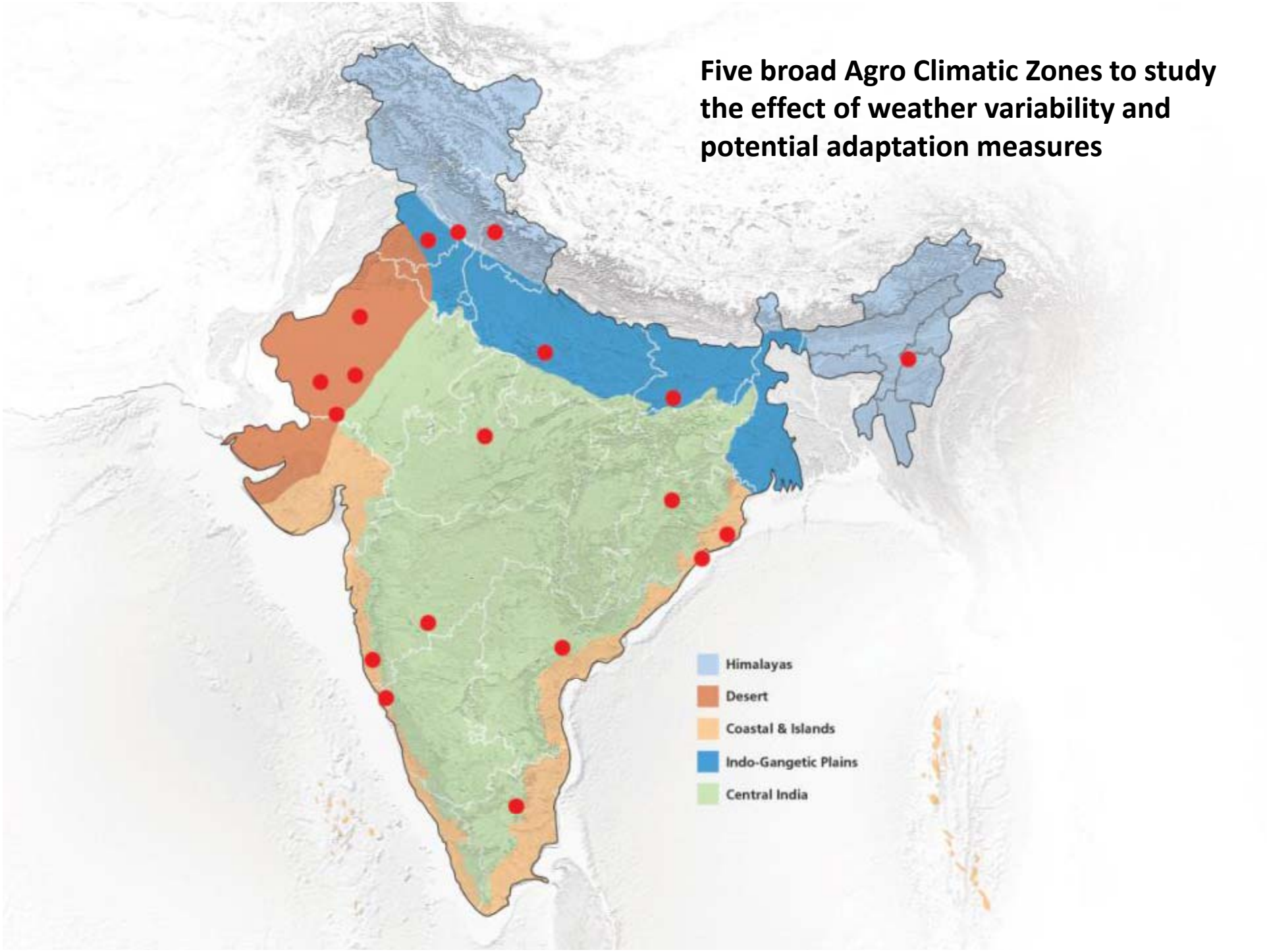
ADAPTING TO CLIMATE CHANGE

Best practices in climate change adaptation

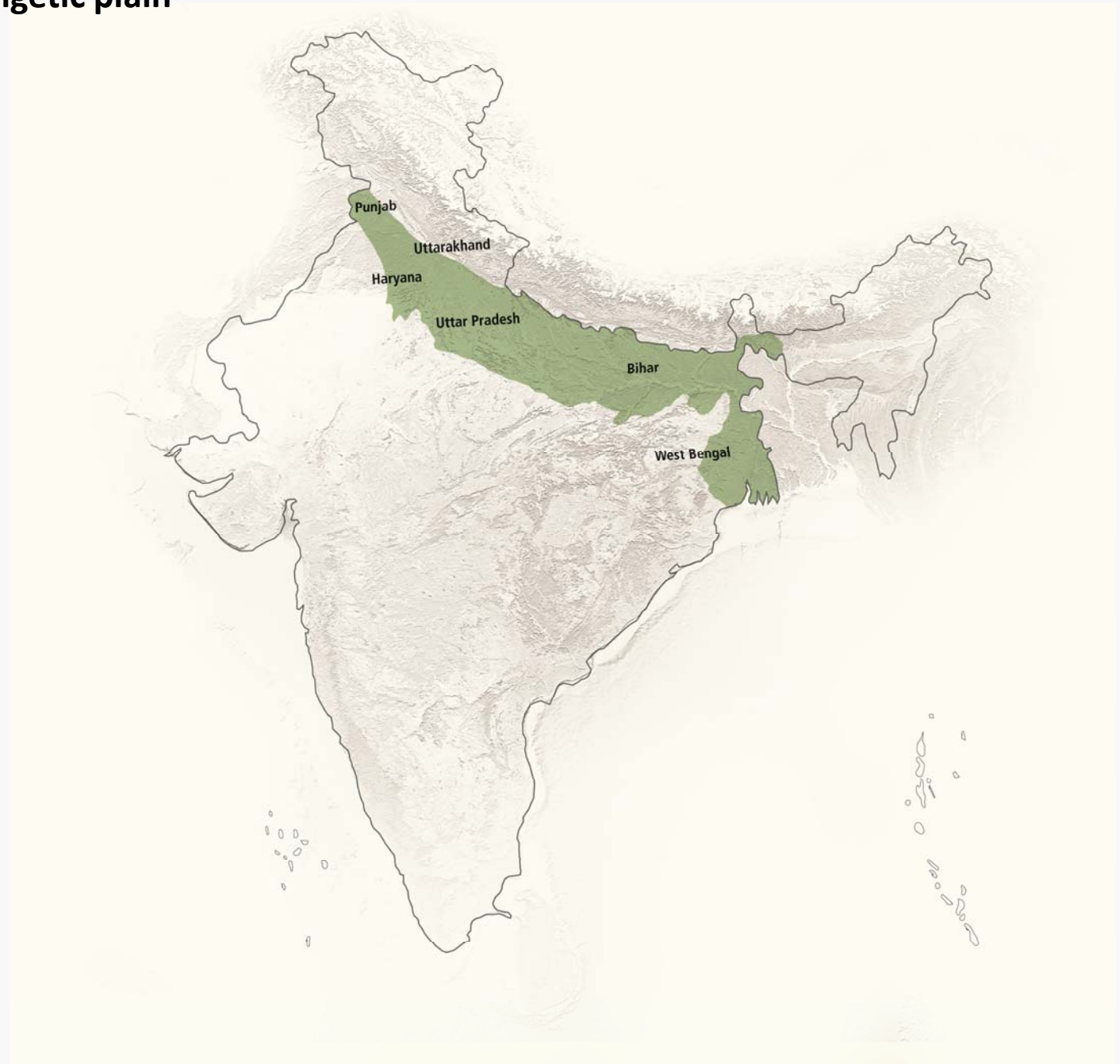


- Documentation of case-studies on best practices in adaptation
- 22 case-studies from across the country, comprehensive maps of extreme weather events, impacts and climate change vulnerabilities
- key feature of the book is its sectional overviews that highlight climate change trends and potential adaptation measures for each of the five regions considered

Five broad Agro Climatic Zones to study the effect of weather variability and potential adaptation measures



The Indo-Gangetic plain

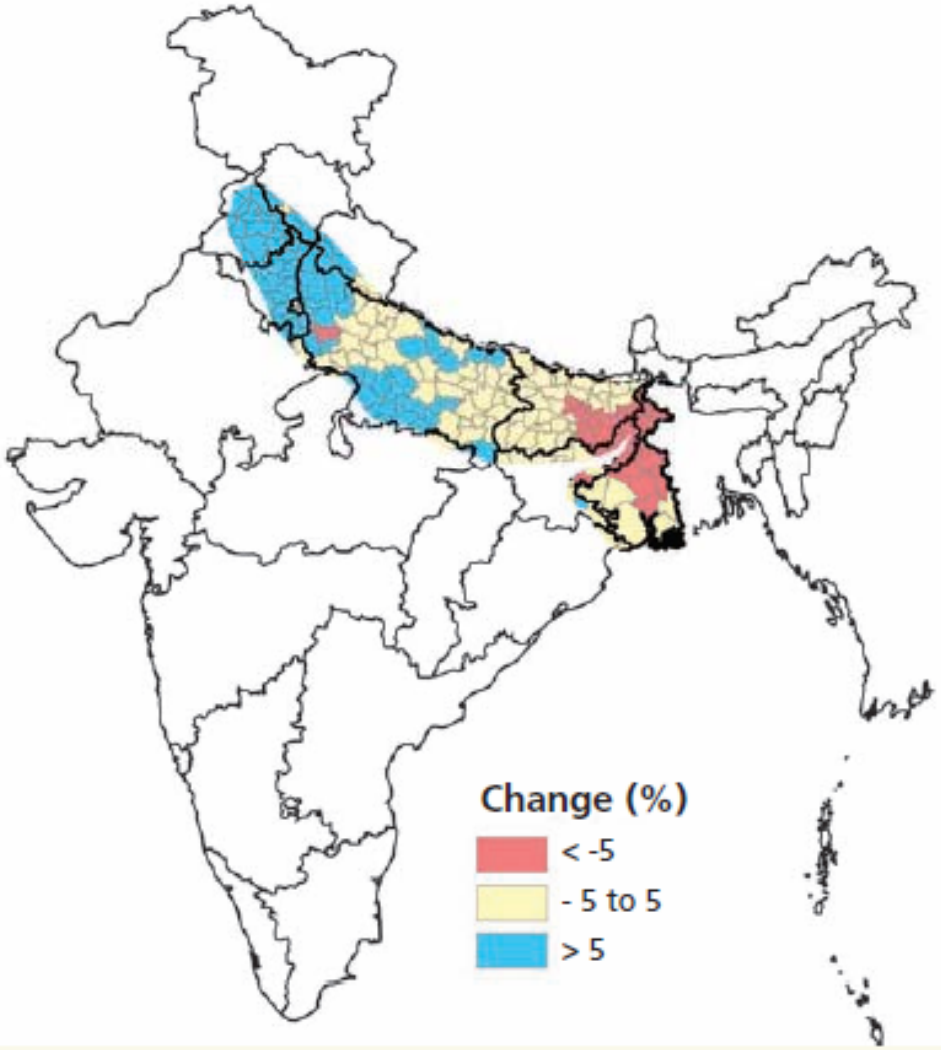


Key Vulnerabilities

- Vulnerability increases as one moves from western to eastern parts through the Indo-Gangetic Plain. Eastern and southern Uttar Pradesh and Bihar are the most vulnerable owing to high exposure, high sensitivity and low adaptive capacity
- A large reduction in wheat yields is projected, unless appropriate cultivars and crop management practices are adopted.
- Rice yields are also expected to decline in Bihar
- Productivity of rice is likely to decline by 0.16 to 9.6 per cent as temperature rises
- wheat yields are likely to decline by 4.6 to 32 per cent with respect to current normal yields in Punjab
- Between extremes – UP floods in 2010, Bihar in 2008, frequency of droughts increasing western parts of Basin and Bundelkhand region

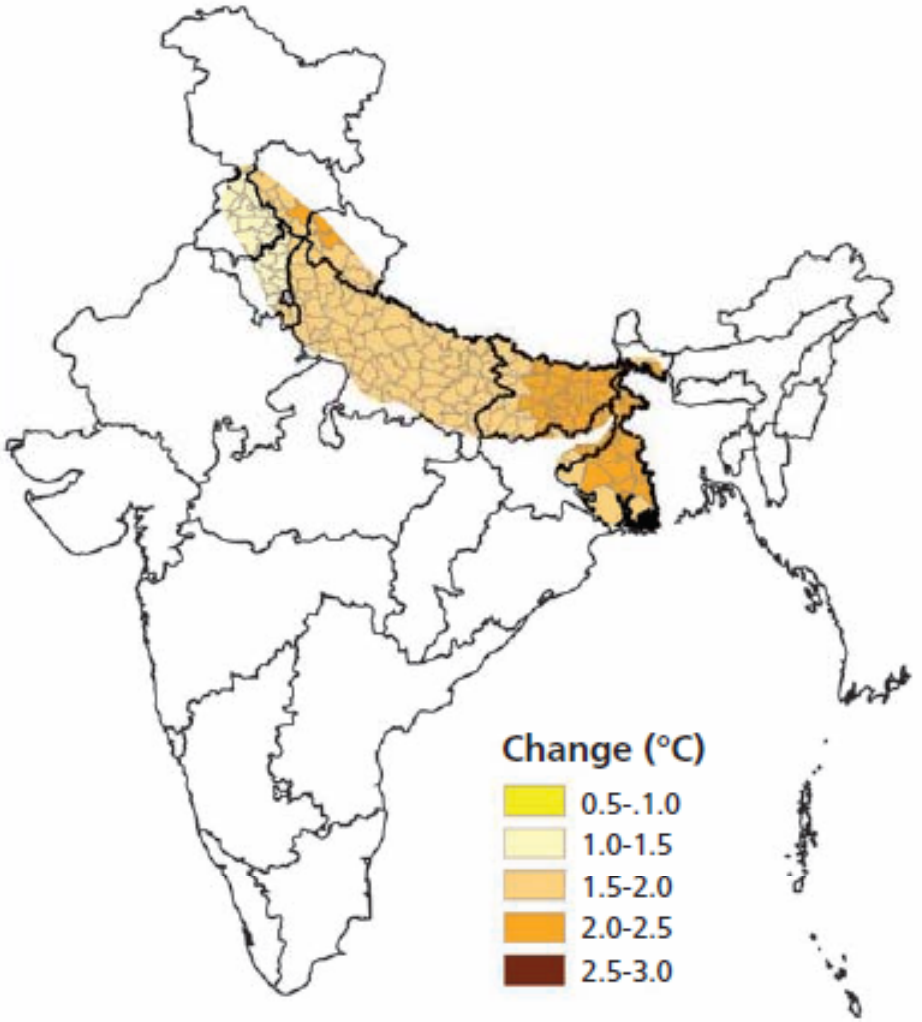
Change in annual rainfall *(2021-50 over 1961-90)*

Punjab, Haryana and parts of UP and Bihar are likely to see an increase in high-intensity precipitation events



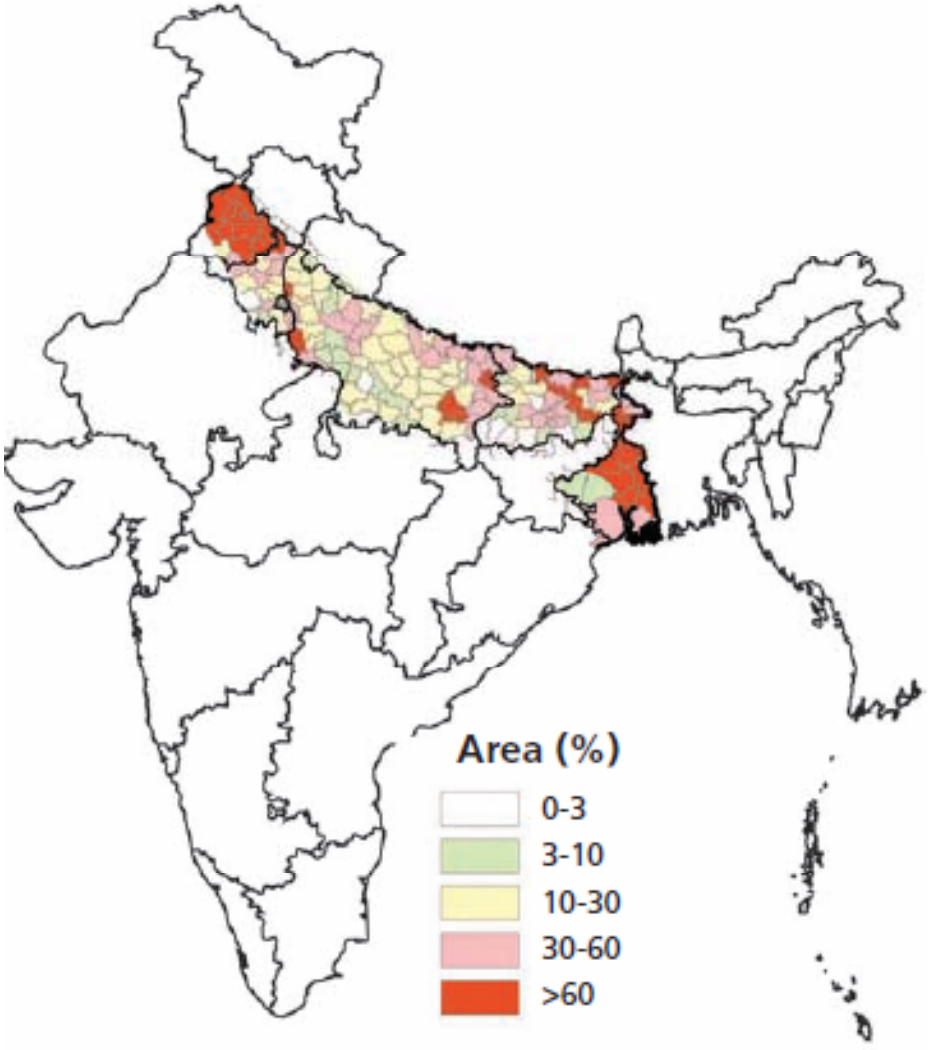
Change in maximum temperature *(2021-50 over 1961-90)*

Average increase of 1 to 2°C in the western parts and 2 to 2.5°C in the eastern parts



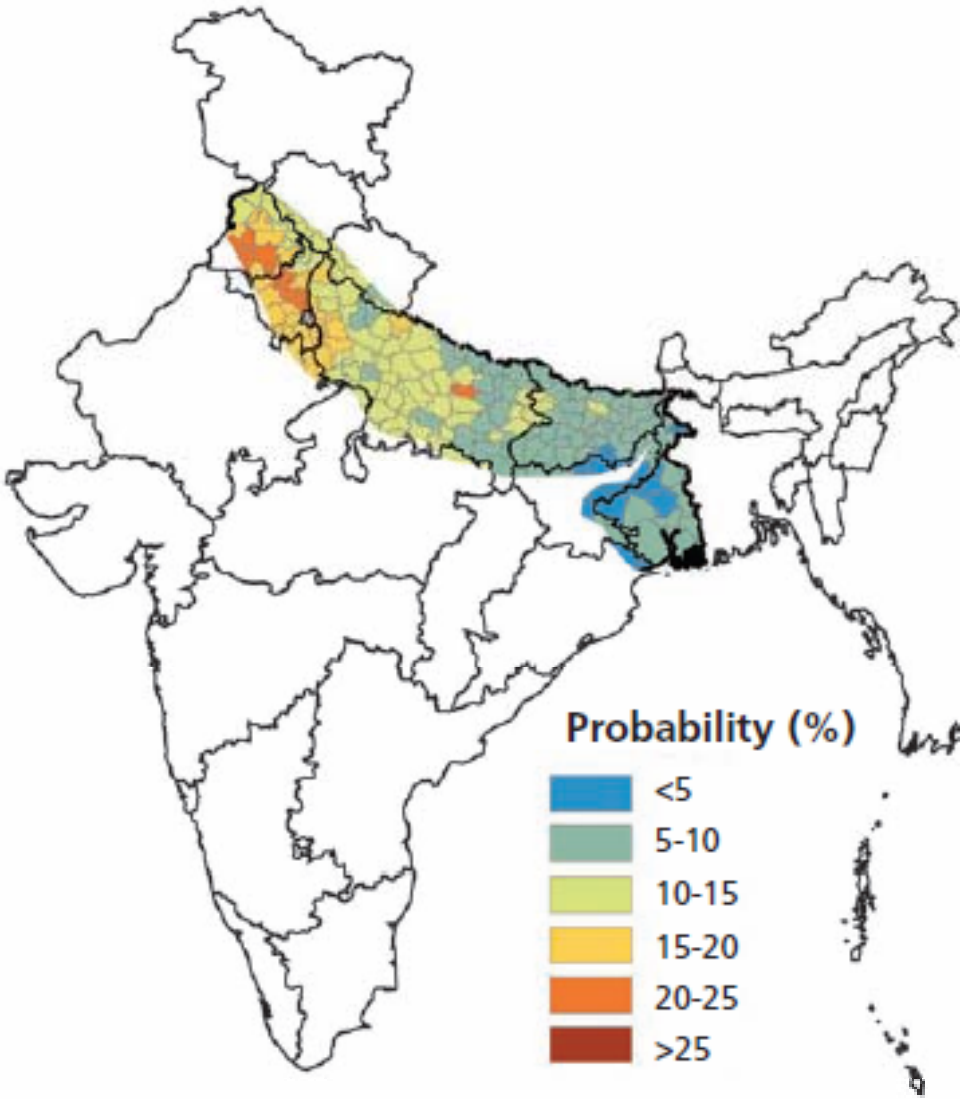
Trends: Flood

High-intensity precipitation events projected to increase leading to floods, particularly in the eastern parts of the basin

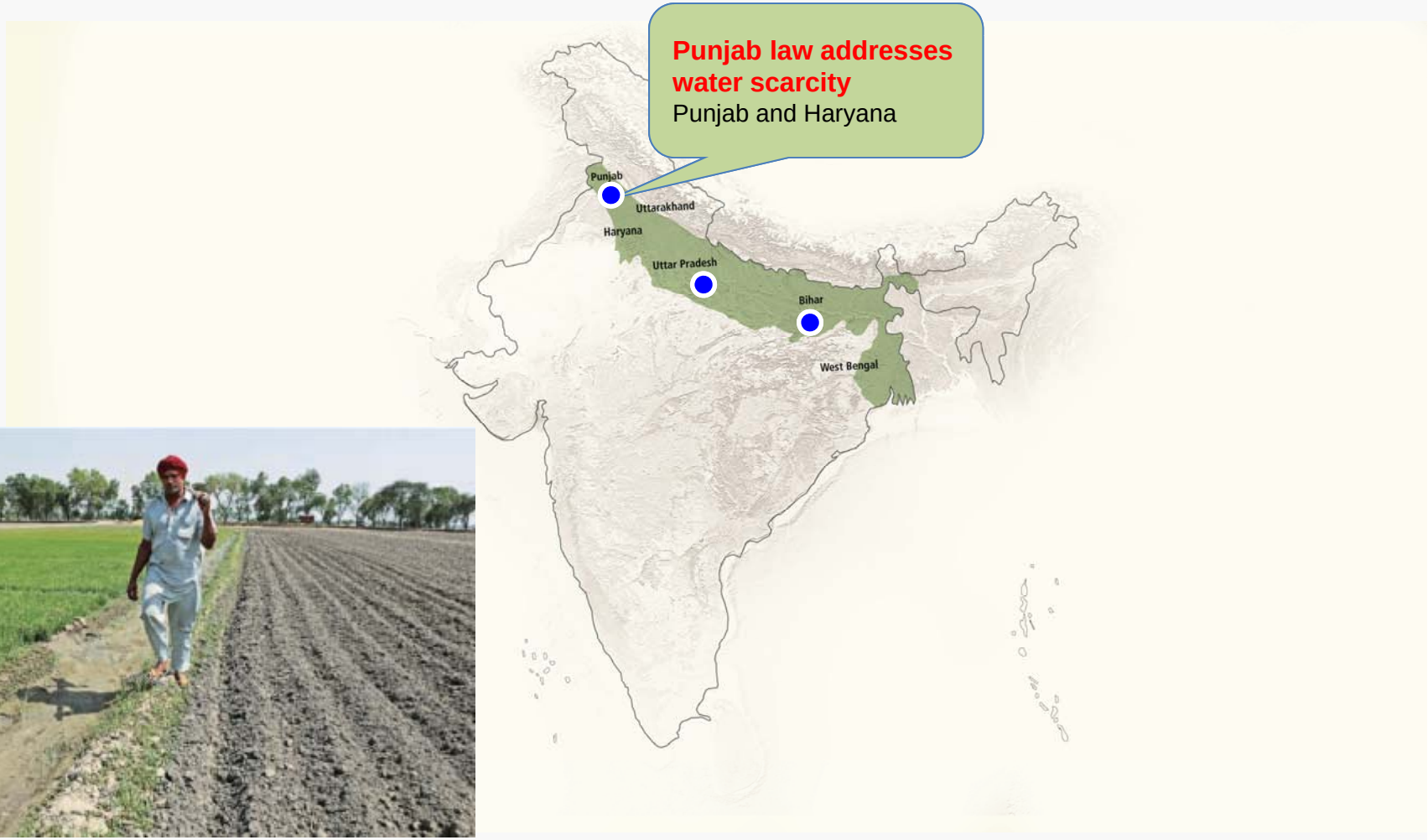


Trends: Drought

Western parts of the basin – Haryana and Punjab – likely to become vulnerble to drought

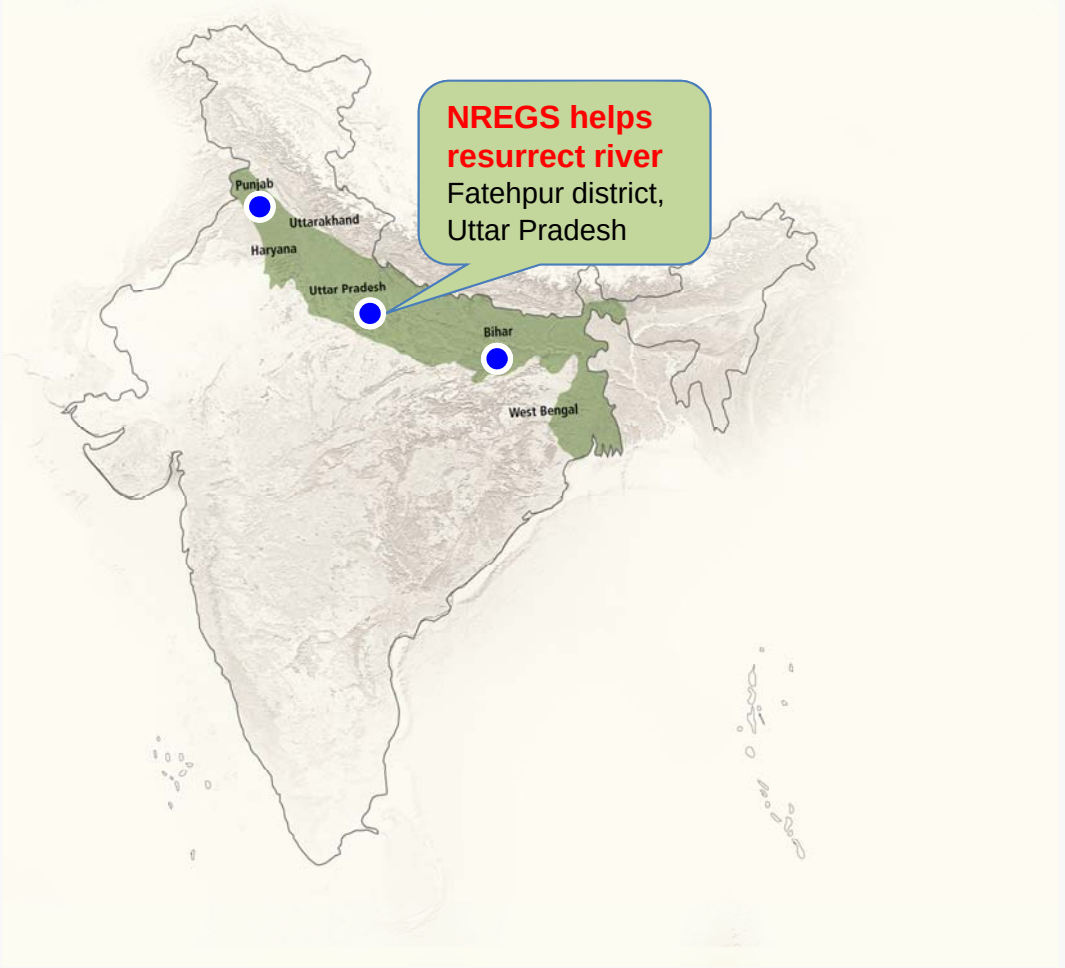


The Indo Gangetic plain



The Punjab preservation of Sub soil act 2009 has succeeded in reducing the depletion rate of the sub soil water. No farmer shall sow or transplant in their nursery before the notified dates. Farmers violating the law will be liable to a penalty of Rs 10,000 per hectare per

The Indo Gangetic plain



Revival of the 46-km-long rivulet Sasur Khaderi-2 between April 15, 2013 and June 15, 2013. The initiative undertaken was local administration

The Indo Gangetic plain

Megh Pyne Abhiyan, campaign worked with local communities to alleviate drinking water stress and improve sanitation practices

NATIONAL LEVEL PROGRAMMES BUILDING RESILIENCE

National Action Plan on Climate Change (NAPCC)

Eight missions that outlines policies and programs addressing climate mitigation and adaptation

- Jawaharlal Nehru National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustainable Agriculture
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission on Strategic Knowledge for Climate Change

In addition each state was directed to come up with state action plans on climate change (SAPCCs) which are more adaptation centric

Government programmes

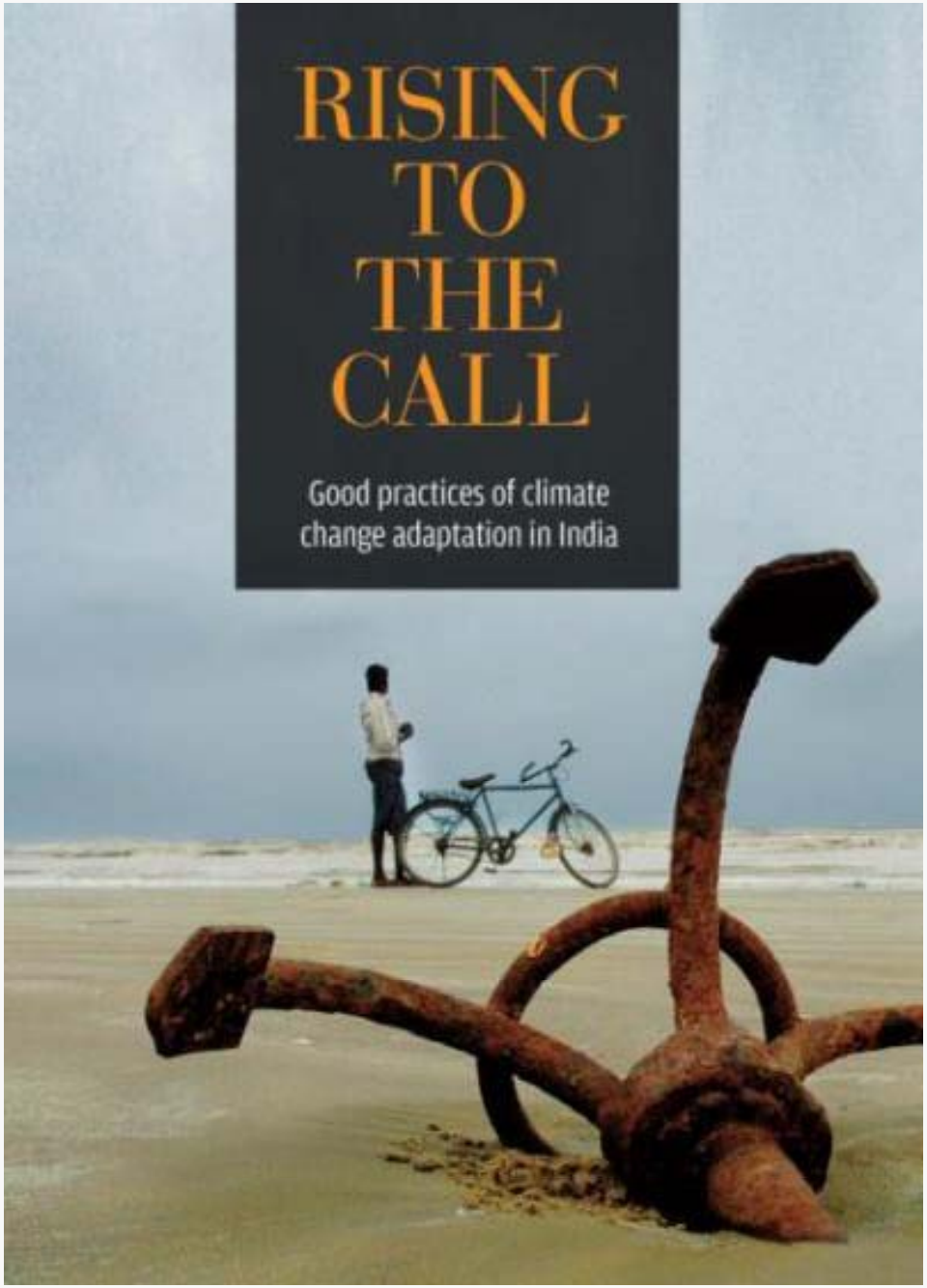
Sl Num	Government programmes**	2015-16 Budget (Cr)*
1	Mahatma Gandhi National Rural Employment Guarantee Scheme	34699
2	Prime Minister's Employment Generation Programme	1050
3	Pradhan Mantri Krishi Sinchai Yojana (includes watershed development, micro-irigation etc)	5300
4	Rashtriya Krishi Vikas Yojana (integrated pest management, soil health, seed farms, market development, etc	4500
5	National Crop Insurance Programme	2823
6	National rural livelihood mission	3343
7	Forestry (National Afforestation and Eco-Development)	688
8	Urban Rejuvenation Mission	6000
++	Others include programmes of NABARD, pilot initiatives of NICRA, etc	

* 1 Cr ~ 200,000$

**Programmes building resilience, reducing vulnerability, social safety nets, etc

Adaptation through collaborations and NGOs…

Name of Project	Agency	Focus Area
Climate Change Adaptation in Rural Areas of India (CCA-RAI)	GiZ, MOEFCC	Implementation in 4 states - MP, Rajasthan, TN, and WB. Supported SAPCC in 18 states
Climate Smart villages	CGIAR-CCAFS	Haryana, Bihar, Punjab and Maharashtra – 1000 villages
Climate Change Adaptation (in semi-arid regions)	Watershed Organisation Trust (WOTR)	Maharashtra, MP, Rajasthan, Telangana, Andhra Pradesh, Orissa, Jharkhand
Programme on Sustainable Agriculture, Livestock , water resource management and others	BAIF Development Research Foundation	Multiple states across country
Small Holder Agriculture & Climate Change and Natural Resource Management	Oxfam (India) through numerous grassroots NGOs	Assam, Bihar, Chattisgarh, Jharkhand, Orissa, Uttar Pradesh and Uttarakhand
Toolkit to enable local governments to develop climate resilience strategies and plans of action	ICLEI	Three cities: Shimla, Bhubaneswar and Mysore.
Adapting to Climate Change in Urbanising Watersheds (ACCUWa)	ATREE	Karnataka, Tamil Nadu



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http://csestore.cse.org.in/books/greenpolitics/rising-to-the-call.html