

# Climate Induced Vulnerability and Adaptation, India

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# Global Climate Change – Economics

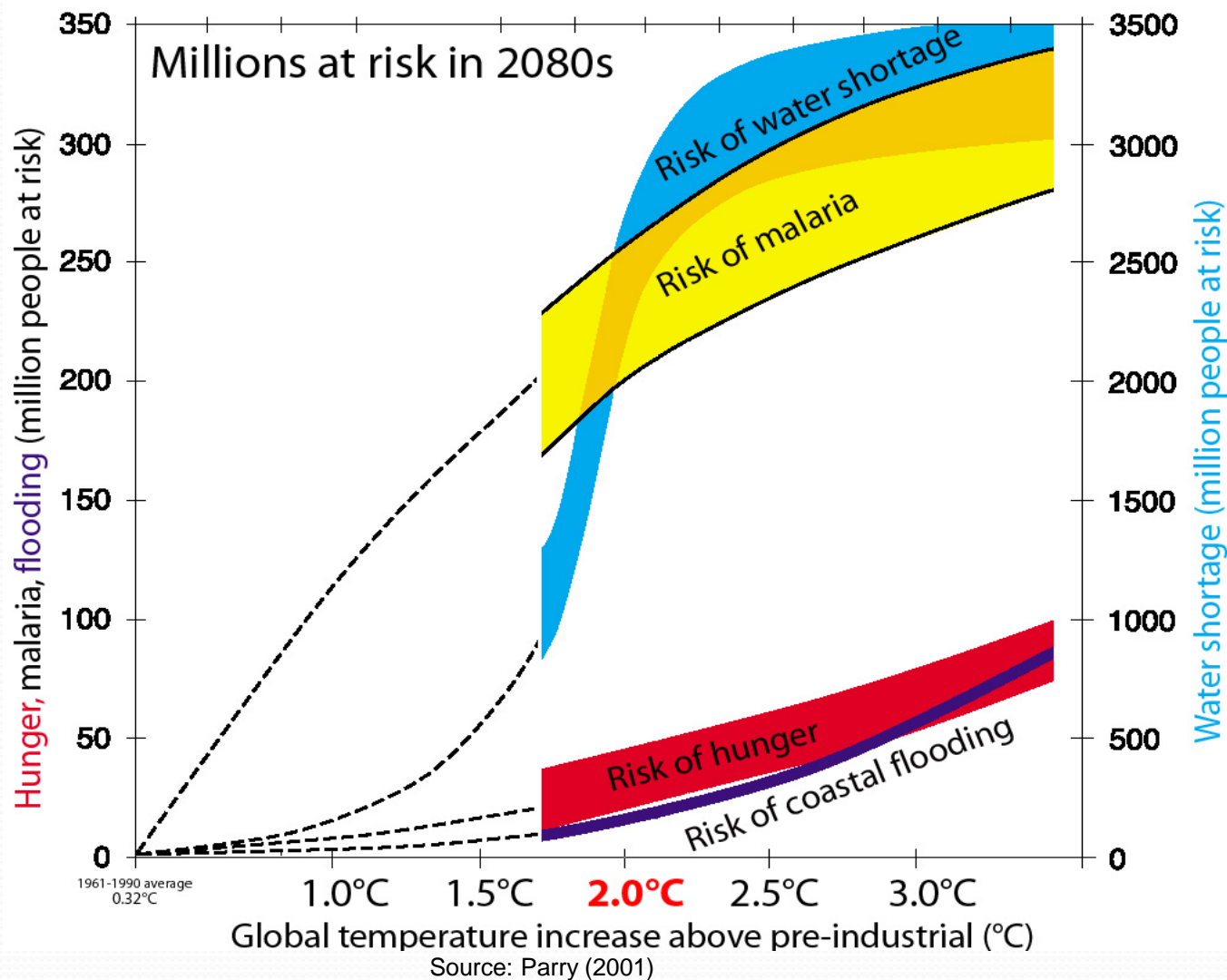
Climate change poses a grave threat to lower income countries due to:

- Geography (already in warm areas).
- Agriculturally dependent economies, and agriculture will be heavily impacted by climate change.
- Lack money for mitigations.

# Public Policy and Climate Change

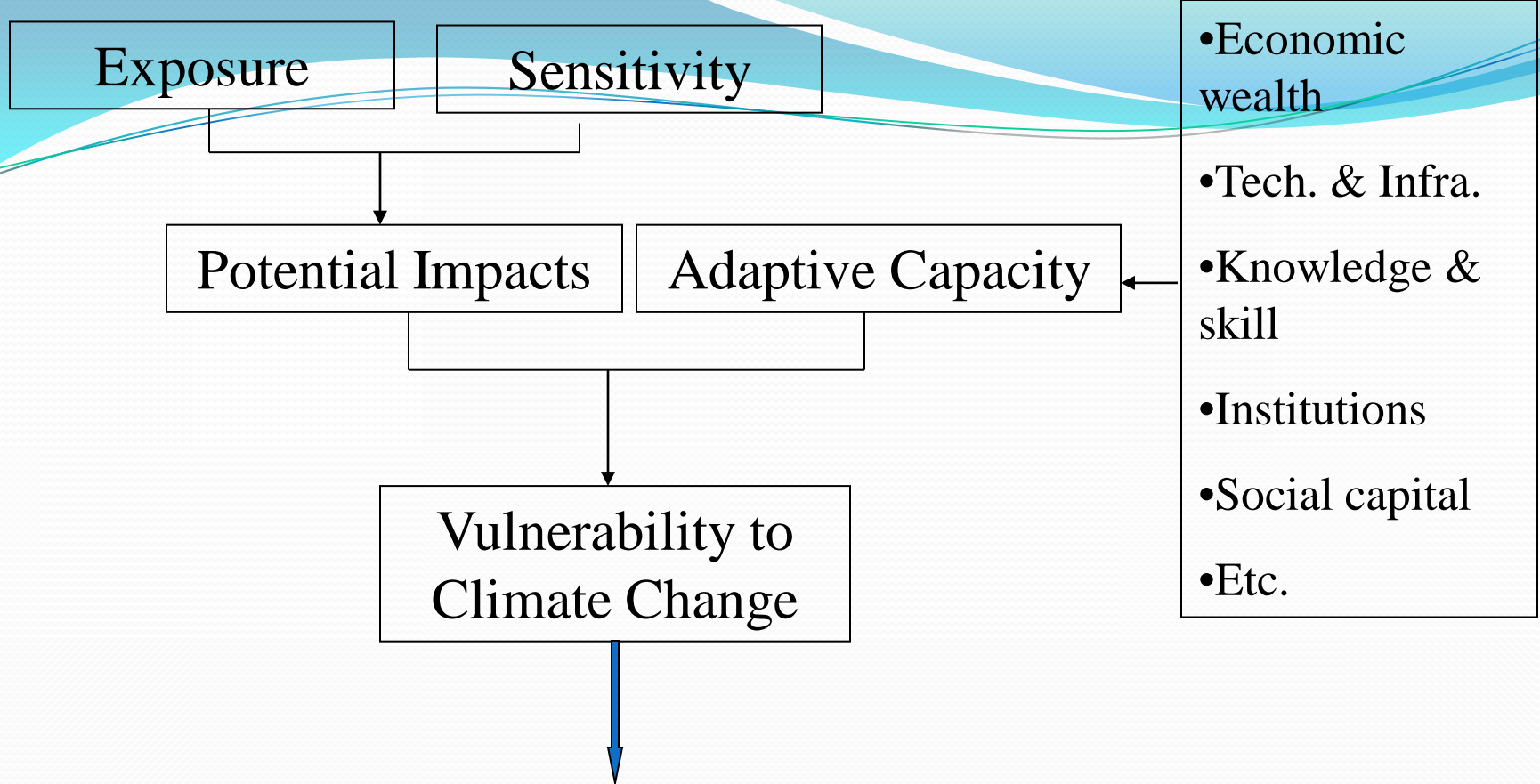
- Two strategies are necessary to reduce the risks of climate change:
- **Mitigation** – the causes of climate change are removed by reducing GHG emissions.  
“avoid the unmanageable...”
- **Adaptation** – the effects of climate change are dealt with by coping with their negative impacts.  
“... and manage the unavoidable”
- The two strategies are interlinked: the more successful the first strategy is, the less the second one is required.

# Risks Associated With from Global Warming



## Vulnerability: Meaning and Definition

- Vulnerability is a complex and multidimensional concept.
- Vulnerability has been used in different research traditions such as poverty and livelihoods, natural hazards literature and climate change research (Adger, 2006; Smit and Wandel, 2006)
- There are a large number of definitions on vulnerability in different literature (Blakie *et al*, 2000; Kelly and Adger, 2000; Adger 1999; IPCC, 2001).
- Vulnerability is most often conceptualized as being constituted by components that include exposure to perturbations or external stresses, sensitivity to perturbation, and the capacity to adapt.



*"The degree to which a system is susceptible, or unable to cope with adverse effects of climate change, including climate variability and extremes, and vulnerability is function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity"* (IPCC, 2007)

# Stationary Climate

# Changing Climate

Vulnerable

Vulnerable

No trend

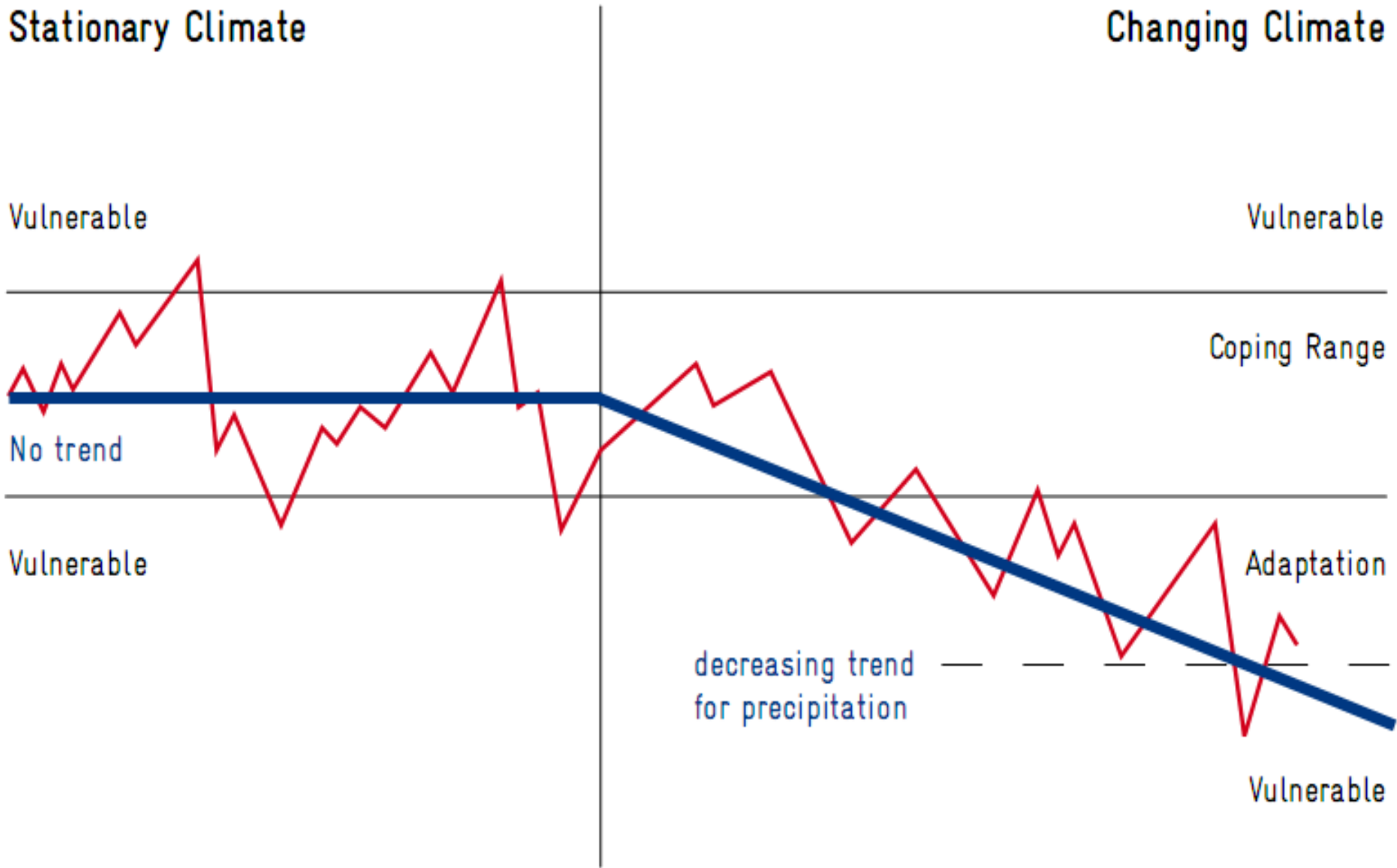
decreasing trend  
for precipitation

Coping Range

Vulnerable

Adaptation

Vulnerable



# Major Categories of Natural Disasters in India 1900-2007

Category	No of Events	People Killed	People Affected (Million)	Damage (US\$M)
Drought	11	4,250,300	711.84	942
Extreme Temperatures	41	13,148	--	544
Flood	198	55,243	747.93	21,355
Wind Storm	141	163,318	87.67	12,719

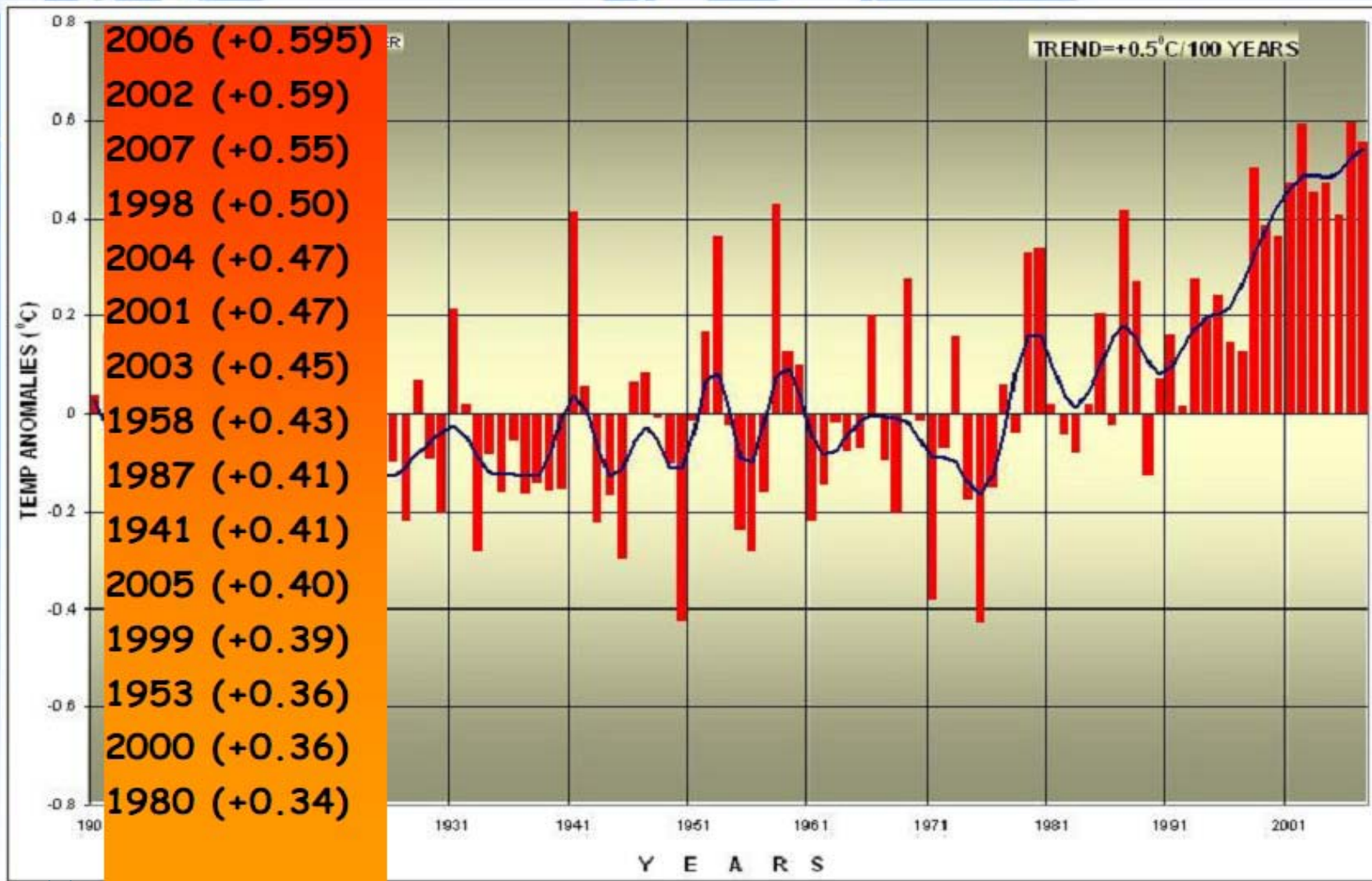
40 million hectare land mass is vulnerable to floods

68% of net sown area is vulnerable to drought

Andhra Pradesh, Orissa, West Bengal and Gujarat are vulnerable to cyclones



# ALL INDIA TEMPERATURE ANAMOLY 1901-2007 (IMD)



# Projected Impacts of climate change on Indian agriculture

- Productivity of cereals would decrease due to increase in temperature and decrease in water availability (especially in Indo-Gangetic plains).
- Global reports indicate a loss of 10-40% in crop production by 2100.
- Greater loss expected in rabi. Every 10C increase in temperature reduces wheat production by 4-5 million tons.
- This can be reduced to 1-2 million tons only if farmers change to timely planting.

# My Research

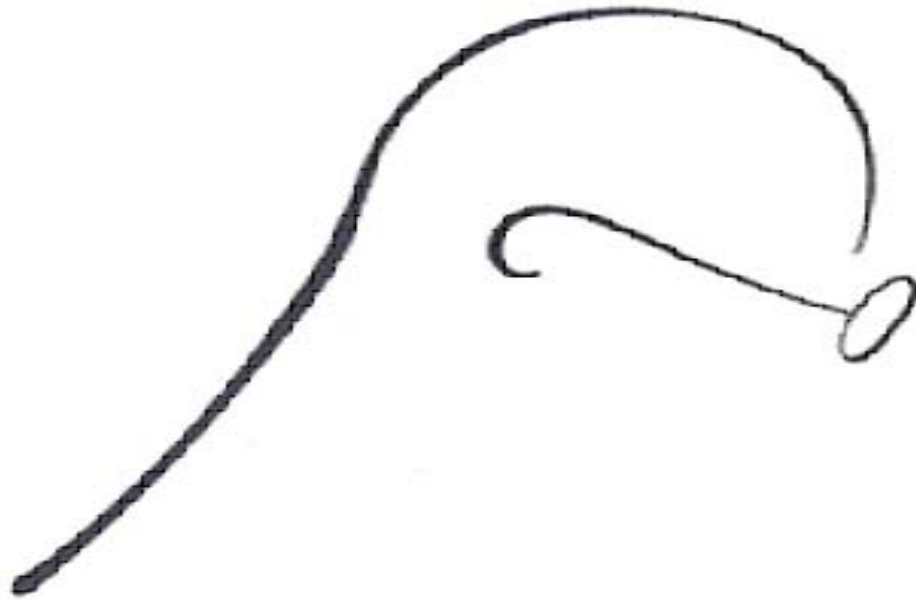
- Analysis of Trends and Patterns of Historical Rainfall and Temperature in the Study Area Using statistical tools like Mann-Kandell tests etc.
- Quantification of Vulnerability to climate change at the Household Level through conceptualizing Vulnerability as Expected Poverty.
- Examining the adaptation to climate variability and change among small and marginal farmers in the study region. For e.g changing cropping pattern, changing crop varieties, water use changes etc.

# Climate Change: Deeper Problem

- Rethinking development: towards alternative development paradigms
- Climate change is still thought of as a separate issue from development;
- If climate change continues to be seen as a process that is separate from development itself, then the **types of adaptation** that are carried out, together with **the types of development** that are prioritized or promoted, are unlikely to be critically questioned.

Table 1. Expenditures and social investment needs

Product	Annual expenditure (US\$ billion)	Alternative	Necessary investment (US\$ billion)
Cosmetics	18	Reproductive health for women	12
Pet food in USA	17	Elimination of hunger	19
Perfumes	15	Universal literacy	5
Luxury cruises	14	Clean water for all	10
Ice cream in Europe	11	Immunisation of all children	1.3



- Gandhi was once asked if he expected India to attain the same standard of living as Britain.

He replied: *It took Britain half the resources of the planet to achieve this prosperity. How many planets will a country like India require!*