

# Micro level realities and policy coherence in SAT-Asia:

*Mainstreaming Strategies for enhancing resilience to climate change*

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- **Linking Climate change with Agriculture & rural livelihoods**
- **Climate change – A Reality**
- **Research Agenda & Key questions**
- **Grass root level insights - needs & constraints**
- **Need based adaptation - Devising/linking government programs and policies**
- **Emerging messages**
- **Need based policy matrix**
- **Conclusion**

- **Agricultural productivity is sensitive to two broad class of climate induced effect**
  - **Direct effect ( Temp, Rainfall, Co2 Concentration**
  - **Indirect effect (Changes in soil moisture and distribution and frequency of infestation by pests and diseases etc.**
- **However, vulnerability of agricultural production to climate change depends not only on the physiological response of the effected plants, but also on the ability of the affected socio economic systems of production to cope with changes in yield- *Village Dynamics***

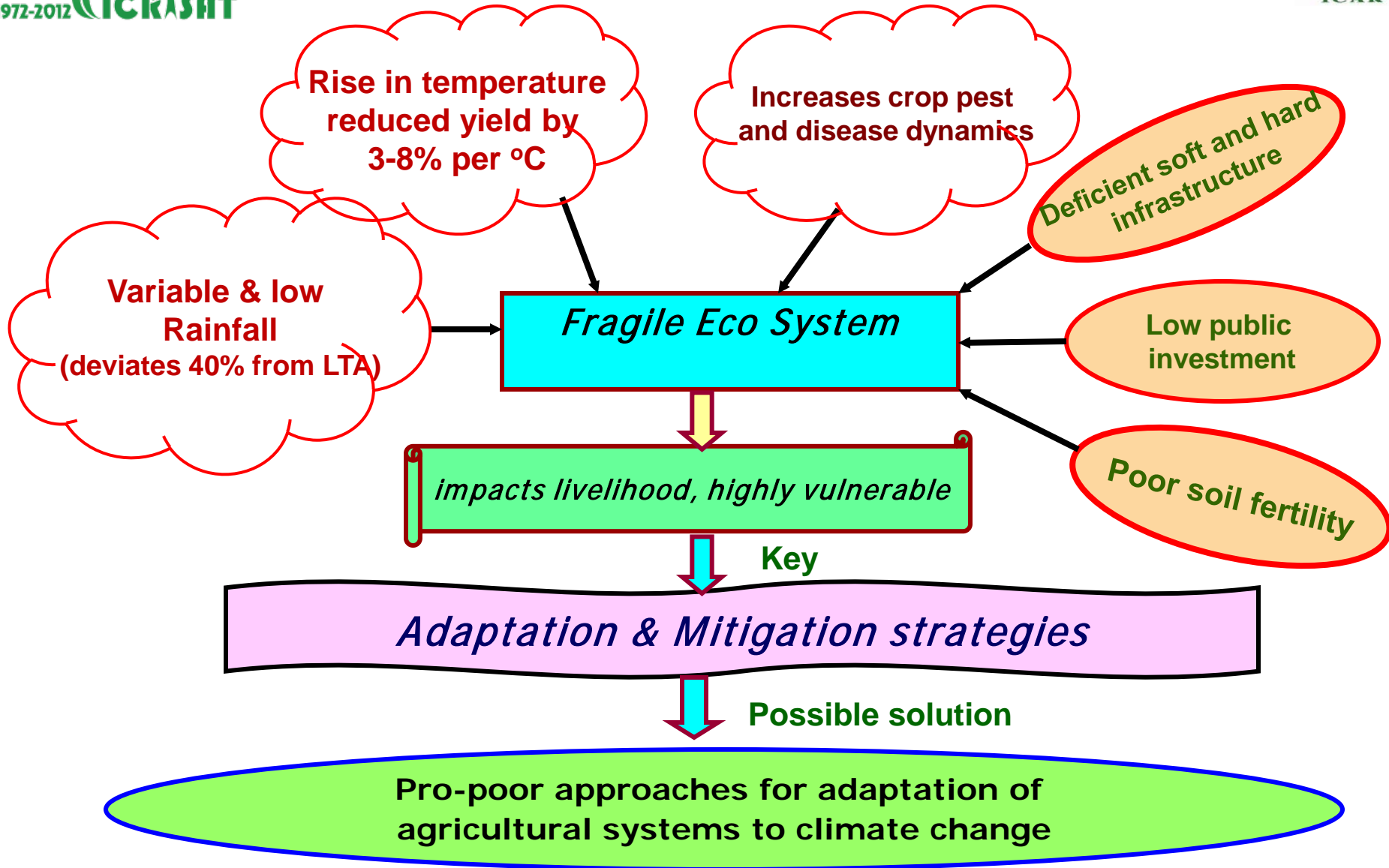
Virtual stagnation or very slow growth of crop yields (changing crop landscape) sustainability concerns and raising questions about viability of farming

**Reducing potential gains, effecting livelihoods ???**

**To cope up with these problem-solution !!!**

**Impact of climate change on SAT agriculture;  
Adaptation strategies and layers of resilience**

# Climate change impact in Dry land Agriculture



# Climate Change – a reality

- Eleven of the last twelve year ranked among the 12 warmest years since 1850
- Extreme events are becoming frequent and highly pronounced
- Atmospheric temperature is rising and it is expected that the earth's mean temperature will rise by 1.1–6.4°C by 2100 (IPCC, 2007)
- In India, mean temperature has risen at the rate of 0.20C per decade in the last 40 years (INCCA, 2010)
- Monsoon shows localized negative trend with large intra and inter seasonal variability

**All these trends and changes definitely impact farming; the livelihood of majority of rural poor.**





- ❖ Expenditure on climate change - USD 9 Bn; around 90% on *mitigation... biased perspective about adaptation*
- ❖ Discourses on aggregates i.e. based on macro information, projections, modelled scenarios – *less relevance at micro level*
- ❖ CC agenda till recently reflected only on climatic indicators; little attention to other changes thereby skewed perspective; *possibly due to lack of information*
- ❖ Above approaches may not offer *inspiring lead lines for evolving holistic coping strategies* against risk
- ❖ Downscale the current approach by *focusing on local situations*
- ❖ Calls for *generating credible information* about potential risks due to CC and providing pragmatic options to policy makers and other stake holders





## The Agenda

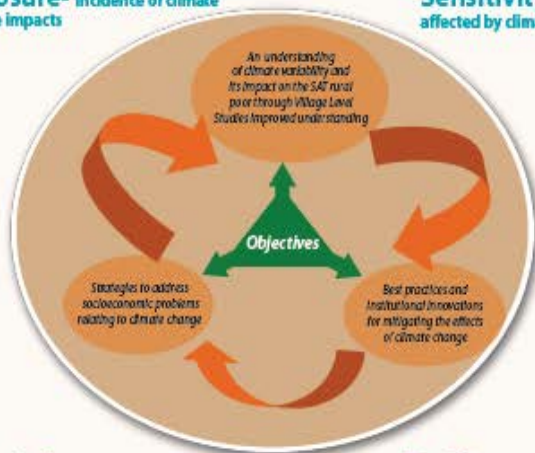
- To provide science-based solutions and pro-poor approaches for adaptation of agricultural systems to CC for the rural poor and most vulnerable farmers in south and south east Asia
- The overall objective is to identify and prioritize the sectors most at risk and develop gender equitable agricultural adaptation and mitigation strategies as an integral part of agricultural development in the most vulnerable areas
- Develop a useful information repository to help policy decisions on critical issues affecting the future of agriculture and livelihoods in the marginal regions of Asia



# Vulnerability to Climate Change: Adaptation Strategies and Layers of Resilience

**Exposure-** Incidence of climate change impacts

**Sensitivity-** Capacity of actors to be affected by climate change impacts



Layers of Resilience

## Farm Level

- ✓ Changes in inputs, timings, tillage
- ✓ Irrigation practices
- ✓ Crop rotation, crop choice, crop diversification
- ✓ Crop harvesting and processing

## Social

- ✓ Group action - social networks, information dissemination
- ✓ SHGs, community projects, coping strategies
- ✓ Local water management techniques, in-house conflict resolution

## Technological

- ✓ Micro-irrigation technologies, water harvesting, flood mitigation, land drainage

## Institutional

- ✓ Involvement through public, civil and market structures

**Adaptation-** Adjustments to reduce the effects of anticipated impacts of climate change

**Resilience-** Ability to shield and recover from adverse climate change impacts



Seven country partnership

## Outcomes and Benefits

### Researchers

- ✓ Science based solutions
- ✓ New governance mechanisms

### Farmers

- ✓ Enhanced linkages
- ✓ Community participation
- ✓ Empowerment

### Economic

- ✓ Stable incomes
- ✓ Access to information/resources

### Social

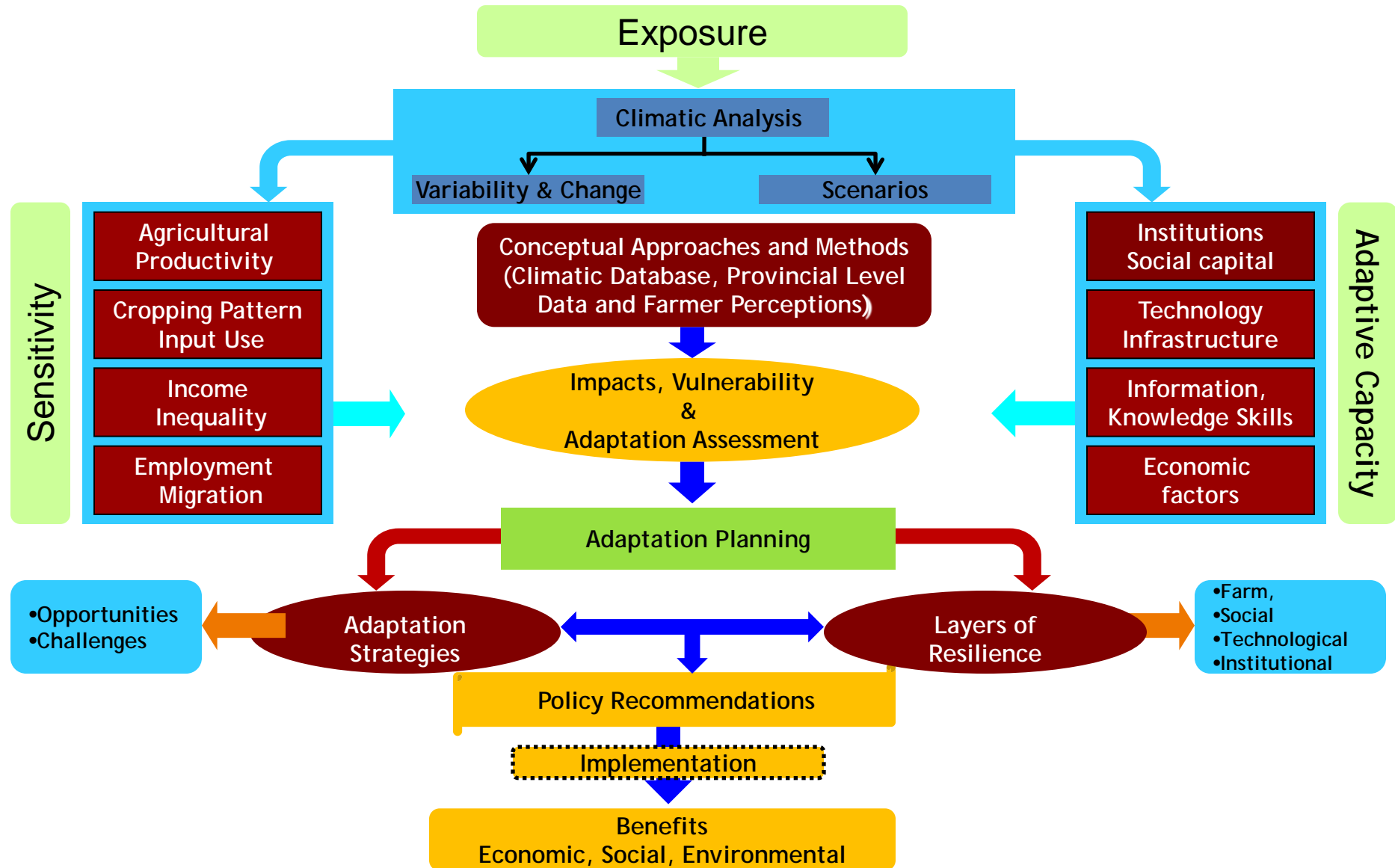
- ✓ Reduction in poverty
- ✓ Social capital

### Environmental

- ✓ Eco-friendly practices
- ✓ Reduced resource degradation



# Conceptual framework for addressing Climate Change agenda



# Key questions

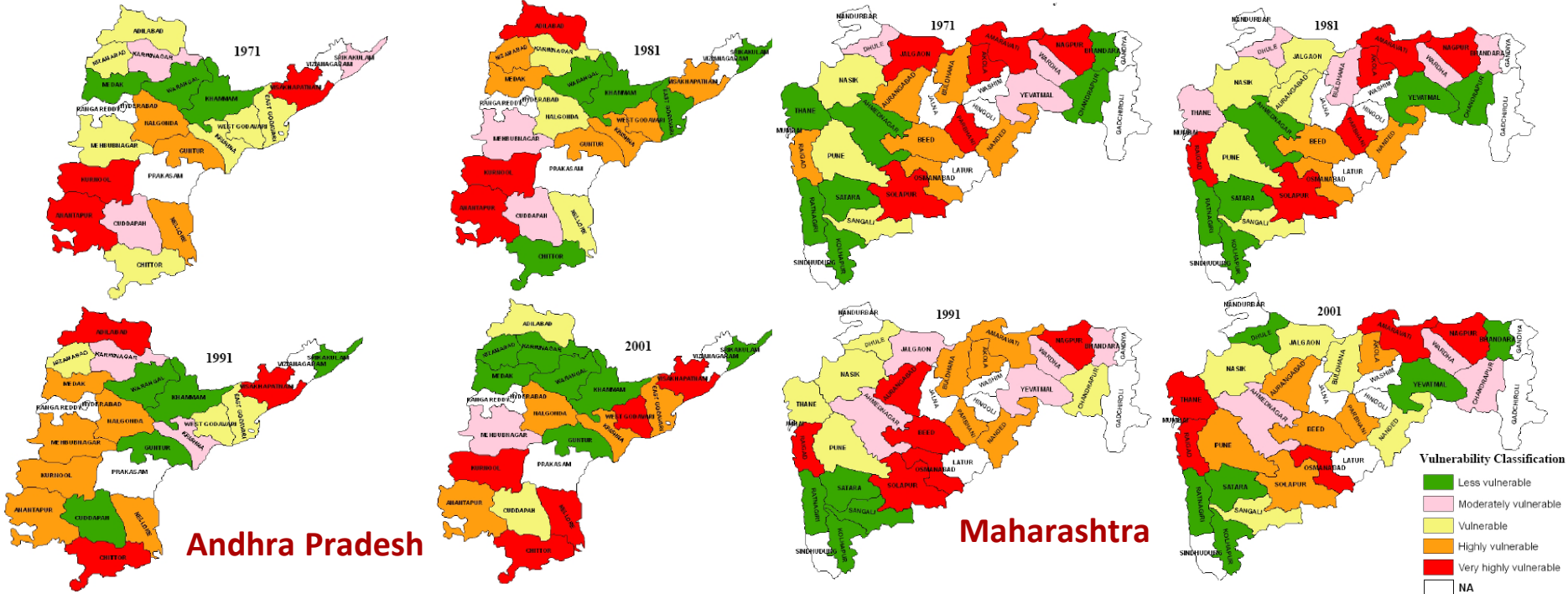
**What are the;**

- **vulnerable regions, sectors, households?**
- **climatic trends & variability at micro level?**
- **grass root farm level insights?**
- **constraints to adaptation?**

**Way forward & road map for action**

# Identifying and prioritizing Vulnerable regions - Illustration

## India

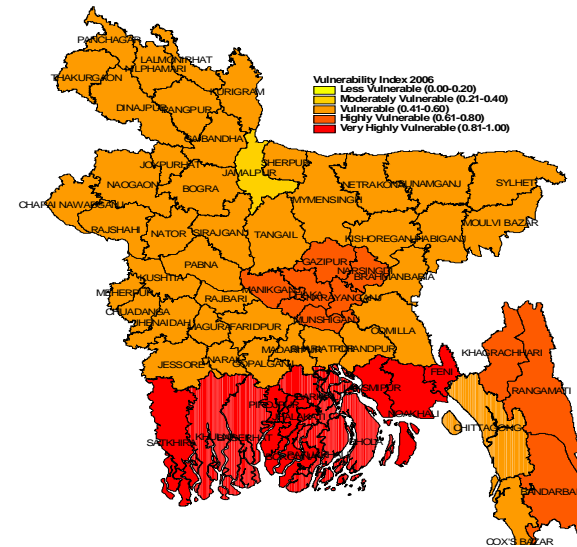


✓ Majority of the districts of Indian SAT falls under vulnerable to very vulnerable to CC (>60%)

# Identifying and prioritizing Vulnerable regions - Illustration

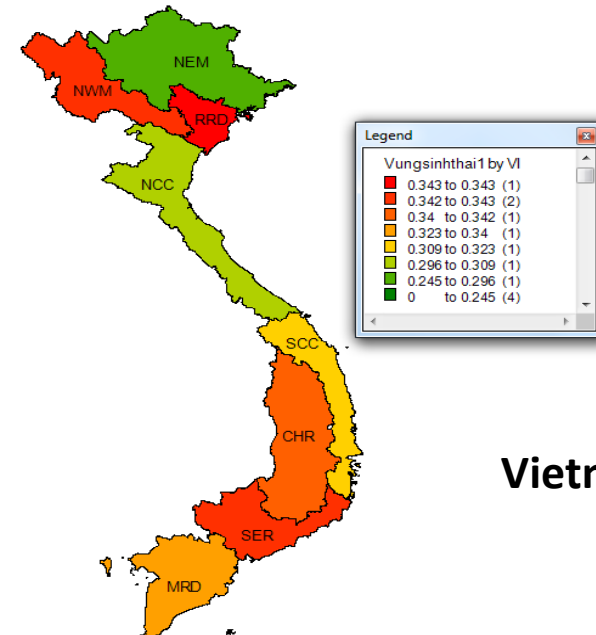
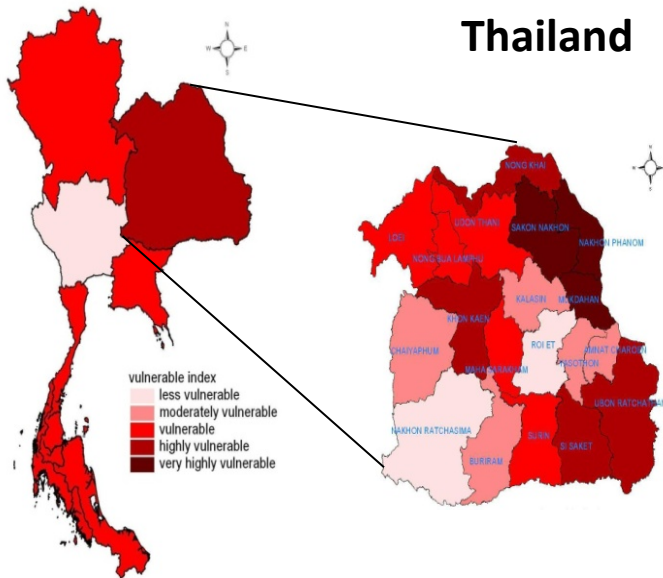
Sri Lanka

Bangladesh



Thailand

Vietnam



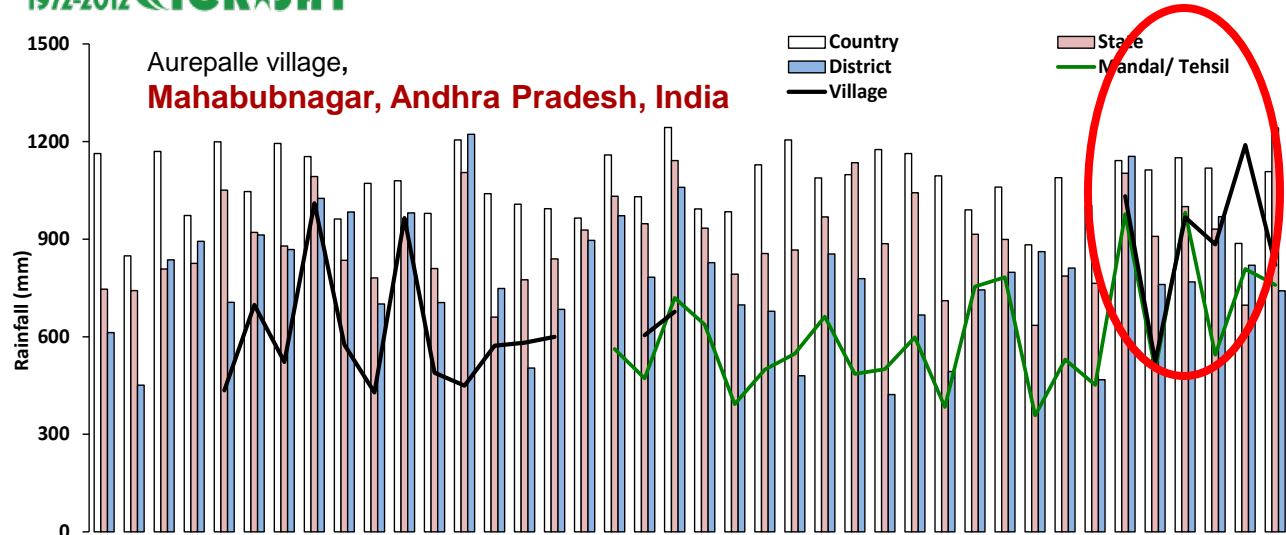




- ❑ Atmospheric temperature – Rise significantly over the years
- ❑ Rainfall - Highly variable and prominent over the years (CV upto 40%)
- ❑ Increased incidence of extreme events viz., drought, flood etc.
- ❑ Increased unpredictability of onset of monsoon season

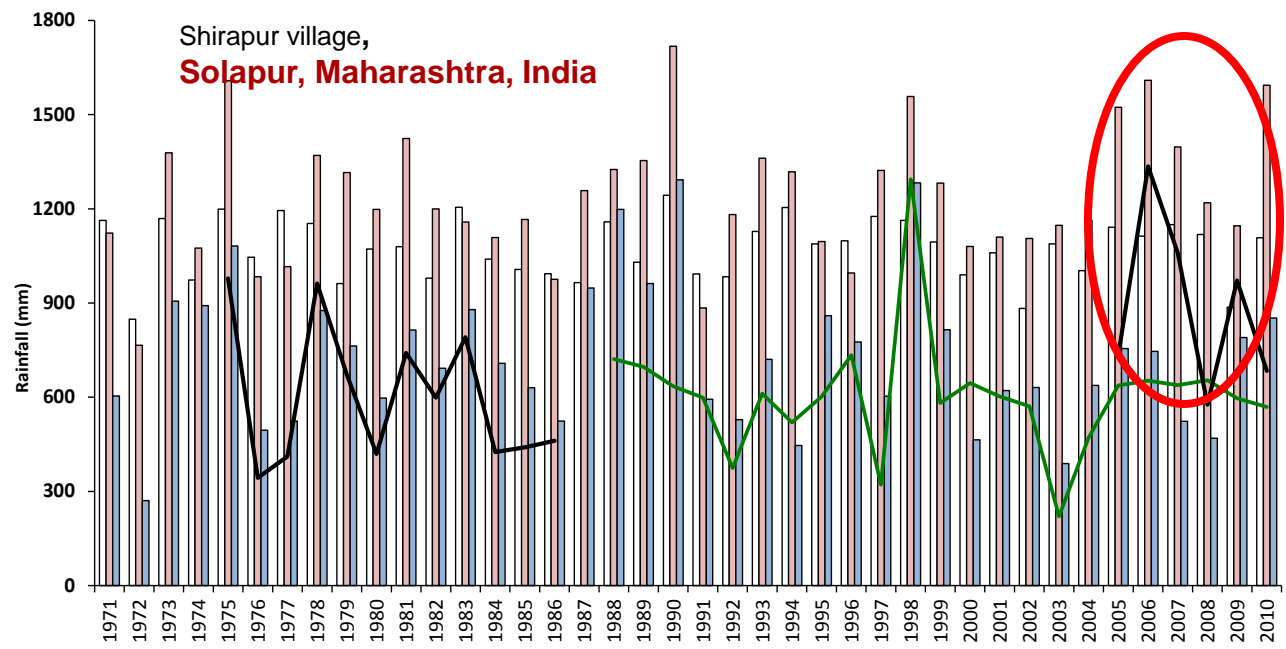


# Divergence in information from micro to macro level



➤ **Divergence in information between macro and micro levels**  
*(Illustration :- rainfall)*

➤ **This difference may not be considered during policy formulation**



➤ **Reduce efficiency & effectiveness of support policies and programs**

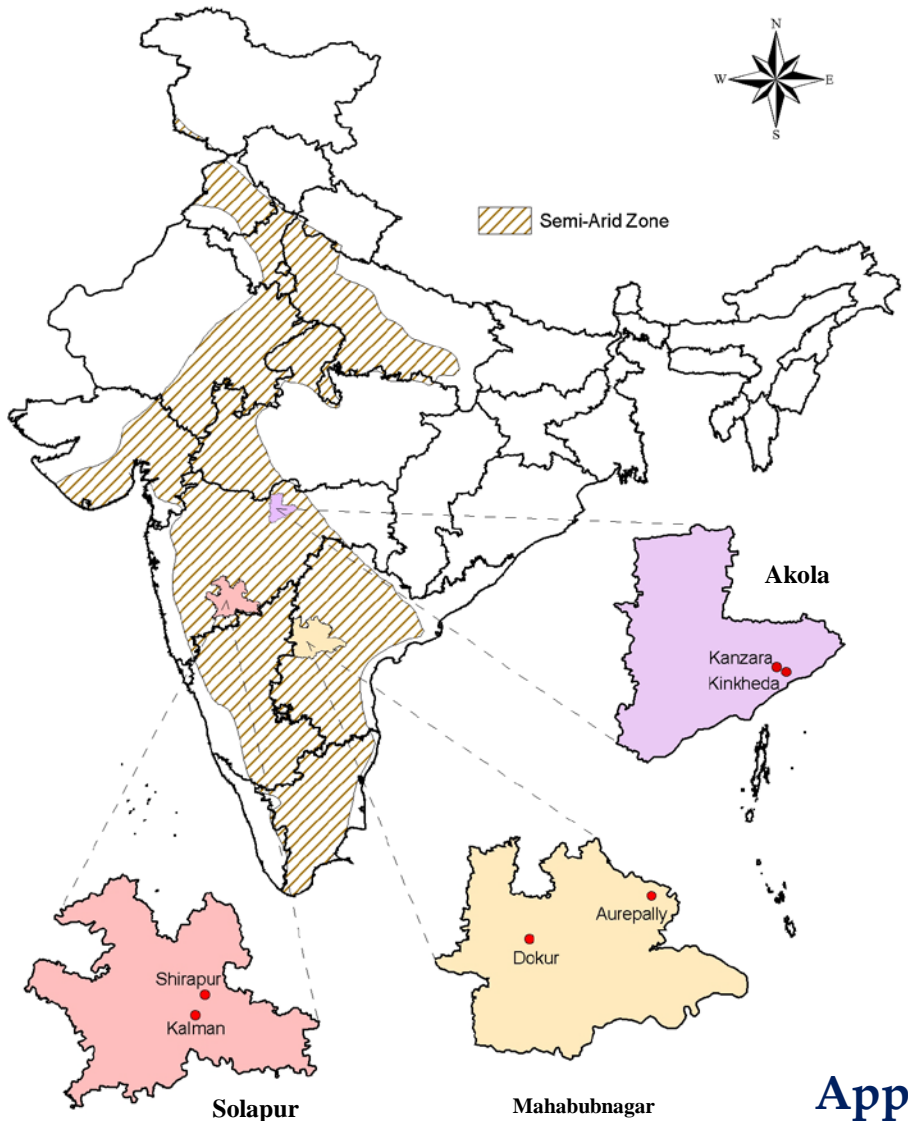
In precise...

- **Climatic realities experienced by farmers manifest at local level**
- **Hence, meaningful strategies are imperative at disaggregated level**

# Grass root level insights some illustrations



# Study domain/villages



- Six villages representing the SAT region of India (Total 36 provinces across Asia)
- Varying agro-bio physical factors, levels of development, Varying resource endowments and social capital

## Method of Elicitation

1. Longitudinal panel data
2. Personal interview
3. FGDs
4. Participant observations
5. Case study methods
6. Village workshops
7. National stake holder consultation and policy dialogue

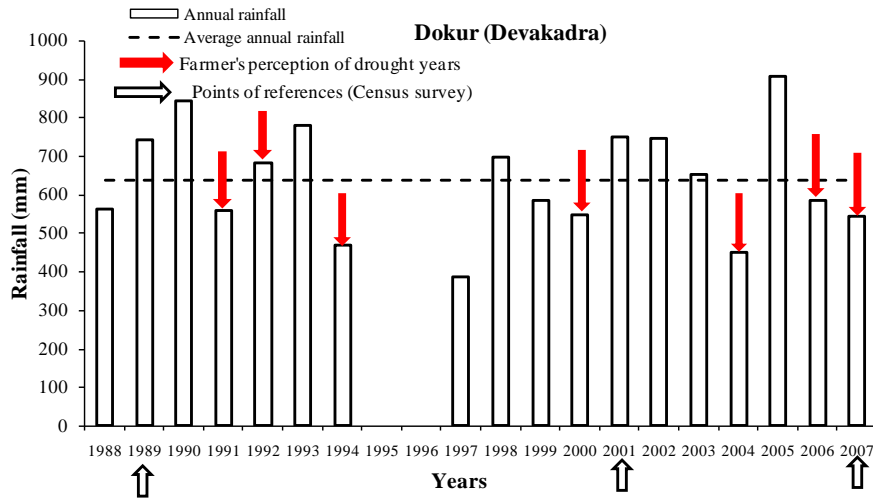
*Approach : Exploratory research with qualitative and quantitative data sets*



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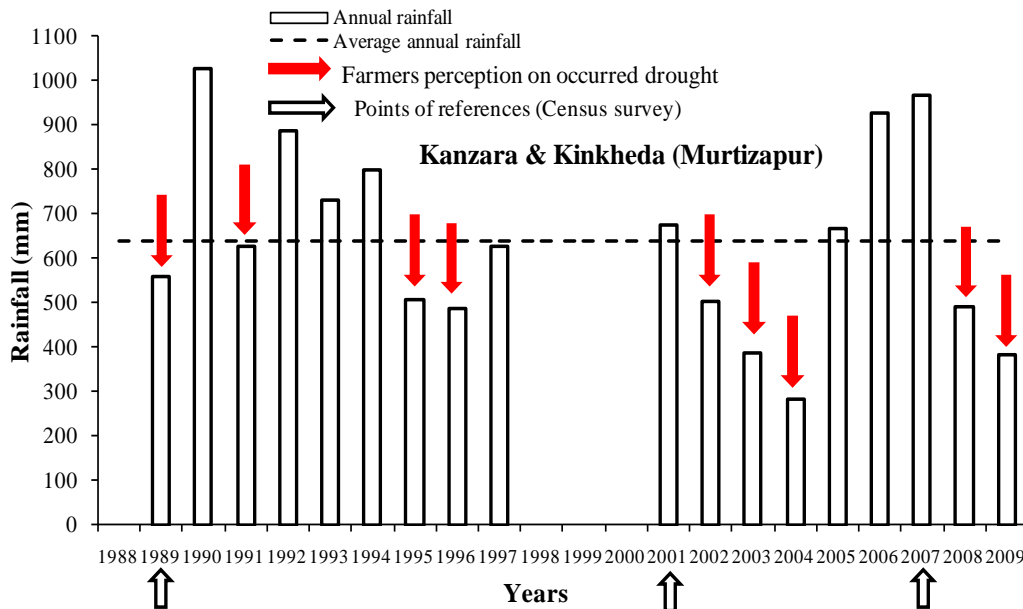
# Agro-climatic analysis – matching with farmers' perceptions



- **Uncertain monsoons (95.3%)**

- **Frequent droughts (86.6%)**

- **Fewer rainy days & amount (90.3%)**



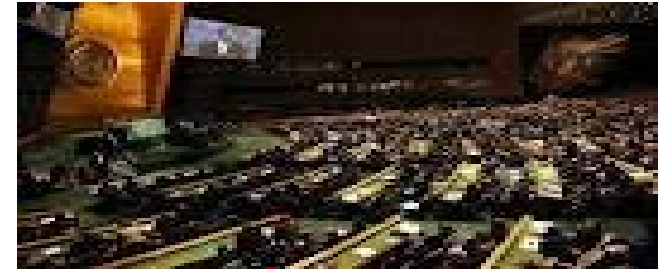
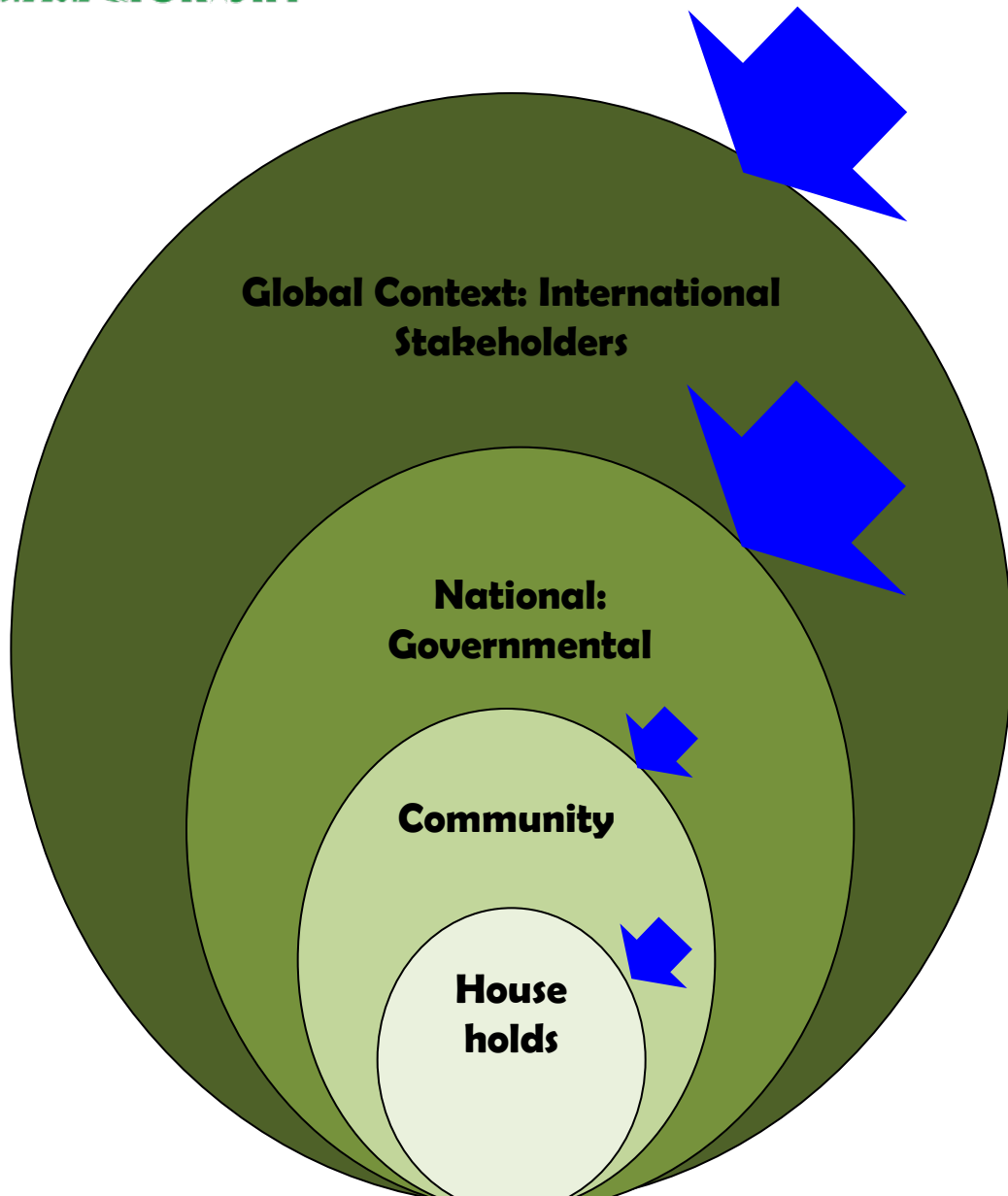
- **Increase summer & winter temperatures (79.4%)**

- **Decreased water in irrigation tanks (74.6%)**

Need based adaptation...  
Devising/linking government programs and  
policies



# Programs in agriculture at different levels – ultimate focus on the farm-household



# Adaptation strategies

## Institutional and policy

*Government policy and program (NAPCC, DPAP, DDP, IWMP, PDS, MNREGA)*

*Agro and weather advisory – Information access*

*Evidence based policy*

*Strengthening governance structure*

## Technological

*Micro-irrigation, conservation agriculture, in-situ, ex-situ, water harvesting, flood mitigation, land drainage, Phonemics and other frontier technologies*

## Social

- *Group action - social networks, information dissemination, migration*
- *SHGs, community projects, coping strategies,*
- *Local water management techniques, in-house conflict resolution,*

## Farm level

- *Crop and varietal adjustment – drought tolerant and extensive root crop*
- *Crop management practices - changes in inputs, timings, tillage*
- *Intercropping and mixed cropping*
- *Irrigation practices,*
- *Crop rotation, crop choice, crop and Income diversification*
- *Crop harvesting and processing*
- *Agro forestry – Agri-silvi-horti-pastoral system*

# Layers of resiliency

## ■ Field level

- ❖ Non-Availability of drought tolerant varieties
- ❖ Difficulty in supplementary irrigation

## ■ Farm Level

- ❖ Lack of access to information on climate
- ❖ Non-availability of potential technologies including improved varieties; seeds etc.
- ❖ Small farm size, limited capacity for crop diversification
- ❖ Lack of availability of other income sources during stress period

## ■ Institution Level

- ❖ Poor access to credits against risk
- ❖ Inefficient co-operatives/association, governance and CPR's tackling risks
- ❖ Lack of incentives to adopt soil and water conservation practices
- ❖ Lack of efficient market access to the produce

## ■ Technology level

- ❖ Decreased ground water availability
- ❖ Lack of improved technology to recharge ground water
- ❖ Lack of information on water efficient crops, varieties etc.

## ■ Social Level

- ❖ Labor shortage, population pressure
- ❖ Lack of collective approach

## Highlights from ICRISAT's VLS long term data

- Adaptation strategies vary: Households, regions, size & class
- Strategies - short (season/year) or long term (2-10 years)
- The marginalized remain disadvantaged
- High inter & intra village variability in adaptation
- Farmers adaptation depends on social and institutional capital

Category of Respondents	Time Span to recover (SAT – India)			
	Dokur	Kanzara	Aurepalle	Shirapur
Big Farmer	2-3 years	1-2 years	1-2 years	1-2 years
Medium Farmer	2-3 years	2-3 years	2-3 years	3-4 years
Small Farmer	3-4 years	4-5 years	2-3 years	3-4 years
Laborers	3-4 years	3-4 years	2-3 years	3-4 years*
Women	Dependent on Household	Dependent on Household	Dependent on household	Dependent on household

The values are by assuming only if the following year is a normal year or a favorable year; Source: Farmer FGD's in the study villages in 2009

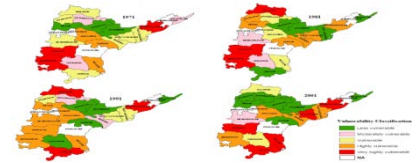



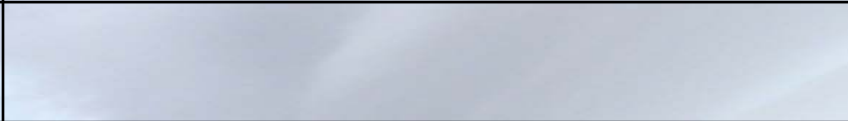
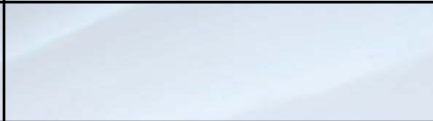





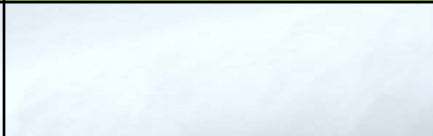
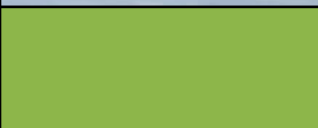

















# Hundreds of governmental programs – forms of enhancing adaptive capacity



Government Programs	Targeted programs (case of AP villages)
Agriculture support program	Agriculture input subsidy, free power , agricultural machinery subsidy
Livestock program	Integrated cattle and dairy development program Livestock and
<p> <b>✓ Marginal (incl. labor) group are poorly benefited from the programs</b>  <b>✓ Marginal group are mainly benefited from food and nutritional security programs</b>  <b>✓ Farm support programs are linked to institutions and networks</b> </p>	
Village infrastrucutre building and maintenance programs	Allotment of houses, rural sanitation program
Programs for the conservation of natural resources	Soil and water conservation programs, water harvesting programs, watershed management project
Programs to improve human nutritional and health services	Health camps, integrated mother and child development programs, Immunization program

- ➔ Support target based on vulnerability
- ➔ Capture micro level spatial variability  
- weather observatories in all villages
- ➔ Suitable crop & resource management practices
- ➔ Blend farmers traditional knowledge with  
advanced technological interventions
- ➔ Improve participatory governance



Issues	Recommendations	Activities	By whom
			<b>MOA, MORO, MOWR, MOEF, MOLR</b>
			
			
			
			
			
			
			
			

## A. Tools and Technologies

Issues	Recommendations	Activities	By
<i>Need for location specific strategies</i>	<i>Developing suitable crop and natural resource management practices to suit the increased climate variability and change</i>	<i>Varietal adjustment for scope and tolerance</i>	By
<div style="background-color: #90EE90; padding: 10px; border-radius: 15px;"> <h3 style="text-align: center; margin: 0;">Tools, Technologies and Infrastructure</h3> <ul style="list-style-type: none"> <li>✓ <b>Develop required technology and know how</b></li> <li>✓ <b>Identify potential strategies</b></li> <li>✓ <b>Improved climate information</b></li> <li>✓ <b>Blending advanced technology with traditional knowledge</b></li> <li>✓ <b>Climate smart technologies—seeds, water harvesting, heat tolerant</b></li> <li>✓ <b>and short duration varieties, replenishing ground water</b></li> <li>✓ <b>Weather insurance</b></li> </ul> </div>			
	gauges at micro level.		By
<i>Adaptation of technologies</i>	<i>Development and diffusion of location specific crop and farm management techniques</i>	<i>Location specific and need based demonstration and extension</i>	



## B. Strategies

Issues	Recommendations	Activities	By
Need for programs to	Integration of climate change initiatives with	Invest in 'climate proofing' development	R
<p style="text-align: center;"><b>Mainstream climate change perspectives into agricultural Development planning</b></p> <ul style="list-style-type: none"> <li>✓ <b>Prioritize regions of climate change vulnerability</b></li> <li>✓ <b>Stimulate diversification</b></li> <li>✓ <b>Strengthen common property management</b></li> <li>✓ <b>Ensuring equity</b></li> </ul>			
of clarity of programs at grass root level, multiple agencies	Addressing equity issues in accessing government support	Ensuring transparency in distribution of support reaching the targeted communities	R

## C. Financing & partnership for transformational change

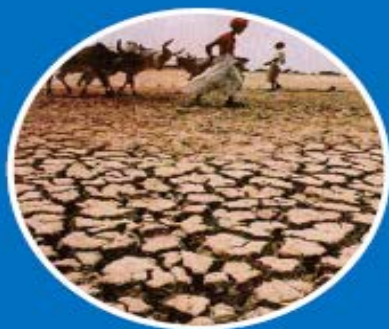
Issues	Recommendations	Activities	By whom
In	<p><b>Financing and partnerships for transformational change</b></p> <ul style="list-style-type: none"> <li>✓ <b>Effective R&amp;D (consortia mode) for CC adaptation</b></li> <li>✓ <b>Strengthen institutional capacity</b></li> <li>✓ <b>Inter organizational partnerships and finances</b></li> </ul>		By ICAR

# Conclusion

To improve resilience capacity to climate change (with all uncertainties and information gaps in the micro-level spatial contexts) the following aspects need to be recognized

- Farmers have developed coping strategies to shield against the climatic uncertainties
- With proper documentation, such mechanisms can support the framing of future adaptation policies and planning
- To improve resilience capacity to CC, the micro-level perspectives need to be recognized
- Adaptation strategies should have element of diversification, both horizontal and vertical
- Need of convergence between development and adaptation process
- Requisite space for grass root level understanding of adaptation strategies for effective bottom up approach
- Effective adaptations requires strong element of collective action and institutional proactive support from public and private agencies

BUT A CLIMATE-SMART WORLD IS POSSIBLE IF WE...



Act now



Act  
together



Act  
differently

**Thank You**