Farmers’ Perception of Risk, Impacts and Adaptation to Climate Change: Perspectives from Western India

Dinesh Moghariya and Dr. Richard Smardon
SUNY College of Environmental Science and Forestry, Syracuse
Outline

- Risk perception and adaptation – Meaning
- Importance of risk perception
- Present and projected risk of CC in India
- Rationale and objectives
- Location
- Methodological approach
- Climate change knowledge
- Climate change risk perception and concern
- Adaptation and adaptation barriers
- References.
What is risk perception?

Risk:
- Probability of occurrence of a hazard and its magnitude of consequences.

- Objective quantification
  or
- Subjective social construction?

Risk perception:
- Subjective evaluation of the probability of hazard occurrence and concern about its consequences
Why is risk perception important?

• Risk perception:
  • can contribute to informed policy level decisions
  • can compel or constrain the government policies and actions
  • influence mitigation and adaptive responses to climate change
  • matters for success in dealing with the issue of climate change
Current and Future Risk of climate change in India:

- Increased nos. and intensity of:
  - Drought
  - Heavy rain
  - Flood
  - Cyclone
  - Dry spell

- Sea level rise
- Glacier melting
- Loss of biodiversity
Rationale of the study

• Major issue → poor attention on people’s perception

• Neglected micro level perspective

• Focused in developed countries

• Local perspectives are important

• India – Not much focus
Goal

Generate knowledge to facilitate communication, policy decisions and program planning

Aims

Identify knowledge gap
Assessment and comparison of risk perspectives
Identify local adaptation perspectives

Objectives

Assess existing knowledge
Assess levels of felt risks and perceived risks
Explore adaptation strategies
Identify perceived adaptation barriers
Study Area

Methodology

Mixed methods

Questionnaire survey

447 Survey participants

Interviews

6 Interview respondents
Climate Change Knowledge

Familiarity:

Heard about climate change?

- Yes: 33%
- No: 67%

Use of language by media matters for awareness

- More familiar with climate change word
- Younger
- Educated
- Residents of cyclone prone and drought prone areas
Climate Change Knowledge

Acknowledgement:

- Respondents accept that their climate has significantly changed

Misconception:

- Climate Vs Weather
- Change Vs Deterioration
Climate Change Knowledge

- Despite apparent confusion, farmers have full understanding of long-term changes in climatic parameters

**Most common detected parameters:**
- Increase in temperature (92.62%)
- Change in quantity of rainfall (32%)

**Other identified parameters:**
- Long term shift in wind speed
- Change in rainfall intensity and
- Uncertainty of rain
Saurastra and Kutch subdivision rainfall pattern 1997 - 2007

Data source: Indiastat.com
Causes and Solution

Majority people rightly identify main causes, but….

• Rural people do not consider agriculture and cattle as one of the contributor of climate change
• Many people mismatch causes and solution
• There exist disconnection
Irrespective of belief about the main cause, people see reforestation as the main solution for climate change.

For many people burning fossil fuel is the main cause of climate change but burning less is not the main solution.
Other causes and Solutions

Other causes:
- Air pollution
- Use of N fertilizers
- Human nature
- Bad karma
- Use of pesticides
- Nuclear experiments
- Coal mining
- Modern life style

Other solutions
- Drive less
- Energy efficiency
- Decrease air pollution
- Renewable energy
- Stop desertification
- Protect wild life
- Eradicate nuisance prosopis sp.
Disconnection

• Local knowledge contained to some extent “a mix of hybridity (Gupta, 1998) reflecting an uneasy blending of ideas from a wide range of sources.

• Many farmers identified reforestation, while some other identified over population, and efficient use of energy as a solution to climate change.

Right ::::: since carbon emissions are connected to all of these causes

But, peoples’ explanation of these causes relied on a very different reasoning
Disconnection

• Some interviewees who cited efficient energy usage stated that light bulbs emit heat into the atmosphere, so having less lighting from a bulb means less heat.

• While some participants connected reforestation with increase flow of cold air or absorption of heat by trees.
Observed impacts

**Agriculture**
- Crop wilting
- More pest and diseases
- Quality of production
- Increased irrigation requirement
- Decrease in soil fertility

**Cattle**
- More diseases
- Becomes weak
- Decreased milk production
- Decreased work efficiency
- Problems in conception and delivery.
Observed impacts

Human health
- New diseases like dengue fever
- Increased incidences of heart attack, skin diseases and cancer
- Feel dizziness/Nausea
- Decreased work efficiency
- Kidney stone disease

Property and Other
- Damage to property
- Reduced durability
- Cracks in buildings and roads
- Desertification
- Shortage of water
• Significant difference were observed between different environmental areas

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<tr>
<td>Pr &gt; Chi-Square</td>
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Mean knowledge index

Index score

- Cyclone prone: 0.72
- Drought prone: 0.77
- Normal: 0.75
Climate Change Risk Perception

- Four-point Likert scale ranging from very unlikely (1) to very likely (4)

- Risk index scores were grouped in four subjective levels of perceived risk: less risk, moderate risk, high risk, and very high risk.
Risk perception

• Perceive moderate to high risk

• Marked spatial differences in perception based on local climatic differences

• Farmers of drought-prone area perceive less risk than that of cyclone prone area

Mean perceived risk

<table>
<thead>
<tr>
<th>Cyclone prone</th>
<th>Drought prone</th>
<th>Normal</th>
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</thead>
<tbody>
<tr>
<td>3.31</td>
<td>2.94</td>
<td>3.1</td>
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Kruskal-Wallis Test

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<td>Pr &gt; Chi-Square</td>
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CC Risk Perception

- Significant difference in perception between levels of education.

- Farmers who are Illiterate or less educated perceive less risk of climate change than having high school education

- No marked difference in perception between small, medium or large farmers

- Farmers having off farm source of income and/or who holds high position in local institutions perceive high risk.
Climate Change Concern

• Overall little to moderate concern

• Marked difference in level of concern between residents of different areas.

• Farmers of cyclone prone area are more concerned than those of drought prone area

Mean level of concern

<table>
<thead>
<tr>
<th>Concern Index</th>
<th>Cyclone prone</th>
<th>Drought prone</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.74</td>
<td>2.42</td>
<td>2.62</td>
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</table>

Kruskal-Wallis Test

<table>
<thead>
<tr>
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<th>Chi-Square</th>
<th>DF</th>
<th>Pr &gt; Chi-Square</th>
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<tr>
<td></td>
<td>6.0234</td>
<td>2</td>
<td>0.0492</td>
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</tbody>
</table>
CC Concern

- Farmers having off farm income are markedly less concerned than those do not have.

- No marked differences in level of concern between different levels of education, age groups, farmer types or income levels.

- However poor are observed to be more concerned than high income group farmers

Farmers perception of risk is moderate to high, however their level of concern is little to moderate.
Risk perception Vs Concern

Why people are not strongly concerned!!!!

- Farmers do not think their livelihoods will suffer due to climate change.
- Many believe that innovations in agricultural science will address any unwarranted situations.
- Others assume that growth in off-farm sources of income will sustain their livelihood.

This suggests that people underestimate the impact of climate change on non-agricultural sectors of the economy.
Risk perception Vs Levels of concern

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Prisk1</td>
<td>Crop pest and diseases will increase</td>
<td>3.62</td>
</tr>
<tr>
<td>Prisk2</td>
<td>Agri. productivity will decrease and become uncertain</td>
<td><strong>2.97</strong></td>
</tr>
<tr>
<td>Prisk3</td>
<td>Agri. expenses will increase</td>
<td>3.56</td>
</tr>
<tr>
<td>Prisk4</td>
<td>Chance of losing agri. investment will increase</td>
<td>3.40</td>
</tr>
<tr>
<td>Prisk5</td>
<td>Chances of damage to farm property will increase</td>
<td>3.22</td>
</tr>
<tr>
<td>Prisk6</td>
<td><strong>Employment in agriculture will become uncertain</strong></td>
<td><strong>2.78</strong></td>
</tr>
<tr>
<td>Prisk7</td>
<td><strong>Standard of living will decrease</strong></td>
<td><strong>2.53</strong></td>
</tr>
<tr>
<td>Prisk8</td>
<td>Water shortage will occur in the area</td>
<td>3.47</td>
</tr>
<tr>
<td>Prisk9</td>
<td>Chances of getting serious disease will increase</td>
<td>3.04</td>
</tr>
<tr>
<td>Prisk10</td>
<td>Plant species mix will decrease</td>
<td>2.91</td>
</tr>
<tr>
<td>Prisk11</td>
<td><strong>Chances of heavy rain and flood will increase</strong></td>
<td><strong>2.50</strong></td>
</tr>
<tr>
<td>Prisk12</td>
<td>Rain will become highly uneven and less predictable</td>
<td>3.20</td>
</tr>
<tr>
<td>Prisk13</td>
<td><strong>Droughts will be frequent and more intense</strong></td>
<td><strong>2.23</strong></td>
</tr>
<tr>
<td>Prisk14</td>
<td>Chances of high temperature and heat wave occurrence will increase</td>
<td>3.71</td>
</tr>
<tr>
<td>Prisk15</td>
<td>Nights will be more warmer than usual</td>
<td>3.51</td>
</tr>
</tbody>
</table>
Adaptation

Traditional measures

• Change in planting dates
• Intercropping
• Crop rotation
• Alternate furrow irrigation
• More use of organic manures
Adaptation

Modern practices:

• Use of hybrid and BT seeds
• Drip and sprinkler irrigation devices
• In situ soil and moisture conservation: land leveling
• Drill or deepen wells/bore wells
• Water harvesting - check dams and farm ponds
• Increased/less use of chemicals
• Use of tractor and other improved implements
• Other – spend less, off farm job, buy insurance
Perceived adaptation

• Majority of perceived adaptation measures are same as current adaptation measures, however, some are more considered as future adaptations than currently adapted

• Buy insurance
• Spend and consume less,
• Get off farm job
• Migration to urban areas
• Increase saving base
• Decrease and/or change no. and types of cattle
Many farmers take early actions for adapting to climate change, however for many, their actions are more related to regular development process rather than climate change.

<table>
<thead>
<tr>
<th>Adaptation Time</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptation after noticing the impacts of CC</td>
<td>111</td>
<td>26.24</td>
</tr>
<tr>
<td>Adaptation before noticing any impact of CC</td>
<td>150</td>
<td>35.46</td>
</tr>
<tr>
<td>Adaptations are not related to climate change</td>
<td>162</td>
<td>38.30</td>
</tr>
</tbody>
</table>
Adaptation barriers

- Lack of money
- Access to weather/climate information
- Lack of opportunity
- Access to credit availability
- Lack of irrigation site
- Lack of knowledge
- Lack of appropriate insurance scheme
Conclusion

• Understanding community

• Better communication!!!!!

• Awareness do not converts into action
  • Focus on local research
  • Use learning from successful events
  • Improve capacity of local communities by joining them in local disaster plans

• Customary practices need attention
References


Thanks!

Questions!
Adaptation Practices - A glance

Land leveling

Sprinkler irrigation

Check dam

Farm bund
Adaptation Practices - A glance

Horticulture

Open well for irrigation

Use of organic manure

Deep ploughing
Familiarity by age and education

Age group

- <25: 42.86%
- 26 to 40: 57.14%
- 41 to 55: 31.03%
- 56 to 70: 31.03%
- 71 to 85: 76.67%

Education

- Illiterate: 23.47%
- Primary: 60%
- Highschool: 45.35%
- Higher secondary: 54.35%
- Bachelors: 33.7%
- Master: 25%

No
Yes
“Have you read anything about global warming or climate change? Yes I read it in newspaper. In that I don’t understand detail. All these word are English word and I don’t know English. Do news papers write these words in English language? News papers write it in Gujarati language, but these words are English words, and I do not know meaning of these words. I read these words but cannot get understanding”. (Big farmer from cyclone prone area)
“Yes, I heard like today’s weather is cold or this way or like that way.... How do you say or believe that climate has changed? ....For last three days we have little cold winds otherwise we were not able to stand in the farm. We are farmers and live on farm or pasture for 24 hours, but this time temperature was so high that I couldn’t stay out there”. (Village leader and farmer from drought prone area)

“You said that climate has changed because of emission of smoke and cutting of trees. What these smoke emission does that because of that climate change? It changes whole season, deteriorates seasons. In our language it is same thing if little butter milk drops in milk and it becomes bad. Whole world’s environment is natural and smoke deteriorates it” (big farmer from cyclone prone area).
“If we use less electricity then climate change can stop. What you believe about this? Yes it is right. Let me tell one experience. If you sleep in this open room without keeping the bulb on and sleep with the bulb on and see how much heat you feel. This gives you a practical experience. That is right but other than is there any other reason? The way it affects human, it will affect climate. Any light we burn (use electricity), the heat is going to be in the environment. That means electricity use (burning) might have equal impact with that of petroleum products. Both are equally responsible. Maybe electricity may increase less heat but it is sure that both increases heat in the environment”. (Village leader from cyclone prone area)