Agricultural Adaptation Practices in South Asia: Experience of Farmers in Sri Lanka

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Outline

- Climate change and farmers
- Climate and agriculture in Sri Lanka
- Overview of agricultural adaptations
- Village tanks: Historical structural adaptation
- Agro-wells: Adjusting to climate and market
- Indigenous varieties & traditional practices: Building resilience
- Some lessons
Climate Change and Farmers

- **Climate & farmers**
  - **Climate**: A matter of uncertainty in all circumstances
  - **Farmers**: Regularly witness climate uncertainty; Inherently adaptive

- **Forms of climate uncertainty**
  - **Climatic variability**: Natural; Familiar to farmers
  - **Climate change**: Human induced; Currently experienced?
Climate Change and Farmers

• Climate uncertainty & South Asia
  – **South Asia**: Poorer communities in SA are highly vulnerable
  – Majority of poor occupied in agricultural livelihoods
    • Rain-fed and irrigated farmers
  – **Rain-fed & Irrigated**
    • **Rain-fed**: Naturally more vulnerable to climate uncertainty
    • Usually more affected by poverty

• There are other shocks
  – **Globalization**: Major force of transformation of agriculture in SA
    • **Globalization and climate change**: Simultaneous, double exposure (Coles and Scott, 2009; O’Brien and Leichenko, 2000)
  – Impacts on traditional system
    • **Local institutions**: Private vs. Common property resources
    • **Traditional knowledge**: Decline of traditional knowledge
• **Adaptation decisions of farmers**
  
  - Perceptions and expectations play a major role (Hansen et al., 2004; Marx et al., 2007)
    
    • Cognitive limitations & biases (Nocholls, 1999; Tucker, 2007; Weber, 2010)
  
  - Farmers are guided by shared beliefs
    
    • Strong empirical evidence (Roncoli et al., 2002; Lybbert et al., 2007; Orlove et al., 2007)
Climate & Agriculture in Sri Lanka

- First Inter-Monsoon (FIM)
  - March & April
- Southwest Monsoon (SWM)
  - May – September
- Second Inter-Monsoon (SIM)
  - October & November
- Northeast Monsoon (NEM)
  - December – February
Climate & Agriculture in Sri Lanka
Cropping calendar based on two seasons

– Normal expectations about seasonality

<table>
<thead>
<tr>
<th>Period</th>
<th>Local Name for the Season</th>
<th>Months of High Rainfall</th>
<th>Months of Low Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>mid-September to mid- March</td>
<td>Maha</td>
<td>mid-October to mid-January</td>
<td>mid-September to mid-October; mid-January to mid-March</td>
</tr>
<tr>
<td>mid- March to mid-September</td>
<td>Yala</td>
<td>late-March to mid-May</td>
<td>mid-May to mid-September</td>
</tr>
</tbody>
</table>

– Normal expectations about Intrapersonal variability
  • Sequence of chronologically ordered events
  • Local terminology: Intensity, purpose
Climate & Agriculture in Sri Lanka

- Several studies based on historical weather data:
  - Chandrapala (1996); Costa (2008); Eriyagama et al. (2010); Jayawardena et al. (2005)
- Air temperature has been rising all over the country during the last century
- Warming trend has accelerated during the recent decades
  - Global warming could be one reason
  - Other local effects also: Urbanization, deforestation, other land use changes etc.
- Negative deviation in average annual RF since 1970s
  - Change is mainly in NEM and FIM. Negligible in SWM & SIM
- Increased occurrence of droughts, floods etc.
Adaptation: A complex behavioral phenomenon

*Adjustment of behavior* in response to actual or expected *variability* or *change* in climate in order to moderate and cope with *harmful impacts* or to take advantage of *opportunities*

- Essentially a risky choice
Climate Change and Farmers

Adaptation

Voluntary adaptation
  - Individual adaptation
  - Joint adaptation

Policy-induced adaptation
  - Individual adaptation
  - Joint adaptation
### Overview of agricultural adaptations

<table>
<thead>
<tr>
<th>Time horizons of decisions</th>
<th>Types of decisions</th>
<th>Types of adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>Tactical</td>
<td>Seasonal adjustments (e.g. dry sowing; selection of varieties; time of harvesting)</td>
</tr>
<tr>
<td>Medium-term</td>
<td>Strategic</td>
<td>Time horizons of one to few years (e.g. Adjustments of portfolio of crops; selection of resilient varieties; new agronomic practices)</td>
</tr>
<tr>
<td>Long-term</td>
<td>Structural</td>
<td>Time horizons of decades or more (Community managed village tanks; agro-wells)</td>
</tr>
</tbody>
</table>
Village tanks: Historical structural adaptation
Village tanks: Historical structural adaptation

- Village tank systems in dry zone Sri Lanka
  - **Village tanks**: Community-owned rain water harvesting devices (5-80 ha water spread area)
  - Man-made structures. Many are several centuries old
  - Around 18,000 tanks

- Institutional framework
  - Historically developed and adapted system of common property resources managed by farmers themselves
  - Interventions by state during colonial and post-independence era
  - **At present**: Legally sanctioned co-management arrangement
    - Agrarian Development Act 2000
    - Farmer Organizations: Legally recognized local institution
    - Agrarian Development Department: Facilitative role
Village tanks: Historical structural adaptation

- **Long history of adaptation to climatic variability**
  - **Traditional farming system**: gradually evolved to accommodate changes (Panabokke et al., 2002; Tennakoon, 2001)

<table>
<thead>
<tr>
<th>Farming system activity</th>
<th>Crops</th>
<th>Seasonality</th>
<th>Water supply</th>
<th>Location</th>
<th>Economic status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lowland farming</strong></td>
<td>Paddy</td>
<td>All plots in the field</td>
<td>Rain-fed + tank water</td>
<td>Command area of village tanks. Bethma in Yala</td>
<td>Manly subsistence with limited sales if a surplus available</td>
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<tr>
<td></td>
<td></td>
<td>Limited area</td>
<td>Tank water</td>
<td></td>
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<td></td>
<td></td>
<td>Maha Yala</td>
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<tr>
<td><strong>Upland farming</strong></td>
<td>Coarse grains, Grain legumes, Pulses, Vegetables, condiments, Gingelly</td>
<td>1-5 ac avg. by all HH</td>
<td>Fully rain-fed</td>
<td>Shifting agriculture in commonly owned uplands</td>
<td>Mainly subsistence with few cash crops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gingelly</td>
<td>Fully Rain-fed</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Maha Yala</td>
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<tr>
<td><strong>Permanent crops</strong></td>
<td>Coconut, fruits, multi purpose trees</td>
<td>No seasonality</td>
<td>Rain-fed + retained moisture in soil</td>
<td>Home gardens</td>
<td>Mainly subsistence with few cash crops</td>
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Paddy cultivation in the dry season

- Rice is the staple diet and critical for food security
- Water in tanks is not adequate for entire command area
- Location of private fields: Cannot ensure water for all

‘Bethma’ (division): Joint adaptation

- Farmers jointly decide the area cultivable under water remaining in tanks
- Individual rights for this area are temporarily suppressed
- Cultivable area is divided proportionately among all land holders for paddy growing
Agro-wells: Adjusting to climate and market
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**Yala’ (dry) season**: Mid May-Sept
- High likelihood of low RF (variability is low)
- Successful outcomes from timing of prospects are limited

**Agro-wells**: Prospect for using shallow aquifer
- Cultivation of weather sensitive cash crops under agro-wells
  - Chilli, onion and vegetables
  - Susceptible to disease and drainage in rainy season. Shifted from ‘Maha’ to ‘Yala’ with ground water option
- **In the past**: Cultivation of paddy in a limited area subject to water level in tanks (joint adaptation)
Indigenous varieties & traditional practices: Building resilience

Green revolution: Fast tracked the agriculture in SL

- **New improved varieties (NIVs):** Short maturation, high yielding, high chemical input intensive
- **GR technology package:** High use of chemical inputs and machinery
- **Government policies:** Expansion of irrigation facilities and input subsidies (e.g. fertilizer subsidies)

Indigenous varieties and traditional agricultural practices

- Practiced by small minority of farmers
- **Interest is rising:** Facilitated by demand for organic products
- Fiercely campaigned by environmental lobby groups
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Indigenous varieties & traditional practices: Building resilience

Indigenous varieties (IV):

- Some IVs are resilient to hazards (e.g. droughts, floods)
- Capable of surviving until the field conditions are favorable
- Possess morphological features that facilitate survival under stress conditions

Traditional agricultural practices

- IVs cannot be taken in isolation. Have to be taken together with traditional practices
- **Numerous practices:** Some are widely practiced (e.g. dry sowing techniques)
- Help to increase the endurance of seeds and plants
Some Lessons

Better to identify as broad strategies than individual practices

- **Strategies**: Selection of broad range of activities

Adaptation includes individual and collective actions

- Changing socio-economic conditions favor private adaptations

Local institutions have a key role to play

- Especially in joint adaptation
- Determining the boundary between private and collective adaptation is difficult

Local knowledge are an essential part of the solution

- IVs and traditional practices combined together
Thank You!