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

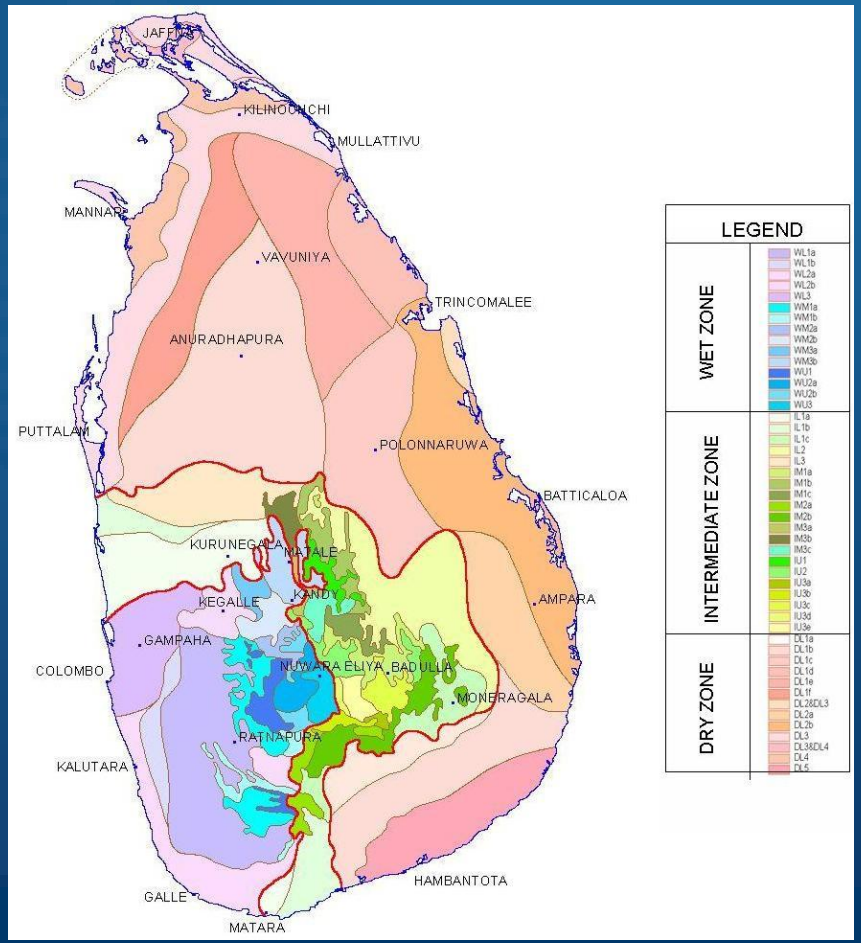
- **There are other shocks**
  - **Globalization**: Major force of transformation of agriculture in SA
    - **Globalization and climate change**: Simultaneous, double exposure (Coles and Scott, 2009; O'brien and Leichenko, 2000)
  - Impacts on traditional system
    - **Local institutions** : Private vs. Common property resources
    - **Traditional knowledge** : Decline of traditional knowledge

Climate Change and Farmers

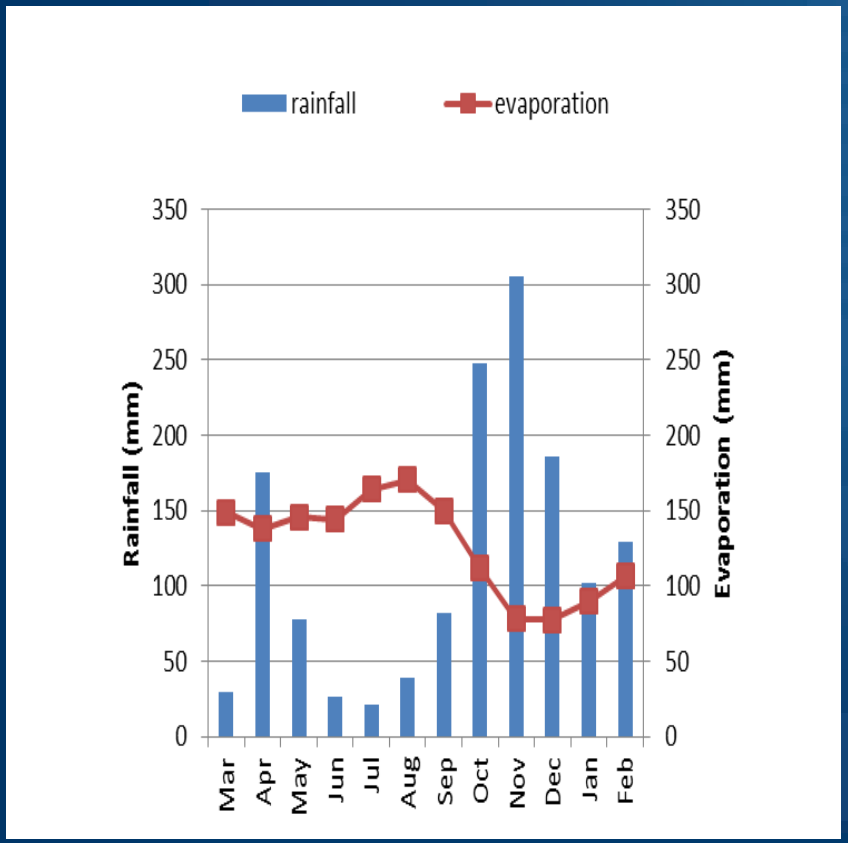
- **Adaptation decisions of farmers**
  - Perceptions and expectations play a major role (Hansen et al., 2004; Marx et al., 2007)
    - Cognitive limitations & biases (Nocholls,1999; Tucker, 2007; Weber, 2010)
  - Farmers are guided by shared beliefs
    - Strong empirical evidence (Roncoli et al., 2002; Lybbert et al., 2007; Orlove et al., 2007)

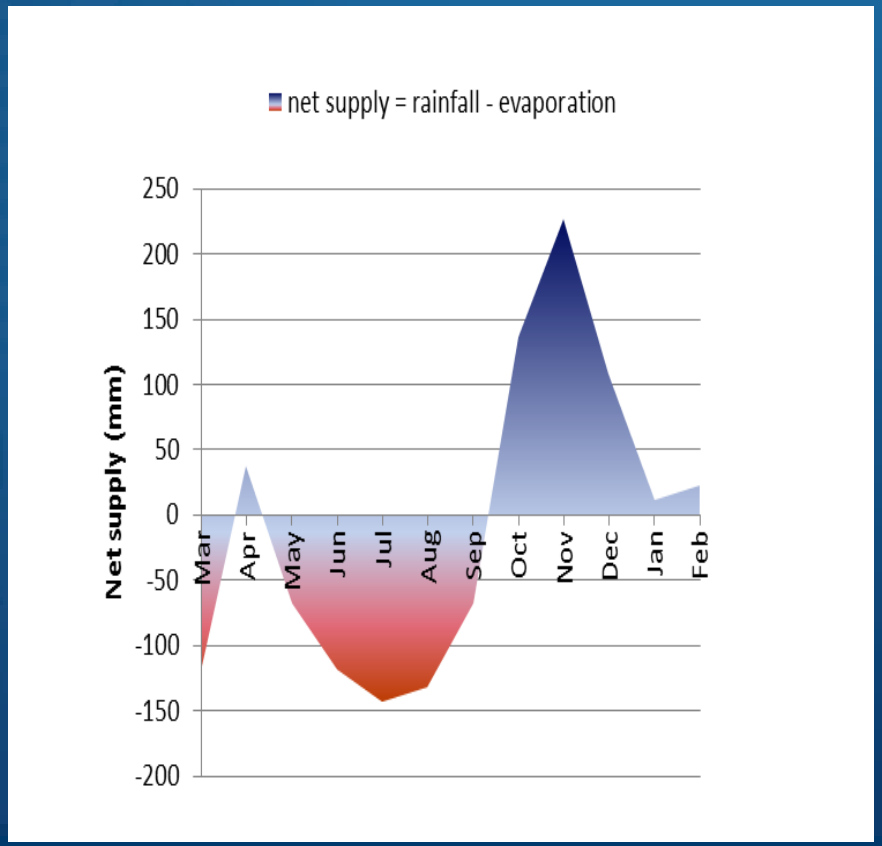
Climate & Agriculture in Sri Lanka

- 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





Climate & Agriculture in Sri Lanka

Cropping calendar based on two seasons

- **Normal expectations about seasonality**

Period	Local Name for the Season	Months of High Rainfall	Months of Low Rainfall
mid-September to mid- March	Maha	mid-October to mid-January	mid-September to mid-October; mid-January to mid-March
mid- March to mid-September	Yala	late-March to mid-May	mid-May to mid-September

- **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.

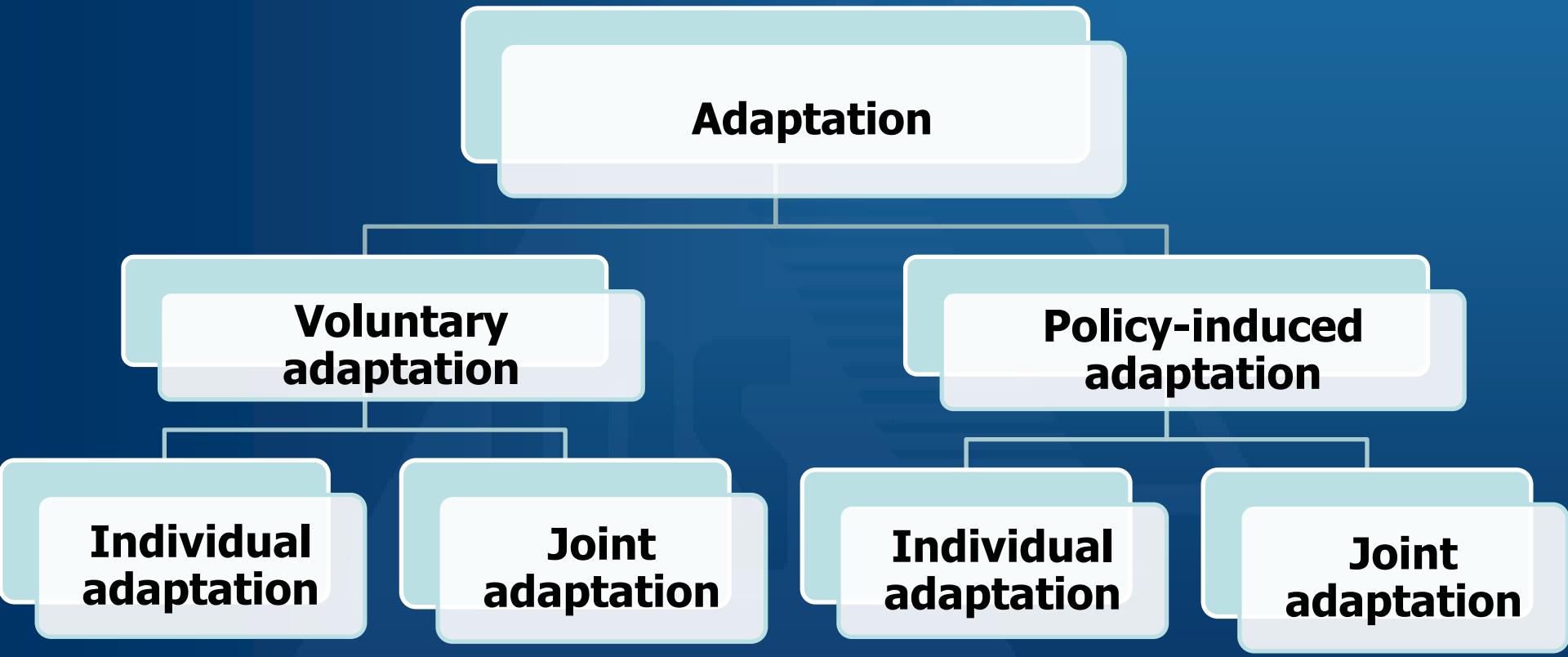
Climate Change and Farmers

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



Overview of agricultural adaptations

Time horizons of decisions	Types of decisions	Types of adjustments
Short-term	Tactical	Seasonal adjustments (e.g. dry sowing; selection of varieties; time of harvesting)
Medium-term	Strategic	Time horizons of one to few years (e.g. Adjustments of portfolio of crops; selection of resilient varieties; new agronomic practices)
Long-term	Structural	Time horizons of decades or more (Community managed village tanks; agro-wells)

Village tanks: Historical structural adaptation

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- **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)

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

Village tanks: Historical structural adaptation

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!