Climate Information and Farmers: *Integrated Management of Information for Successful Adaptation*

Athula Senaratne

Climate Information

- A time gap exists between decisions and outcomes
- Uncertainty creates demands for information
  - risky choices

Climate information products (CIPs)

An Economic Commodity

- Scarce supply relative to demand

- Demand for CIPs originates from climate uncertainty
  - Climatic variability : natural variability
  - Climate change : anthropogenic

- Uncertainty creates demands for information
  - risky choices

Climate Information Products (CIPs)

- Mainly refers to probabilistic weather and climate forecasting products
- Predict future weather and climatic events with a time lag (lead time): e.g.
  - Short term weather forecasts
  - Seasonal precipitation forecasts
  - Long-term projections
- Supply of CIPs need sophisticated technology and advanced scientific knowledge

Farmers' decisions and CIPs

Time horizons of decisions	Types of decisions	Types of matching CIPs
Short-term	Tactical	Daily, weekly, monthly forecasts
Medium-term	Strategic	Annual, Seasonal, Multi-year & multi-seasonal predictions
Long-term	Structural	Long-term climate projections

Farmers' local climate knowledge

- **Perceptions and expectations about local climate**
  - Play a major role in farmers' decisions (Hansen et al., 2004; Marx et al., 2007)

- **Shared beliefs & local indicators on climate**
  - Guide farmers' decisions on daily basis
  - Strong empirical evidence (Roncoli et al., 2002; Lybbert et al., 2007; Orlove et al., 2007)
  - Long-term collective memory based on a social process of transmission

Farmers forecasts and beliefs

- Beliefs about local seasons and average pattern about variability
- Beliefs about intra-seasonal variability
- Users forecasts: local climatic indicators
- Probabilistic CIPs Vs. Local knowledge
  - Substitutes or Complements?

Beliefs on Local Seasons

NRE (Shared beliefs)

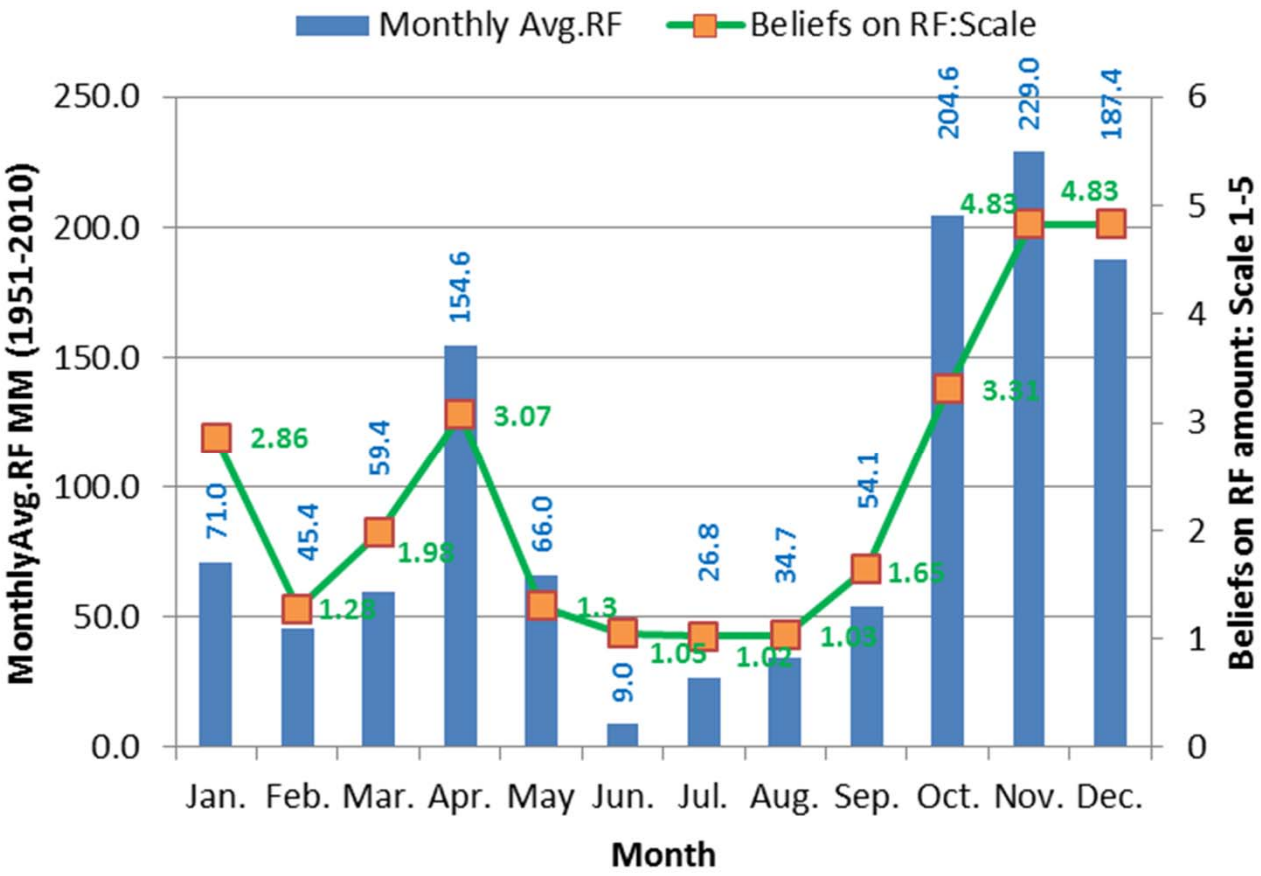
- **Two major components of beliefs**
  - **Beliefs about seasonal variation of rainfall**
    - Normal expectations about seasonality

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

  - **Beliefs about intra-seasonal variation of rainfall**
    - Normal expectations about Intrapersonal variability
      - » Sequence of chronologically ordered events
      - » Local terminology: Intensity, purpose,

Beliefs on intra-seasonal variability

Month	Local Name for Rainfall Events	Time of Rainfall Event	Nature of Rainfall Event
January	Duruthu wehihella (werahella)	Throughout the month	Low intense continuous rains
February		Early period of month	Scarce occasional rains
March	El eta pelawena wehi, Tala wehi	Late period of month	Evening rains with thunder and lightening
April	Bak maha wehi, Tala wehi,	Rainy period can shift (early, mid or late)	Evening rains with thunder and lightening
May	Mee mal mandarama, Wel mal mandarama		Dark cloudy sky
June	Maluwa hedena wehi	After full moon	Scarce occasional rains
July			Scarce occasional rains
August	Nikini palu wehi	After full moon	Scarce occasional rains
September	Binara kaluwa Nikini palu wehi, Wehi tuna	• A pre-rain period • Rains after 20 September or early October or after full moon	A few intensive rains
October	Wap idella Akwessa (Mul wehi)	• Dry spell in the early month • Rains around or after15 October	Scattered, intensive rains
November	Il maha wehi,	Rains throughout the month	Continuous, intensive rains
December	Undu raluwa Nattal kunatu	Rains throughout the month. • Rains during the early to mid-period (around 15 days) • Stormy rains in the late month (around 20–30 December)	Continuous, intensive rains


Monthly Avg.RF
Beliefs on RF:Scale
MonthlyAvg.RF MM (1951-2010)
Beliefs on RF amount: Scale 1-5
250.0
200.0
150.0
100.0
50.0
0.0
6
5
4
3
2
1
0
71.0
45.4
59.4
154.6
66.0
9.0
26.8
34.7
54.1
204.6
229.0
187.4
2.86
1.28
1.98
3.07
1.3
1.05
1.02
1.03
1.65
3.31
4.83
4.83
Jan.
Feb.
Mar.
Apr.
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Month

Users' Forecasts: Local Climate Indicators

Signs, indicators & predictors	Nature of observations	Time lag of forecast	Remarks
Beliefs about rainfall events connected to milestones	Occurrence of expected events in relation to milestones (early, usual, late or non-occurrence)	Serve as predictors of immediate events as well as general projections about season to come	Appears to be the most important indicators for the seasonal updating of rainfall.
Observations on wind, sky and clouds	Direction, speed and nature of wind movement Specific cloud formations, cloudiness and colour of the sky Occurrence of fog, mirage etc.	Serve as short-term predictors of rainfall events to come. Time lag may be around 1-10 days	Commonly observed indicators along with the predictions based on events connected to milestones.
Local hydrological phenomena	Water level, spread area and spilling of tanks Water level of wells	General indicators of rainfall potential of the unfolding season	Essential observations taken into consideration when decisions on joint adaptation are taken. Farmers have identified 'indicator' tanks and wells.
Thermal changes in the environment	Sudden changes in temperature in notable manner (warm or cold) especially in morning and night times	Short-term predictors of weather events with a few days' time lag	There is a natural tendency among farmers to take such changes as signs of forthcoming weather events.
Cosmological phenomena	Visibility and brightness of stars Width and intensity of aura of moon	Short-term predictors of weather events with a few days' time lag	Generally held beliefs that can strengthen the confidence on other predictors when they coincide with them.
Resurgence of indicator species	Sudden rise in insect populations (mosquitoes, fire flies) Appearance of certain species of animals (e.g., birds)	Short-term predictors of rainfall events with a few days' time lag	Generally held beliefs that can strengthen the confidence on other predictors when they coincide with them.
Specific observations on animal behaviour and local fauna	Nesting behaviour of certain bird species Relative abundance of flowering and fruiting of local tree species	Predictors with relatively longer time lags that may vary from few weeks to few months; usually of rainfall conditions of forthcoming season	Respected as local wisdom yet with limited current use. Limited experience and knowledge in young farmers. Changes in the local environment (e.g., clearing of forests) have made them obscure.

Climate Information Gap

- Supply gaps
- Credibility gap
- Communication gaps
- Declining reliability of local belief systems

Climate Information Gap

- Gaps in supply of information
  - Farmers' climate information needs vs. available sources of information
  - Probabilistic CIPs vs. local climate knowledge
    - Declining reliability of local climate knowledge
    - Lack of dependable probabilistic CIPs

- Gaps in communication of information
  - Constraints and barriers to access CIPs
  - Available channels vs. desired channels of communication
  - Limitations in format and content

Integrated Climate Information Management Systems (ICIMS)

- Farmers use CIPs and expectations based on local knowledge in their decisions

- Information from CIPs and local knowledge could complement each other

- ICIMS
  - To combine the strengths CIPs and local knowledge
  - To overcome weaknesses by complementing each other
  - To offer complete decision support solution for bridging supply and communication gaps

Project at Glance

Project:

Bridging the Climate Information Gap for Effective Adaptation Decisions

Partner Organizations

- Institute of Policy Studies
- Department of Meteorology
- Janathakshan Gte.Ltd.
- South Asia Network of Development and Environmental Economics (SANDEE)

Donor:

Think Tank Initiative (TTI) of International Development Research Council (IDRC)

Project Objectives

- Pilot-test models of ICIMS intended to combine the strengths of decision criteria used by farmers, CIP providers and policymakers for successful outcomes of adaptation
- Undertake an action research programme to identify critical factors that determine the success and sustainability of models of ICIMS
- Build the capacity of climate information providers and farming community to jointly develop and communicate effective climate information products
- Identify replicable ICIMS models that can be applied in other parts of South Asia and the developing world for the benefit of vulnerable farming communities

Project at a Glance

- **Project Duration**
  - Start - 2015
  - End - 2018
- **Project Locations**
  - Anuradhapura district - Padaviya
  - Kurunegala district - Kotawehera
  - Baticaloa district - Vakarai
  - Hambantota district - Bundala
  - Ratnapura district - Dandeniya

Project at a Glance: Key Components

- **The *Socio-economic Research Component***
  - Assessing specific climate risks faced by farmers
  - Studying local systems of climate knowledge and belief systems
  - identifying viable institutional structures and suitable communication modes for ICIMS
- **The *Capacity Development Component***
  - Assessing the data requirements and availability
  - Identifying CIPs that cater to farmers' climate information needs
  - Designing appropriate CIP templates that complement local knowledge systems
  - Transferring necessary technical skills through training
  - Designing technical means of communicating information through identified modes of communication.
- **The *Regional Knowledge Sharing Component***
  - Learning from the existing best practices in the South Asia and other TTI supported regions
  - Sharing the lessons at the end of the project period.

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Key Lessons

- Farmers have their own traditional knowledge regarding weather & climate and they are still using that knowledge for agricultural decision making.

- However, farmers accept that the reliability and accuracy of their own forecasts is diminishing due to unexpected changes in the climate pattern over the years.

- Farmers are cooperative, willing to receive weather forecasts through the project and ready to learn about use of climate information. There is a clear demand for climate information from farmer's side.

Thank you

INSTITUTE OF POLICY STUDIES OF SRI LANKA

Institute of Policy Studies of Sri Lanka
100/2 Independence Avenue,
Colombo 7, Sri Lanka
T: +94 11 2143100

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