

Workshop Proceedings

Development of an Algorithm for Drought- related Crop Insurance Products

Organised by Section F of SLAAS on 22nd May 2018 at SLAAS Council Room



Organized By SLAAS Section F

Coordinated by Dr. Wasanthi Wickramasinghe

Partners



Summary

Considering the risk associated with drought on agriculture and rural livelihoods and the repeated and widespread severe drought impacts experienced in the recent past, SLAAS section F organised a half-day workshop in partnership with Gamani Corea Foundation, World Food Programme, National Insurance Trust Fund and Institute of Policy Studies to bring the concerned groups together to develop an implementable and sustainable risk management program for farmers by introducing innovative crop insurance products. Workshop also addresses the 2018 SLAAS theme of interest “*Use of Space Technology for Sustainable Development*”.

Workshop was held on 22nd May 2018 at SLAAS council room and was attended by representatives from several agencies working on drought assessment and monitoring, agricultural production and risk management, agricultural insurance and agencies developing and maintaining information systems in agriculture. National Insurance Trust Fund (NITF) provided financial support in organizing the workshop.

Thematic presentations, group activities and a panel discussion were conducted. Workshop was able to identify the important prerequisites in order to introduce innovative crop insurance products as risk management strategy for farmers. Identification of gaps in information, possible collaborative institutional working arrangements and responsibility sharing and identification of some research studies were the main outcome of the workshop. Workshop paved the way to initiate a series of workshops in future as follow up activities.

DEVELOPMENT OF AN ALGORITHM FOR DROUGHT RELATED CROP INSURANCE PRODUCTS

Background

Erratic rainfall pattern, climate changes in the agro-climatic regions and resultant deviation in the typical *maha* and *yala* seasons have made the crop production more vulnerable in the country. The drought has become a recurrent phenomenon and farmers have to undergo either to abandon cultivation, shift to alternative crops, or to incur crop losses. Significant drought occurrences were observed during 1986/1987, 1992, 1996, 2001, 2004 and consecutively for 3 years from 2015 to 2018 in the country. The loss of crop yield affects the farmer and farming in a number of ways. Reduced income and difficulty in repaying outstanding loans, issues with eligibility for fresh loans caused to liquidity problems. In some cases, the farmers are compelled to divest and dispose off some assets created over past years. Sometimes, they have to resort to costly borrowings from informal sources. If the government has issued the loans, it bears the cost by writing off crop loans from time to time.

Although the event of drought cannot be forecasted, the production risk associated with drought can be measured. Risk management is a process of appraising and reducing risk. The ways devised to do so are referred to as risk management alternatives. Crop insurance is one such alternative to manage risk in yield loss by the farmers. It is a financial mechanism to reduce the impact of production loss on the farmer and means of protecting farmers against the variations in yield resulting from the uncertainty of practically all natural factors beyond their control. As such it is a risk management alternative where production risk is transferred to another party at a cost called premium.

The weather-based crop insurance uses weather parameters as a proxy for crop yield in compensating the cultivators for deemed crop losses. It provides a good alternative both to farmers and government. Farmers get on actuarially fair insurance with swift payments at little administrative costs to the government. Rainfall insurance is a specific form of weather insurance. As such weather insurance is not an yield insurance while crop insurance is. In both the cases, cultivators pass risk in yield to another party for a premium.

Due to the erratic nature and the severity of weather impacts, the premium associated with in transferring the risk is high and are not favourable to farmers. Such that, crop insurance has not been an attractive business for private insurance agencies. Currently, crop insurance is a mere responsibility of the governments except for some involvements by the microcredit agencies like SANASA in Sri Lanka. Crop insurance /agricultural insurance scheme has been in operation in Sri Lanka for paddy and few other crops since 1958 by enacting two legislations in Parliament, mainly the Crop Insurance Act (No. 13 of 1961) and the Agricultural Insurance Law (No. 27 of 1973). Agriculture Insurance Board was established under this law and its activities were expanded in 1999 renaming the organisation as Agriculture and Agrarian Insurance Board (AAIB). Farmer participation in the insurance program was around 16 percent of the total area cultivated with paddy in 1974 and has sunk to a very low level to only 2.8 percent of the total paddy extents in 2002. According to the

AAIB's crop insurance scheme, farmers paid 6 per cent of the cost of crop production as an insurance premium. The mandatory crop agriculture insurance introduced in 2013 budget enrolled all paddy farmers who became eligible to the crop insurance by being bundled the risk premium with the subsidy. By indirectly increasing the price of a 50kg bag of subsidized fertilizer by Rs.150 to Rs.500 from the earlier price of Rs.350, a compulsory premium was introduced.

In 2017 crop insurance was expanded five non-paddy crops; Potatoes, Big Onions, Chilies, Maize and Soya beans with a compensation up to a maximum of 10,000 rupees per acre for damages to crops in times of a calamity. The funds received from the 1% levy charged from the profits of all registered Banks, Financial institutions, and the Insurance companies. Now the farmers can claim up 40,000 rupees per acre for a complete loss of their yield.

Indemnity based payments have been the practice of incurring a large administrative cost. The cost associated with indemnity payments sometimes may go up to large sums that huge financial support will be required for the sustainability of such programs. Cutting down administrative costs, developing innovative insurance products by adopting lessons learned from other parts of the world are important. Therefore this workshop attempts to bring the concerned groups together to discuss, and develop an implementable and sustainable risk management program by way of introducing innovative crop insurance products.

Main Themes for Discussion

- Drought Incidence -Meteorological drought and Agricultural drought
- Available Technologies and methods for drought Assessment and their strength and limitations
- Risk management strategies
- Prospective Insurance Products and tenability of index based insurance

Thematic Presentations

Risk Management Strategies of Dry Zone Farmers in Sri Lanka by Kanchana Wickramasinghe, Research Economist, Institute of Policy Studies

Findings from a study conducted in Anuradhapura district taking a sample of 750 farmers' show that climate related risks are significant among other risks and uncertainties in particular for paddy farmers under rain-fed and minor irrigated cultivation. To the increased frequency and intensity of natural disasters, farmers have limited options for effective risk management. Most farmers have to avoid risk or to retain and to share it. The most common risk management strategy is borrowing from informal sources as and specifically pawning jewellery. But as a risk transferring mechanism insurance can play a vital role in their farming communities. Nevertheless, climate insurance is not considered as a risk management strategy by the small farming community due to lack of trust, lack of education and awareness. Climate insurance can complement other risk management strategies if farmers are educated. Rainfall Index-based Insurance can help farmers to manage climate risks effectively.

Key Learning Points- Agricultural Insurance by Sanath de Silva, CEO, National Insurance Trust Fund

Implementing compulsory crop insurance scheme from the time of its first implementation in 2013 which coupled with the fertiliser subsidy scheme it was pointed out the government's responsibility in safeguarding the livelihood of small farmers as they do not have the individual capacity to withstand exposure to catastrophic weather events. However, government policy should be holistic that all other risk management strategies be considered first. The government should focus on catastrophic risk only and should not deal with normal risk. Through risk layering, the marketable risk needs to be identified. The government should facilitate startup conditions such as information, regulations, training, and awareness. Corporate strategy should be defined.

Group Discussions

Methodological consensus on drought assessment technologies to characterise agricultural drought in Sri Lanka

The drought assessment and related work carried out by meteorology department, Arthur C Clarke Centre and World Food Program were shared.

Meteorological Department: Estimate SPI (Standardised Precipitation Index) values for currently operating meteorological stations and interpolates to the entire country and prepares SPI maps which can be downloaded from

<http://www.meteo.gov.lk/images/drought/endOfApril.pdf>

Arthur C Clarke Centre: The mandated agency to receive satellite data from international agencies. Process the satellite coloured band images to produce Normalized Difference Vegetation Index (NDVI) images atresolution that shows the state of vegetation

World Food Programme: Vegetation health Index (VHI) which combined NDVI and surface temperature is overlaid with several other socio-economic data to estimate the drought impact. Experiences of application of VHI for different applications, such as drought detection, drought severity and duration, early drought warning in other countries are considered in their analysis.

In developing a better assessment methodology on agricultural drought following improvements were suggested.

- Likely modalities were discussed on how these agencies could work together with other relevant agencies such as the Ministry of Agriculture.
- To supplement the real time SPI with temperature to develop SPEI (Standard Precipitation and Evaporation Index)
- Verification of satellite based indices and meteorology related indices with impact data at field level, The importance of geocoding of farmers was highlighted
- Further work related to rainfall pattern identification, drought pattern identification, consideration of La-Nina El-Nino oscillations and solar oscillations in rainfall distribution patterns. This involves a vigorous time series data analysis
- To establish alternative real time meteorological data feeding system in the absence adequate rainfall stations around the country
- Analysis of historical data on tank water levels
- The relevance of current spatial resolution of images (.....) in developing drought related insurance products

Use of existing knowledge in risk management in agriculture: Opportunities and Challenges (in particular knowledge sharing, networking, capacity building, etc)

The discussion primarily focused around the current risk management strategies /approaches/tools/mechanisms adopted at various levels, the existing information systems, the role of various stakeholders in the supply chain in relation to risk mitigation and risk transfer before insurance been considered as a risk management strategy.

Irrigation and water management is the most superior risk management strategy that ensures farmer income and the maximum water consumptive use. Increase the water capacity of minor tanks, reduce water wastage, and recommend crop choice and the other risk management tools need to be considered. The government policy should take holistic approach to risk management.

Risk mitigation through department of agriculture interventions were discussed and their limitations. Common practices recommended by department of agriculture during drought situation are to cultivate short-aged varieties (for all irrigation schemes), less water demanding crops, to follow soil moisture retention practices, etc. Concern was raised by the Agriculture and Agrarian Insurance Board to specify the varieties recommended to different localities by their name rather than general recommendation.

Market failures that can happen such as experienced recently in pumpkin market showed the importance of a well detailed information system. Also risk transferring to various stakeholders such as financial institutions lending to agriculture, processors, or those dependent on agricultural production for their turnover like seed companies was discussed.

The need to amalgamate existing information systems to develop a real time farmer level data collection system was highlighted.

The usefulness of digitised paddy land registry <http://www.aginfo.lk> which was developed by department of agriculture with ICTA through the funding of NSF which has Meta data at farm level was highlighted. Through this information system, fertiliser cash transfer program had been implemented.

Past records of drought impact at field level are available at Agrarian and Agriculture Insurance Board at Agriculture Instructor level/Farmer level ??

Mapping this information to analyse the effects of the drought was considered a good start-up.

Exploration of prospective Insurance Products

Issues with current insurance products and the process of insurance payment

Current agriculture insurance only indemnifies the cost compensation rather not the forgone farmer income occurred due to natural calamities. Only crop losses, are accounted for calculations of indemnities and are based on cost incurred.

Farmer income loss caused by

- complete abandoning of cultivation
- yield reduction due to moving to different varieties
- moving to less economical other crops

are not accounted.

Under major irrigation, insurance can be claimed for the lands that have been under crop. Paddy land that left fallow is not accounted as drought affected.

Factors to be considered when developing insurance products

The need to include market risk and farmer health risk as insurance products was mentioned.

Information needs for risk modelling as the first step was emphasized.

Synthesis and Recommendations by Wasanthi Wickramasinghe

1. Amalgamating existing information systems

The main production related information systems currently available for use are;

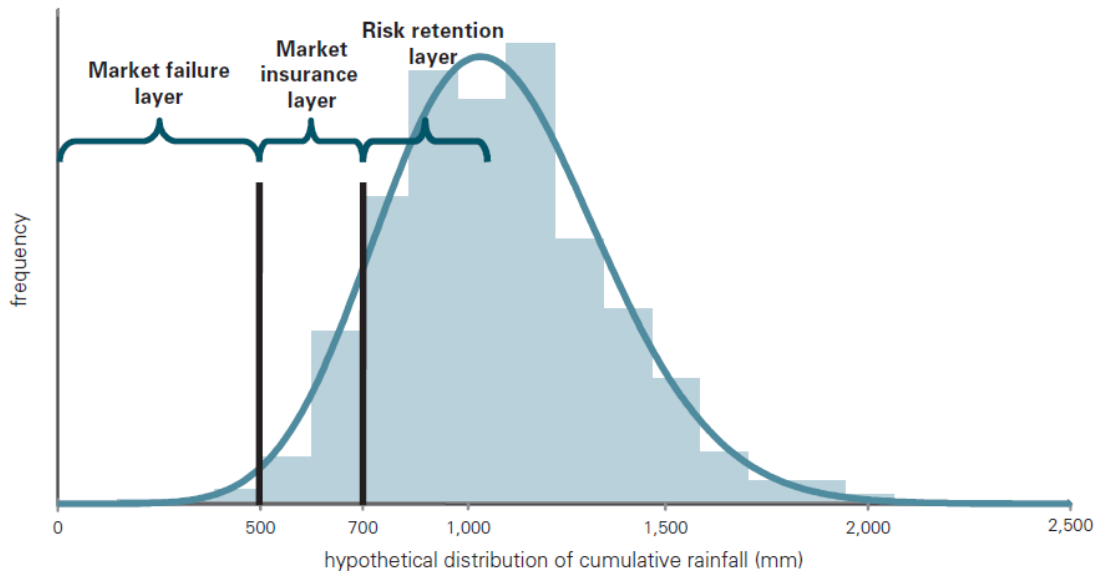
- Digitised paddy land registry <http://www.aginfo.lk> which contains Metadata of farmers
 - croplook.net web based crop production related AI level data collection system covering entire country
2. Geo referencing of data at farmer level
 3. Developing a geo referenced information system -Individual farm field is the lowest geo referenced data layer. On top of this layer, information available at other geographical boundaries can be fed to this information system.
 4. Developing a geo referenced real time data feeding system using farmer motivated web based application (APP) so that farmer can feed real time discrete data using an APP to the system to fill the information gaps. Eg. The rainfall at farm level, drought impact
 5. Assess the production risk (Farmer Income Loss) related to drought by developing relationships with meteorological drought and drought impact data
Mapping of field level drought impact and various drought related indicators (SPI, SPEI, VHI, and NDVI). This can be a research work of collaborative agencies.
 6. Risk modelling - Drought related information should be fed to all agencies dealing with risk management to mitigate, transfer and design short term and long term programs. Both real time and historical data are important.
 7. Designing a comprehensive risk management programme which is integrated in a broader programmes for development and climate risk management and considering weather derivative contracts and catastrophic risk in it
 - Increase awareness and capacity building on risk assessment and mitigation
 - Consideration of risk mitigation options and their superiority Eg. Water use efficiency methods
 - Risk layering – This can be based on the model currently being implemented
 - Development of an Index based insurance for farmers which is integrated in a comprehensive risk management programme
 - Identification of risk sharing partners in the supply chain

Identification of gaps in information, possible collaborative institutional working arrangements and responsibility sharing and identification of some research studies were the main outcome of the workshop.

Workshop paved the way to initiate a series of workshops in future as follow up activities.

Currently Implemented Risk Layering Model

Currently all farmers who cultivate paddy,



Sample Rainfall Distribution Showing Layering of Deficit Rainfall Risk by Rainfall Levels

Risk	Parameter	Loss Compensation
Self-Retention Layer	20% yield reduction	
Market insurance layer (subsidised premium attached to the fertiliser subsidy)	20% to 100% Yield loss is the loss parameter when compensation /indemnities are paid on the basis of total cost of production Rs. 40,000	NITF Up to Rs.10,000
Market failure layer		Treasury Upto Rs. 40,000

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Workshop Series – SLAAS section F Social Sciences

22nd May 2018

SLAAS Council Room

Registration from 8.30 am

9.10 am -9.30 am Introduction to the Workshop

Wasanthi Wickramasinghe, Senior Research Fellow, GCF

Thematic Presentations

9.30 am – 10.00 am Risk Management Strategies and Innovations

Kanchana Wickramasinghe, Research Economist, IPS

10.00 am – 10.30 am Current Implementation of crop insurance schemes in Sri Lanka and Prospective Insurance Products

Sanath C de Silva, CEO, NITF

10.30 am – 11.15 am International Experiences (Skype Presentations)

11.15 am- 11.30 am Break

Group Discussions 11.30 am – 12.30

Group A - Methodological consensus on drought assessment technologies to characterise agricultural drought in Sri Lanka

Group B – Use of existing knowledge in risk management in agriculture: Opportunities and Challenges (in particular knowledge sharing, networking, capacity building, etc)

Group C – Exploration of prospective Insurance Products

Panel discussion 12.30 pm – 1.30 pm

Factors related to the development of an algorithm (underlying factors – severity of deviation, availability of alternative risk management strategies & etc.) and Way Forward

Lunch

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