Climate Insurance for Dry Zone Farmers in Sri Lanka: Prospects for Index Insurance

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INSTITUTE OF POLICY STUDIES OF SRI LANKA

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Climate Insurance for Dry Zone Farmers in Sri Lanka: Prospects for Index Insurance

KANCHANA WICKRAMASINGHE

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List of Abbreviations

AAIB	Agriculture and Agrarian Insurance Board
CBOs	Community Based Organisations
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station
DOM	Department of Meteorology
DS	Divisional Secretariats
FAO	Food and Agriculture Organisation
FGDs	Focused Group Discussions
IPS	Institute of Policy Studies of Sri Lanka
KIIs	Key Informant Interviews
MMDE	Ministry of Mahaweli Development and Environment
NAP	National Adaption Plan for Climate Change Impacts in Sri Lanka: 2016 - 2025
NITF	National Insurance Trust Fund
IRI	International Research Institute for Climate and Society

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Executive Summary

Increasing climate related risks in Sri Lanka pose significant challenges for farming communities, especially those in the dry zone. This calls for the need of having effective risk management strategies in place, in order to minimise the cost of escalating climate related risks.

Climate insurance is being increasingly viewed as a possible tool for managing climate risks. This study aims to shed light on the existing policy gaps in the area of climate risk management in general and climate insurance as a tool of risk management more specifically. The study assesses the problems and constraints in the existing climate insurance programmes and technical feasibility for index-based solutions. The assessment is based on quantitative data collected through a survey of 750 farmers in the Anuradhapura district and qualitative information gathered through focused group discussions and key informant interviews.

Climate risks have been covered under crop insurance schemes in Sri Lanka for several decades, which are in the form of indemnity-based insurance. However, few farmers adopted insurance as a risk management strategy. During the period of 1998 - 2017, less than 3 % of paddy cultivated areas has been covered by the existing crop insurance programmes. A major portion of crop insurance is obtained as a guarantee for obtaining loans from financial institutes that operate at the formal level. Poor awareness on insurance and lack of trust on insurance providers have been identified as major reasons for not adopting insurance as a risk management strategy. The study finds that the major risk management strategy of farmers is borrowing loans, mostly from informal sources. Climate insurance can be adopted as an effective tool for improving the farmer's ability to repay agricultural loans in the event of climate-induced disasters.

Index insurance is increasingly being recognised as an innovative approach to eliminate issues in the existing indemnity-based approach. An assessment conducted based on the information gathered on specific bad years faced by the farmers and rainfall anomalies depicted by the Climate Hazards Group InfraRed Precipitation with Station (CHIRP) shows that implementing rainfall index insurance is technically feasible in Sri Lanka.

Comprehensive education and awareness programmes are needed to educate farmers about the concept and potential benefits of climate insurance. Further, implementation of index insurance is challenged in Sri Lanka to a greater extent due to absence of adequate number of rainfall stations and high level of microclimatic variations. The available number of weather stations maintained by the Department of Meteorology is not adequate to implement a sustainable index insurance programme.

The study recommends increasing the number of rainfall stations and establishing an effective mechanism for sharing rainfall information among the insurance providers. The private interventions and community-based approaches in establishing and implementing rainfall stations should be encouraged and effectively linked to the proposed data sharing mechanism.

1. Background

Climate-induced disasters have become much frequent and more severe in Sri Lanka during last few decades. The Global Climate Risk Index indicates that Sri Lanka is among the most vulnerable countries in the world to the adverse climate impacts. Sri Lanka was the second most affected country in 2017 and fourth most affected country in 2016 to climate related impacts (Eckstein et al., 2018). More specifically, the country faced a series of alternative droughts and floods during the past few years and many districts where agriculture is predominant were severely affected. Unprecedented changes in the usual weather pattern have posed additional challenges to agriculture, which is inherently a risky economic activity. The dry zone of Sri Lanka is particularly vulnerable to the climate impacts (Abeysekera et al., 2015; Ministry of Environment, 2011). Changes in the rainfall pattern, both in terms of quantity and distribution, affects negatively on agricultural performance in the dry zone, and thereby on overall food security of the country.

Usually, the post-disaster coping strategies adopted by the farmers during extreme weather conditions do not provide adequate protection to cover the damages to the crops from adverse short- and long-term impacts. The existing social protection system also shows gaps in providing protection against climate and disaster related risks (Wickramasinghe, 2012). Effective risk management has now become an essential component in adapting to the impacts of climatic change. This requires comprehensive research-based information on existing risk management strategies of farmers and effectiveness of such strategies to be in place. There is growing recognition that climate insurance can play an important role in the case of climate-induced disasters (Food and Agriculture Organisation (FAO), 2011). Particularly, weather index-based agricultural insurance has been recognised as one out of ten innovations for climate smart agriculture (Dinesh et al., 2017).

Though crop insurance programmes which cover climate related agricultural risks have been in place in Sri Lanka for several decades, the uptake rate is very low. Given the increasing impacts of climate-induced disasters, it is vital to understand the issues hindering the success of climate insurance and to find out ways in which climate insurance can be adopted as an effective tool for risk management among farmers. It is encouraging to note that climate insurance has gained much prominence than ever before in Sri Lanka's policy discussions. The National Adaptation Plan for Climate Change Impacts in Sri Lanka (NAP) 2016 - 2025 highlights the need for adopting effective risk management strategies in facing climate related risks. Sri Lanka intends to introduce possible insurance schemes to cover important sectors including agriculture, under the Intended Nationally Determined Contributions (INDCs) submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The draft Sri Lanka National Disaster Management Plan (2018 - 2030) highlights the issue of non-coverage of all disaster vulnerable communities and livelihoods by insurance in order to minimise financial impacts of disasters.

Given the increasing importance of climate insurance as a risk management tool, from policy perspective it is vital to understand the issues in the existing programmes and assess the future steps for effective implementation of climate insurance in Sri Lanka. In this background, the paper intends to understand climate risk management strategies of farmers, with a view to assess the problems and constraints in existing crop insurance programmes that cover climate risks, to evaluate the technical feasibility of the innovative approaches such as index-based solutions and to identify policy implications for successful implementation of climate insurance as an effective risk management tool in Sri Lanka.

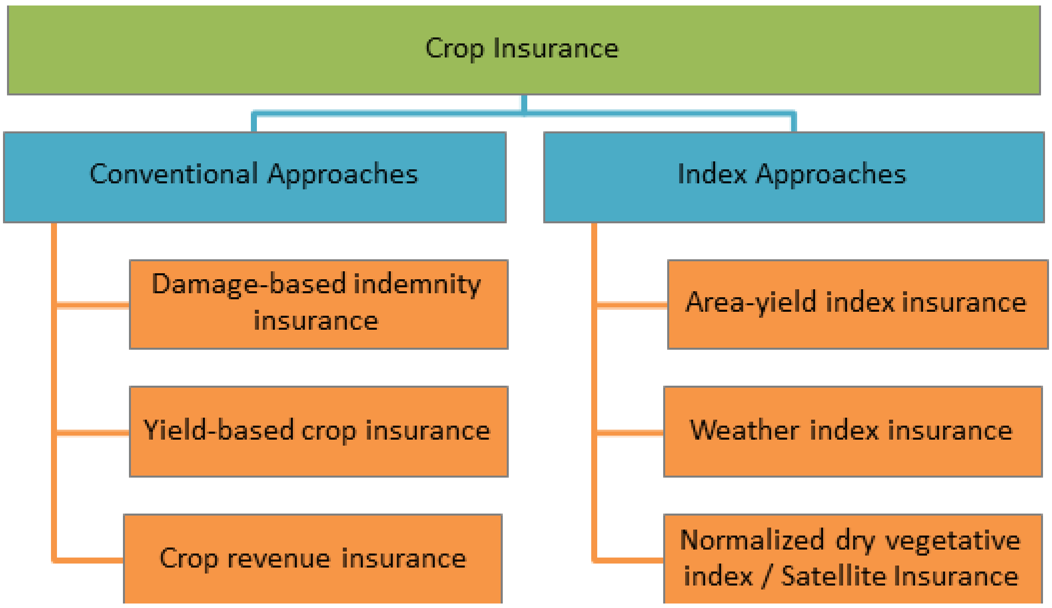
2. Climate Insurance as a Risk Management Tool for Farmers

Agriculture is a key sector which is negatively impacted by climate risks such as droughts, floods and changes in the rainfall pattern in Sri Lanka (Ministry of Mahaweli Development and Environment (MMDE), 2016). The climate risks take a covariate nature, indicating that a large number of households in a given area are affected by such risks. Household level or community-based risk managements are ineffective in addressing covariate risks (FAO, 2011). Climate insurance is often viewed as a possible risk transfer tool to deal with the impacts due to covariate risks.

Climate insurance is already in place in terms of agriculture insurance (covering climate risks) in many countries in the world. Asia Pacific region has shown a considerable progress in initiating agricultural insurance over the years (Prabhakar et al., 2013; FAO, 2011). Conventional forms of crop insurance are still the most common approaches/forms of crop insurance around the world (World Bank, 2011). Conventional approaches involve field level verification of the disaster impacts, thus takes the indemnity-based nature. Several categories of this form of crop insurance are available (Figure 1) including damage-based, yield-based and revenue-based crop insurance. Damage-based approach involves measuring the crop damage at the field level once a damage occurs. In the case of yield-based crop insurance, realised yield is compared with the insured yield. Crop revenue insurance takes into account both the crop yield and loss of market price (FAO, 2011).

There are several inefficiencies associated with the conventional climate insurance approaches as per the evidence from many parts of the world. In the case of Sri Lanka, conventional crop insurance programmes have been facing the issues of delays in indemnity payments, transparency in loss assessments, lack of trust etc. (Rambukwella et al., 2007). Though crop insurance has been in place for more than five decades, it has not been able to meet the expected objectives of stabilisation of the farmers' income in Sri Lanka.

Figure 1
Types of Crop Insurance



Source: FAO (2011), World Bank (2011).

Alternatively, index insurance is viewed as a novel strategy which opens up new opportunities to manage climate related risks in developing countries (Hellmuth et al., 2009). The key feature of index insurance is that it is based on a specific weather-related parameter (such as rainfall, humidity etc.) which has a close correlation to the crop losses. In real-world implementation, the weather parameter measurement in a location for a given time period is compared with the pre-determined threshold levels to check if a pay-out is possible. Rainfall is the common weather parameter used in many index insurance programmes around the world. Crop losses can occur both due to deficits as well as excess in rainfalls. Payouts are made when the rainfall levels measured at a particular weather station for a given period of time is beyond the threshold levels - i.e. is below a lower threshold level or above an upper threshold level.

Though index insurance involves considerable challenges, it minimises some of the important issues attached to conventional indemnity-based insurance. Index insurance provides the ability to process claims much faster and thereby rids the common issue of delayed payments in indemnity insurance. This approach helps to minimise transaction costs involved in visiting the farm fields to verify crop losses, which is a major advantage over indemnity-based insurance. Use of an index for loss verification reduces the common problems of conventional insurance, namely, adverse selection and moral hazard.

Index insurance has its inherent challenges. The most significant challenge arises when the insurance payouts does not match with the actual crop losses - which is termed as 'basis risk'. This may lead to two situations. On one hand, farmers may not eceive a payout though they undergo considerable crop losses. On the other hand, farmers may receive a payout even in the absence of a crop loss.

Eventhough an appropriate index is selected as the weather parameter, basis risk can arise due to low density of weather stations and lack of availability of data for processing payouts. When the number of weather stations is inadequate, the distance from farm fields to weather stations tends to be relatively high and this reduces the accuracy and quality of measurements. This is termed as 'spatial basis risk'. Another category of basis risk deals with temporal aspects where the index insurance does not reflect the crop growth stages. In addition, the product basis risk can occur when the actual crop loss and insurance payments do not tally. Index insurance will be successful and scalable when the basis risk components are minimised to the extent possible.

Index-based insurance provides new opportunities for addressing the gaps in climate risk management if designed and introduced carefully (Hellmuth et al., 2009). Experience with regard to the developing world highlights few common aspects that have evidently contributed to successful index insurance programmes (Greatrex et al., 2015).

- Explicitly targeting obstacles to improving farmer income
- Integration of insurance with other development interventions
- Giving farmers a voice in the design of products
- Investing in local capacity
- Investing in science-based index development

Farmers adopt a range of risk management strategies depending on their circumstances. Index-based insurance does not intend to replace these strategies, but is expected to play a complementary role for improved risk management (Hellmuth et al., 2009).

3. Study Approach

The study deployed both primary and secondary data and information, collected/obtained through a survey of farmers, focused group discussions (FGDs), key informant interviews (KIIs) and secondary sources of information. The study has been based in the Anuradhapura district in the North Central province of Sri Lanka. Anuradhapura is an agriculture-based district located in the dry zone of the country and therefore is highly vulnerable to rainfall variations and extreme climatic events such as droughts (Zubair et al., 2006) that result in crop damages and losses.

3.1 Farmer Survey

A survey of farming households was carried out in the sites/areas selected for the study in the Anuradhapura district in Sri Lanka. Selection of sites for the purpose of the survey was conducted based on the vulnerability levels. Source of water is the indicator considered for categorising the areas based on vulnerability levels. Water for agriculture in Anuradhapura is obtained through three main sources namely, rain-fed, minor irrigation tanks and major irrigation schemes. Tanks in villages serve as rain-water harvesting devices. Farmers who get access to irrigation water from the major irrigation schemes are least vulnerable to changes in the rainfall pattern. Farmers who purely depend on rainfall and minor irrigation tanks are more vulnerable to rainfall deviations, than the farmers who are dependent on major irrigation schemes.

The survey was based on a pre-tested structured questionnaire. The questionnaire covered the aspects of socio-economic information on the household, agricultural information (crops cultivated, cost of production, marketing, revenue etc.), risks and uncertainties, natural disaster experience, risk management strategies including climate insurance etc. Information gathered and compiled by the divisional secretariats (DS) were used selecting villages within the respective DS divisions (Figure 2), based on the source of water. In addition, the survey purposively covered certain areas where crop insurance programmes are comparatively more popular among farmers.

However, given the very low level of penetration of crop insurance, it was difficult to identify an area with a substantial number of farmers who have purchased crop insurance. The farmer organisations in each selected village provided lists of farmers which were used for stratified randomisation. The sample included farming households who engaged in paddy farming and cultivation of other crops in fulltime. The total sample size of

Figure 2
Study Areas (DS divisions) in the Anuradhapura District

Source: Author's illustrations.

Table 1
Distribution of the Sample by Divisional Secretariat Areas

Divisional Secretariat	Number of Households
1. Kebithigollewa	74
2. Kahatagasdigiliya	50
3. Thirappane	75
4. Galenbindunuwewa	125
5. Nachchaduva	50
6. Horowpothana	49
7. Kekirawa	45
8. Rajanganaya	47
9. Mihintale	50
10. Medawachchiya	42
11. Thambuttegama	49
12. Palagala	75
13. Rambewa	12
Total	**743**

Source: Author's illustrations.

the survey was 750 farmer households (Table 1). However, responses from seven households had to be removed/ eliminated due to the absence of full/comprehensive data that were mandatory for the study. Overall, it recorded a response rate of 99 %. Therefore, this analysis was based on 743 farmer households.

3.2 Qualitative Data Gathering

The FGDs and KIIs were conducted to gather qualitative data. Around 15 FGDs have been conducted in the selected study sites in the Anuradhapura district. However, index insurance has not been put to practise in the Anuradhapura district during the period of study. Pilot level index insurance programmes were being implemented in few locations in Kurunegala and Batticaloa districts during the same period. Therefore, a few FGDs were also conducted in Kurunegala and Batticaloa districts in order to collect information for assessing index insurance approach in Sri Lanka, as the participants included vulnerable farmers in the respective areas. The selection was based on the fact that they have/have not purchased any insurance programs before and the degree of vulnerability to climate risks, as indicated by the source of water for agriculture (rain-fed / minor irrigation tanks / major irrigation schemes). Rain-fed paddy cultivations are naturally highly vulnerable for climatic changes, compared to the areas which receive irrigation water through major irrigation schemes.

The FGDs provided useful qualitative information which cannot be captured through a typical household survey. Also, FGDs were used to gather information with regard to previous bad years experienced by the farmers. The information with regard to the specific bad years, impacts of the disasters (floods or droughts), risk management strategies were collected during the discussions. The first round of discussion aimed to collect information on crops cultivated in the area, the worst five years that the farmers can recollect (and the order starting with the worst year) and reason for identifying such years as bad years (drought / flood etc.).

The second round of discussions aimed at probing into more detailed information including the stage of the crop that the disaster event occurred, month, frequency of occurring bad years, pattern of bad years, access to climate information etc. This was followed by a final round of discussion to get information on the effects of bad years. The information included the actual impact of the disaster event on farmers, the sub-groups which were mostly affected, the manner in which the households communities reacted to the events and the external help sought from government and other groups. The KIIs were carried out with crop insurance providers, representatives from microfinance institutions, community level leaders and agricultural experts to gather their experience and perception on climate insurance as a risk management strategy.

3.3 Secondary Information

Secondary information was obtained from a number of agencies including the Agriculture and Agrarian Insurance Board (AAIB), private insurance companies, Department of Census and Statistics, Annual Reports of the Central Bank of Sri Lanka. In addition, DS level data was obtained through the annual compilations of DS level information in 'Sampath Pethikada' in the Anuradhapura district.

The study also utilised data of the Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) to identify the rainfall anomalies in the analysis (http://chg.geog.ucsb.edu/data/chirps/). It is a quasi-global time-series rainfall dataset which includes data from 1981 to near present that includes 0.05° resolution satellite imagery with in-situ station data.

3.4 Analysis

The study used descriptive statistical methods to analyse the quantitative data collected through the survey and secondary information sources for identifying the risks and uncertainties, risk management strategies and the current situation of crop insurance in Sri Lanka. It involves calculating the percentages of farmers facing climate related and non-climate related risks and uncertainties, adopting different risk management strategies including climate insurance. The assessment also focuses on measuring the impacts of climate-induced disasters in terms of the percentage of crop losses and percentage of farmers affected in each site of study. The quantitative assessment was supported and validated through qualitative information collected via FGDs and KIIs.

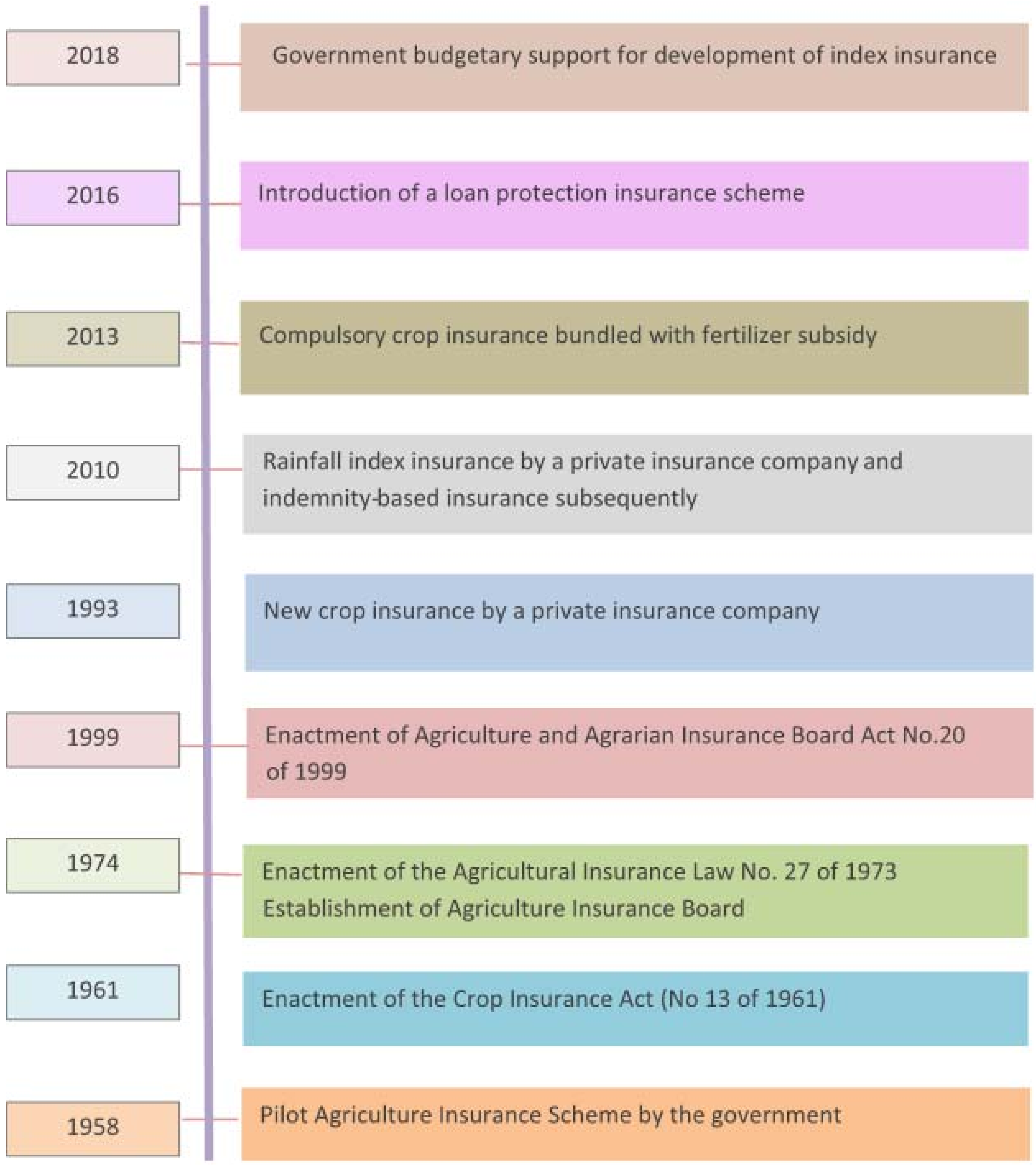
The technical feasibility for index insurance in Sri Lanka was assessed through bad year analysis. The bad year analysis intends to produce information regarding the specific difficult years for farmers during a given period of time (last 30 years for instance), which can be then compared against secondary climate data (CHIRPS data is used in the current study). The study adopts the approach developed by the International Research Institute for Climate and Society (IRI) at the Earth Institute, Columbia University, USA. The qualitative information regarding the bad years faced by the farmers was obtained from FGDs, involving five to six farmers in each group.

The bad year analysis yields useful information with regard to specific disaster events and its impacts based on their recollections. The information was then matched with the CHIRPS data. Rainfall anomaly maps were produced for the specific months of the bad years that farmers mentioned to assess the compatibility. High degree of compatibility denotes that rainfall index insurance is technically feasible in the context under consideration.

4. Climate Insurance for Agriculture in Sri Lanka

In this section, the current situation of climate insurance is reviewed as a risk management tool in agriculture in Sri Lanka. It also describes the historical evolution of agriculture insurance in the country which is mainly based on the information obtained from secondary sources and inputs from KIIs.

Figure 3
Climate Insurance in Sri Lanka: Timeline



Source: Author's illustrations.

Climate insurance exists in the form of crop insurance, covering important climate risks in Sri Lanka. The timeline of climate insurance indicates that insurance to cover climate risks has been in existence for nearly six decades in Sri Lanka (Figure 3). Crop insurance in Sri Lanka was primarily initiated by the government in 1958, as a voluntary crop insurance scheme. This indemnity-based crop insurance programme is still operational and implemented by the AAIB with revisions made from time to time. In 1993, a private insurance company entered the crop insurance business, along with its other financial services. A milestone moment of Sri Lanka's climate insurance history took place in 2010 when another private insurance company in Sri Lanka introduced rainfall index insurance for the first time in Sri Lanka. In 2013, the government introduced a compulsory crop insurance scheme for farmers who received government's fertilizer subsidy. Loan protection insurance was introduced in 2016 to cover the agricultural loans obtained by the farmers. A brief overview of climate insurance programmes is presented in the following sub-sections.

4.1 Indemnity-based Crop Insurance in Sri Lanka

Indemnity-based crop insurance programmes are implemented by both the AAIB and private insurance companies. Both are voluntary crop insurance schemes. The government also introduced a compulsory indemnity-based insurance scheme in 2013 which is no longer in existence. A brief overview of each scheme is presented below.

4.1.1 Crop Insurance Implemented by the AAIB

The indemnity-based crop insurance programme was first introduced in Sri Lanka by the government as a pilot project in 1958. The Crop Insurance Act (No 13 of 1961) was approved in 1961 to provide the required legal framework for the operation of regular crop insurance. The Agricultural Insurance Law No. 27 of 1973 came into operation in 1974 to make provisions for a more comprehensive scheme. The AAIB was established in 1999, which is the responsible government agency for undertaking the crop insurance programme at present. The AAIB is currently implementing an indemnity-based insurance programme which covers six field crops including paddy (maize, soybean, big onion, potato and chilies). At present, almost all the farmers who get enrolled to the AAIB crop insurance do so in order to obtain agricultural loans.[1] Links have been established between the AAIB and banks which provide agricultural loans to farmers.

The insurance covers the risks of floods, droughts, dry spells, excess water, pest and diseases and wild elephant attacks. The premium levels and insurance coverage vary across the levels of risks as denoted by the source of water for agriculture. Given the increasing impacts of droughts and floods on agriculture, the government expanded the insurance cover up to Rs. 40,000 per acre by the Government Budget Proposals 2018. The premium that needs to be paid by the farmers is approximately Rs. 1,800 per acre (Ministry of Finance, 2017).

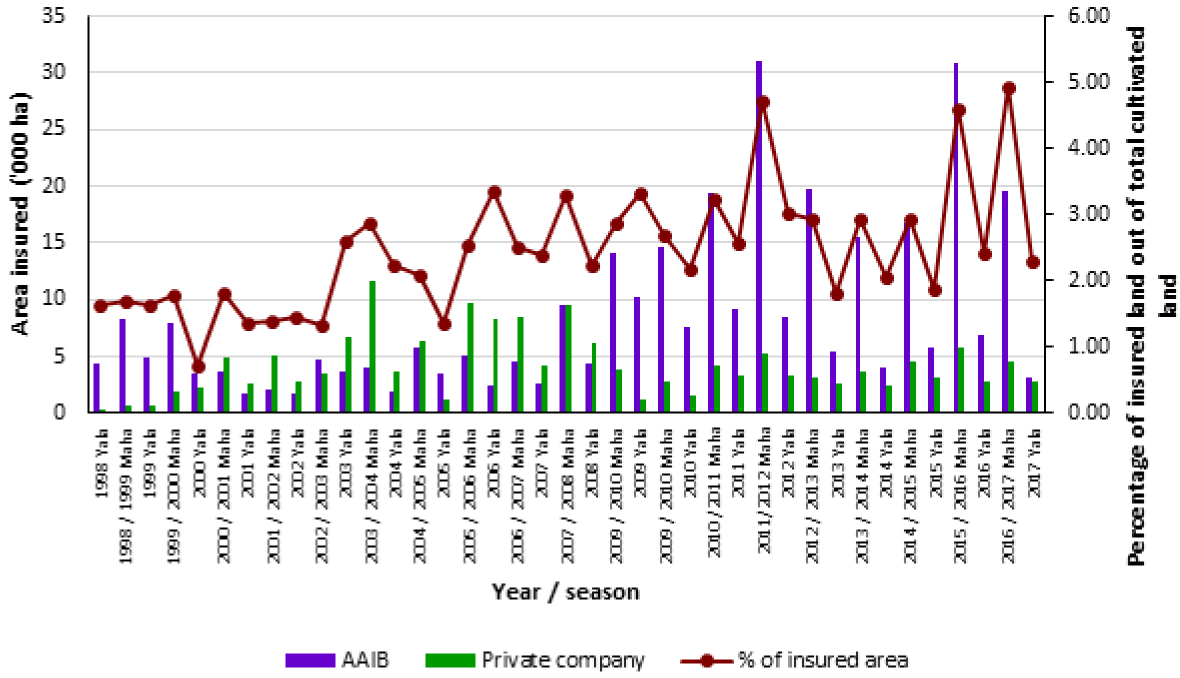
Field level verifications are undertaken by the ground level officers of the AAIB. Lack of human resources leads to delays in field verification of losses and repayments. Due to financial and human resource constraints, the AAIB is not undertaking marketing and advertising programmes to increase the possibiltiy of uptake. As a result, the coverage of the programme is still remaining at a low level, despite the presence of the programme in Sri Lanka for several decades.

4.1. 2 Crop Insurance Implemented by a Private Insurance Company

The initial private crop insurance intervention took place in 1993. The crop insurance programme was introduced more or less as a corporate social responsibility activity by the insurance company. Though the crop insurance programme has not been a profitable business, the company has still been continuing it as a welfare programme for farmers. The insurance product is

[1] Key informant interviews with the AAIB officers.

Figure 4
Paddy Land Area Covered Indemnity-based Crop Insurance (1998 - 2017)



Source: Central Bank Annual Reports 2008, 2017, Sri Lanka.

based on the cost of cultivation and it is functioning as loan protection insurance. Promotional activities are carried out to a certain extent via banks that provide agricultural loans to farmers. Similar to the AAIB crop insurance, the product covers the important climatic risks including droughts and floods.

In terms of the area insured, on average only 2.45 % of the paddy cultivated area is covered by both the government and private indemnity-based crop insurance programmes during the period of 1998 - 2017. Further, the average percentage of coverage (2.79 %) for the same period is higher with regard to the Maha season, which is the major rice cultivation season in Sri Lanka. The average insurance coverage in the Yala season is 2.13 %. The private crop insurance programme had been able to cover relatively a higher area of paddy cultivation than the AAIB programme at the initial period. The area covered under the AAIB crop insurance programme is considerably higher than that of the private insurance company over the last decade (Figure 4).

4.1. 3 Compulsory Crop Insurance Programme Associated with the Fertilizer Subsidy

The government introduced a compulsory crop insurance, bundled with the existing fertilizer subsidy programme in 2013. An insurance premium of Rs. 150 is added to the price of one 50 kg bag of fertilizer (Rs. 350), hence farmers had to compulsorily pay Rs. 500 per bag of fertilizer. Since the paddy cultivation is extensity dependent on chemical fertilizers that are considered as important, majority farmers are automatically enrolled in the insurance programme when they obtained the government fertilizer subsidy (Table 2).

The number of farmers receiving the fertilizer subsidy varies across seasons as shown in the Figure 5. As *Maha* is the major paddy cultivation season due to availability of water and demand for fertilizer subsidy is higher during the Maha seasons when compared with Yala seasons. The paddy extent covered by the fertilizer subsidy also follows a similar pattern.

The compulsory crop insurance programme has covered 74 % of paddy cultivated area in 2014/ 2015 Maha season and 93 % of paddy cultivated area in 2015 Yala season (Figure 6). This is also an indicator of the degree of

Table 2
Number of Farmers who Received Fertilizer Subsidy in 2014

District	Number of Farmers who Obtained Fertilizer Subsidy
1. Colombo	2,948
2. Gampaha	13,231
3. Kalutara	15,273
4. Kandy	23,498
5. Matale	18,678
6. Nuwara-Eliya	7,945
7. Galle	10,387
8. Matara	23,304
9. Hambantota	37,480
10. Kurunegala	122,921
11. Puttalam	15,860
12. Anuradhapura	42,346
13. Polonnaruwa	45,217
14. Badulla	28,063
15. Monaragala	17,574
16. Rathnapura	20,046
17. Kegalle	14,357
18. Ampara	46,487
19. Trincomalee	13,852
20. Batticaloa	11,934
21. Vavuniya	1936
22. Mannar	3,661
23. Mullaitivu	708
24. Killinochchi	342
Total	**538,048**

Source: Department of Agrarian Development.

programmes implemented by the AAIB and a private insurance company were also operational during the same period. When all the indemnity-based insurance programmes are combined, 77 % and 95 % of paddy cultivated areas had been insured in 2014/ 2015 Maha and 2015 Yala season, respectively.

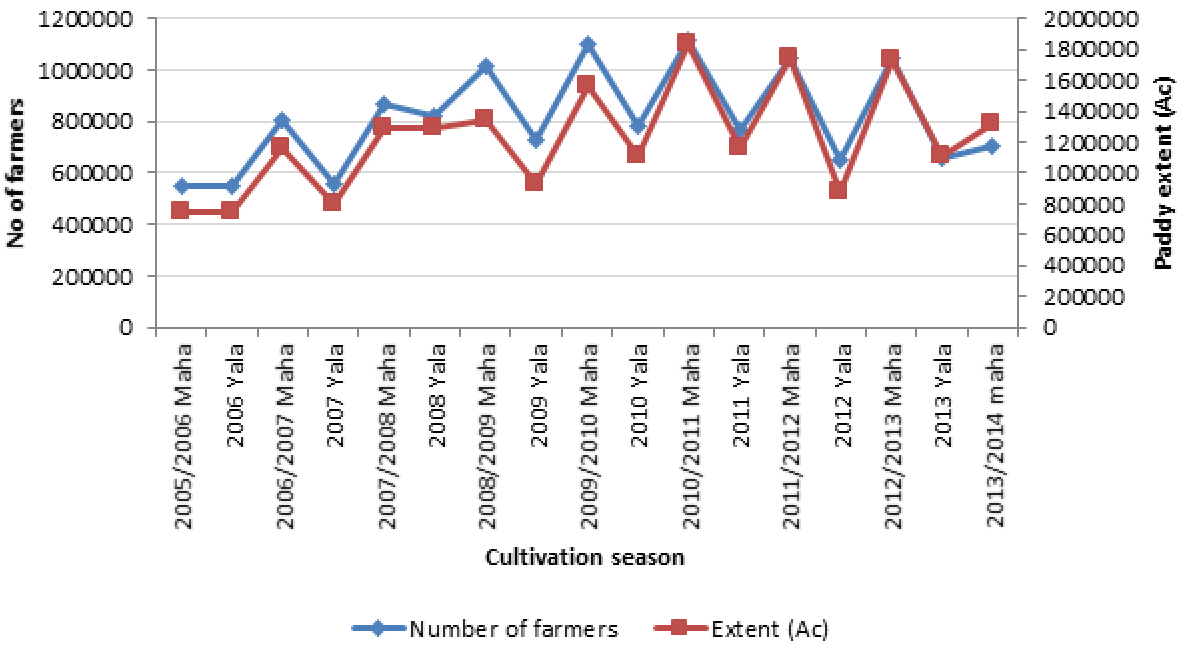
4.1. 4 Loan Protection Insurance

A loan protection insurance was introduced by the government in 2016 to help financial institutes to manage risks associated with lending for cultivation of paddy. Farmers are not required to contribute to the scheme. The scheme is financed through the crop levy which was initiated in 2013. All the financial institutes that are under the purview of the Banking Act No. 30 of 1988, Finance Companies Act No. 78 of 1988 and Regulation of Insurance Industry Act No. 43 of 2000 are liable to contribute 1 % of the profit after tax payable to the Levy. The programme is undertaken by the National Insurance Trust Fund (NITF). Banks and financial institutes can claim the damages estimated by the Committee for Crop Damage as recommended by the respective Divisional Secretary to the NITF, within six months after the cultivation season. The risks covered by the programme include droughts, floods and wild elephant attacks.

The amount of the claims paid per acre is Rs. 10,000 if the damage takes place close to the time of harvest. Thereafter, the payment is 40 % if the damage occurs within 30 days after planting, and 60 % if the damage takes place thereafter up to the blooming stage. However, the NITF has not done any compensation payments to financial institutes to date, as it appears to have not received proper claims. Lack of awareness on this programme among regional branches of financial institutes is a key reason for not utilising this facility. [2]

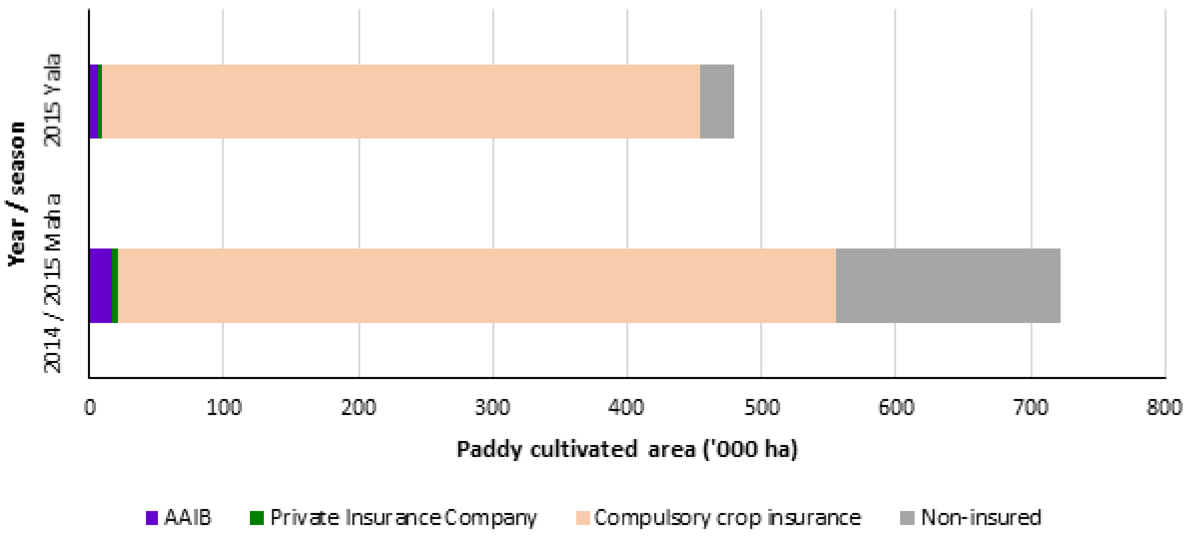
[2] Interview with the Chief Executive Officer Mr. Sanath de Silva of National Insurance Trust Fund (NITF), July 2018.

Figure 5
Number of Farmers and Paddy Extent Receiving Fertilizer Subsidy



Source: Department of Agrarian Development.

Figure 6
Coverage of Paddy Cultivated Area by Compulsory Crop Insurance



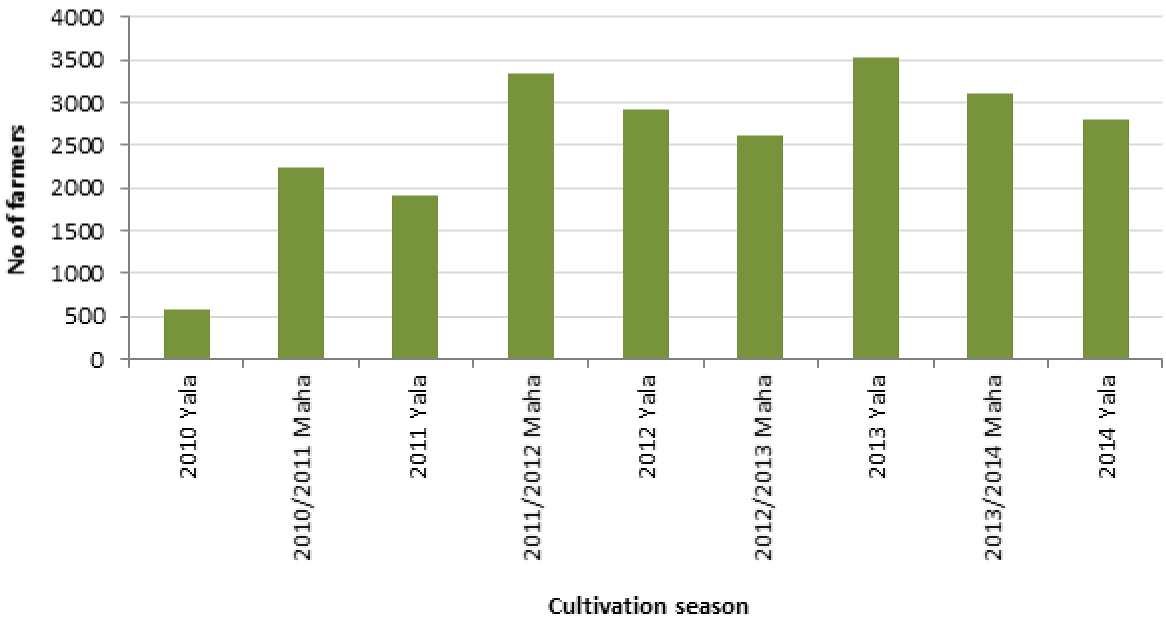
Source: Author's illustration using data from Central Bank Annual

4.2 Index-based Weather Insurance Implemented by a Private Insurance Company

A private insurance company, member of a cooperative group in Sri Lanka introduced a rainfall index insurance scheme for paddy in 2010. The same company introduced a different rainfall index insurance product for tea cultivations in 2012. As index insurance is a new concept for farmers, training and education programmes were carried out via the farmer societies. Since the initiation, the number of farmers enrolled has been fluctuating within the years and across the seasons of cultivation (Figure 7). Data on the land area covered under index insurance, were not readily available for comparison with other programmes.

Overall, Sri Lanka has experimented several approaches of offering climate insurance in the form of crop insurance. Most of the climate insurance schemes are voluntary in nature, apart from the mandatory scheme which was bundled with the fertilizer subsidy programme. A summary of climate insurance schemes administered by both the government and private insurance entities are given in Table 3.

Figure 7
Number of Paddy Farmers Involved in Weather Index Insurance in Sri Lanka



Source: Private Insurance Company.

Table 3
Summary of Crop / Climate Insurance Schemes in Sri Lanka

Name	Provider	Type	Delivery	Risks Covered
A. Crop Insurance (government)	AAIB	Indemnity-based	Voluntary	Floods Droughts Pests and disease attacks Wild elephant attacks
B. Crop Insurance	Private insurance company	Indemnity-based	Voluntary	Floods Droughts Pests and disease attacks Wild elephant attacks
C. Crop Insurance	Private insurance company	Index-based	Voluntary	Rainfall
D. Crop Insurance linked with the fertilizer subsidy (not operational now)	NITF / AAIB	Indemnity-based	Compulsory for farmers obtaining fertilizer subsidy	Floods Droughts Elephant attacks
E. Agricultural Loan Protection Insurance	NITF	Indemnity-based	Offered for the farmers who obtain agricultural loans	Floods Droughts Wild elephant attacks

Source: Author's illustrations.

5. Nature of Climate Risks and Uncertainties Faced by Farmers

This section presents an analysis of risk and uncertainties faced by farmers based on the information collected in the household survey. It begins with a profile of households covered in the survey, followed by a description of patterns of cropping and sources of water for cultivation. Detailed assessment of specific risks and uncertainties and impacts of climate-induced disasters are presented in the subsequent sub-sections.

Table 4
Average Number of Individuals in Households by Employment Category

Employment Category	Mean
Farmer	1.231
Government Employee	0.257
Semi-government Employee	0.020
Private sector employee	0.100
Employer	0.011
Fisher	0.001
Other own account worker	0.036
Casual labourer	0.009
Contributing family worker	0.016

Source: Author's calculations using farmer survey data.

5.1 Profile of Households

The survey covered households who are engaged in agricultural activities, whereby the average household size is around 3.67 and it ranges from a minimum of 1/one and maximum of 11. The analysis based on the employment category shows that several individuals within a household is principally engaged in farming activities (Table 4), with an average of nearly 1.23 individuals per household. Second major employment category is government employees (0.26 individuals per household), followed by private sector workers (0.1 individual per household).

5.2 Cropping Pattern

Average number of crops cultivated by a household during the Maha season is (1.51) higher than that of the Yala season (1.45). Maha is the major cultivation season in the dry zone, as availability of water is comparatively higher in the Maha season. Nearly 19.3 % of the households have not cultivated any of the crops during the Yala season. In the Maha season only 3.8 % households have not cultivated any crop. Paddy is the predominantly grown crop in both Yala and Maha seasons where percentages are ranging from 75 % to 92 %, respectively.

In terms of the cost of cultivation, hired labour and cost of machinery contribute to more than two third of the total cost of paddy cultivation in the area of study in both Yala and Maha seasons (Table 5). Machinery cost alone is around 38 % in the Yala season and 40 % in the Maha season. Labour cost amounts to 28 % of total cost of production in both seasons. Cost of agrochemicals, which include fertilizer, insecticides and weedicides, is higher in the Yala season, when compared to the Maha season. Farmers may have been attempting to increase paddy production in the Yala season by investing more on agrochemicals. Accordingly, an average cost of paddy cultivation per one acre was estimated at Rs. 31,237 in the Yala season and Rs. 29,630 in the Maha season.

5.3 Sources of Water

The percentage of purely rain-fed farmers is only 8 % in the Maha season and 1 % in the Yala season (Figure 8). Pure rain-fed farmers are the most vulnerable group to the changes in the

Table 5
Percentages of Cost Items out of Total Cost of Paddy Cultivation

Cost Item	Yala Season	Maha Season
Labour	28.6	28.6
Seeds	09.0	09.0
Fertilizer	05.9	05.5
Insecticides	04.3	03.9
Weedicides	07.6	07.4
Transport	03.1	02.8
Machinery	38.4	39.5
Irrigation	00.4	00.2
Land rent	02.5	03.2

Source: Author's calculations using farmer survey data.

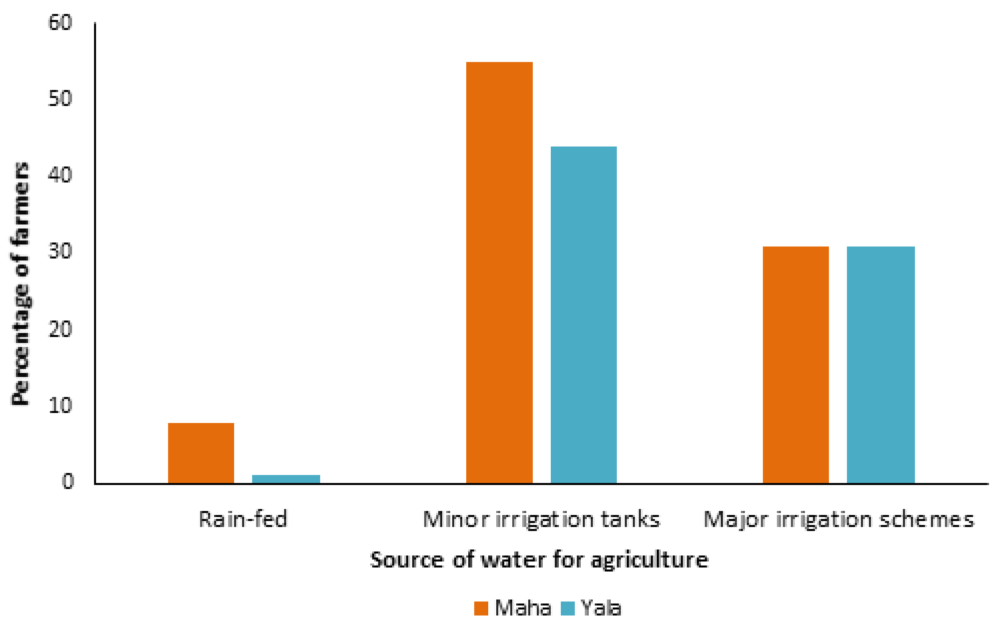
rainfall. Further, over 55 % of farmers depend on minor irrigation tanks, which serve as village level water harvesting devices. Since these farmers are not supported by any source of diverted water from surplus areas, they can also be considered as semi rain-fed.

Thus, the farmers who depend on minor irrigation tanks for agricultural water also show high level of vulnerability. Since Yala season is characterised comparatively with less rainfall, the percentage of farmers dependent on minor irrigation tanks (44%) is lower than that of the Maha season. Comparatively, the farmers who are getting water through major irrigation schemes are less vulnerable. The farmers who are dependent on major irrigation schemes for irrigation water is 31 % and included in the sample of study.

5.4 Risks and Uncertainties

In order to develop a comprehensive picture of specific farmer risks and uncertainties, respondent farmers were asked to mention key risks and uncertainties (Table 6). Climate related natural disasters were mentioned by nearly 65 % of the farming households. Uncertainty in regard to rainfall was mentioned by nearly 54 % of farmers. In addition, fluctuations in water availability in village tanks and agro-wells are risks as experienced by 41 % and 30 % of respondents respectively. This

Figure 8
Source of Water by Season

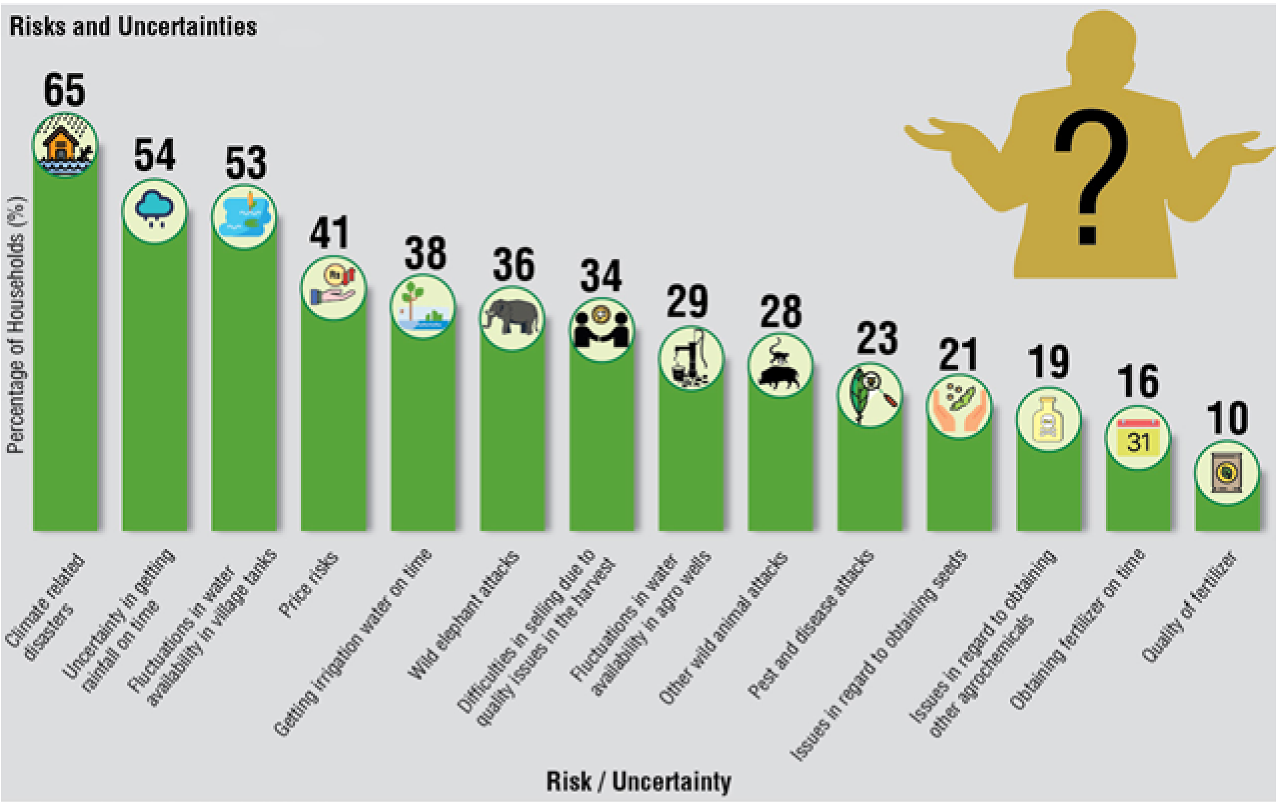


Source: Author's calculations using farmer survey data.

Table 6
Risks and Uncertainties

Risk / Uncertainty	Percentage of Households
a) Climate related disasters	65
b) Uncertainty in getting rainfall on time	54
c) Price risks	53
d) Fluctuations in water availability in village tanks	41
e) Getting irrigation water on time	38
f) Wild elephant attacks	36
g) Difficulties in selling due to quality issues in the harvest	34
h) Other wild animal attacks	29
i) Fluctuations in water availability in agro wells	28
j) Pest and disease attacks	23
k) Issues in regard to obtaining seeds	21
l) Issues in regard to obtaining other agrochemicals	19
m) Obtaining fertilizer on time	16
n) Quality of fertilizer	10

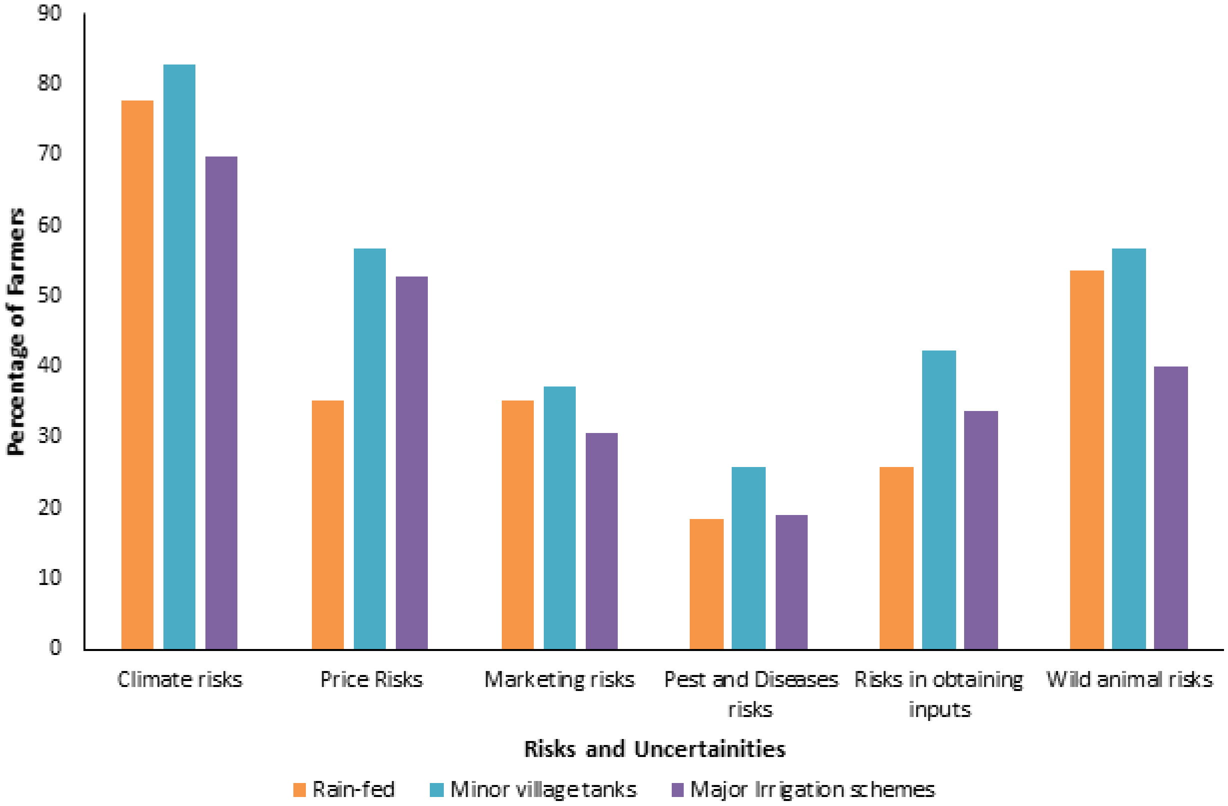
Source: Author's calculations using farmer survey data.



shows that the uncertainty associated in getting access to the supply of water for agriculture plays a major role in relation to their vulnerability. The second and third categories of risks and uncertainties included price risks (53 %) and wild animal attacks including attacks from wild elephants (36%).

The assessment of risks and uncertainties by vulnerability levels suggests that farmers in all categories face similar risk types in general (Figure 9). However,

Figure 9
Risks and Uncertainties by Vulnerability Level



Source: Author's calculations using farmer survey data.

climate risks were more prominently felt by the rain-fed farmers who purely depend on rainfall. Farmers who get access to irrigation water from major irrigation schemes are less vulnerable to climate related risks.

5.5 Climate-induced Disaster Experience of Farmers

Four major types of climate-induced disasters reported in the survey were floods, excessive rainfall, lack of rain and droughts. Over two third of respondent farmers have faced one or more natural disasters during 2010 - 2015. A greater number of households has faced disasters in 2014 (Table 7). During the FGDs with farmers, it was revealed that the year 2013 was characterised with a lengthy dry period with no rains. Following with that many study areas have experienced heavy rains in 2014. Some farmers have had to replant since seeds were washed away in heavy rains that occurred during the first planting. Towards the end of the season, farmer's crops had been destroyed again due to heavy rains.

The main impacts which are linked with vulnerabilities and disaster risk management were assessed under two main categories, namely, agriculture-related difficulties and household related difficulties (Table 8). In terms of agriculture-related difficulties, nearly 40 % of the respondents have lost their cultivation due to natural disasters before harvesting. Another one fourth of the respondents have faced post-harvest losses due to disasters. Reduced quality in the harvest and price risks were also mentioned as significant difficulties. Issues in claiming insurance payments were not mentioned as significant, because the degree of insurance penetration was very low among the farmers.

Table 7
Percentage of Households Affected by Natural Disasters during Last Five Years

Year	Percentage of Households Affected			
	Flood	Excessive Rain	Lack of Rain	Drought
2015	6.4	26.4	0.8	0.4
2014	27.4	31.4	12.8	5.4
2013	5.9	5.6	19.8	10.6
2012	6.6	4.0	0.3	1.5
2011	2.6	1.5	0.1	2.4
2010	1.1	1.1	0.7	2.4

Source: Author's calculations using farmer survey data.

Table 8
Impacts faced during Natural Disasters

	Percentage of Respondents
a) Agriculture related	
1. Cultivation destroyed before harvesting	40
2. Post-harvest losses due to disasters	25
3. Reduced quality in the harvest	22
4. Transport issues	22
5. Problems in marketing the produce	14
6. Issues related to agricultural loans	02
7. Issues in getting agricultural insurance payments	02
b) Household related	
1. Transport issues	22
2. Negative health impacts due to disasters	21
3. Difficulties in repaying loans	11
4. Constraints on other livelihoods that household members are engaged in	10
5. Schooling issues for children	09
6. Had to sell harvest allocated for consumption to repay loans	05
7. Had to sell assets to replay loans	04
8. Reduced number of meals taken per day	02

Source: Author's calculations using farmer survey data.

Table 9
Percentage of Crop Losses due to Climate Impacts

Year	Flood	Excessive Rain	Lack of Rain	Drought
2015	6	26	1	0
2014	27	31	13	5
2013	6	6	20	11
2012	7	4	0	1
2011	3	1	0	2
2010	1	1	1	2

Source: Author's calculations using farmer survey data.

With regard to household related impacts, negative health impacts and transport related issues were highlighted by over one fifth of the respondents. Repayment of loans has been an issue for over 11 % of the households following the natural disasters they faced. Nearly 10 % of households have faced constraints in regard to other livelihoods (other than agriculture).

Information was also collected on the crop losses due to natural disasters during 2010 - 2015. Accordingly, excessive rains in 2014 and 2015 have caused severe crop losses. On average, floods in 2014 have caused 27 % of crop losses. In 2013 rainfall deficit has caused 20 % of crop losses on average (Table 9).

According to the survey results, paddy and maize are the two major crops affected by the disasters. In 2004, more than 20 % of households have lost more than 50 % of their crops due to natural disasters. In 2003, the percentage damage is more than 18 % (Table 10).

Table 10
Crop Losses in Paddy and Maize Cultivations due to Natural Disasters

Year	Percentage Crop Loss[3]				
	Paddy				
	0	1 - 25	26 - 50	51 - 75	76 - 100
2015	89.1	2.7	2.7	2.4	3.1
2014	53.3	9.7	16.2	6.9	14.0
2013	72.3	2.4	7.3	3.4	14.7
2012	92.3	0.7	2.0	0.7	4.3
2011	97.7	0.1	0.7	0.3	1.2
2010	98.3	0.0	0.3	0.3	1.2
Year	Maize				
2015	98.7	0.1	0.9	0.3	0.0
2014	85.6	1.5	7.3	3.0	2.7
2013	91.1	0.7	4.2	1.9	2.2
2012	97.7	0.3	0.8	0.5	0.7
2011	99.6	0.0	0.1	0.0	0.3
2010	99.7	0.0	0.1	0.0	0.1

Source: Author's calculations using farmer survey data.

[3] Percentage of crop losses were directly obtained from farmers during the survey, as per their recollections.

6. Risk Management Strategies and the Role of Crop Insurance

Borrowing is the most commonly adopted coping strategy by the farmers subject to the survey (Table 11). It is remarkable to note that nearly half of the surveyed farmers used informal avenues such as pawning jewelries and loans from informal sources. Only 7 % of farmers have obtained agricultural loans from formal banks. Farmer indebtedness is a long-discussed issue in Sri Lanka. The qualitative information gathered through the FGDs substantiated the fact that the ability to cope with crop losses is still a major problem among farming communities. Farmers often borrow at the beginning of the cultivation to cover the costs of inputs and repay at the end of the respective season. This takes a cyclic pattern, leading to a vicious cycle of debt.

During the FGDs, farmers highlighted that they face a cyclic pattern of obtaining credit or loans in the beginning and repaying them at the end of the season. This is a notable feature in every area in which the study was undertaken. When the farmers are affected by a climatic event, that reduced their ability to repay the borrowings. Repeated occurrences of floods and droughts in several agricultural districts in Sri Lanka during the past few years must have further worsened indebtedness of farmers.

In addition to borrowing, around 10 % of the farmers worked as informal labourers, and most of them are engaged in agricultural activities to cope with damages caused by climate hazards. Opportunities for agricultural labour work are usually limited in the times of widespread disasters such as droughts and floods. Further 7 % of surveyed farmers

Table 11: Risk Management Strategies

Risk Management Strategy	Percentage of Respondent Farmers
Borrowing	
(a) Pawning jewelries	47
(b) Agricultural loans from formal banks	07
(c) Agricultural loans from Community Based organisations (CBOs)	04
(d) Agricultural loans from Non-government organisations(NGOs)	01
(e) Agricultural loans from informal sources	03
Working as labourers	
(a) Agricultural activities	08
(b) Non-agricultural activities	02
Selling paddy allocated for household consumption	06
Selling vehicles (motorbikes etc)	01
Other income generating activities	01
Investing money	01
Agricultural insurance	01
Outmigration seeking employment	01

Source: Author's calculations using farmer survey data.

have sold paddy stocks allocated for household consumption.

Notably, agricultural insurance was identified as a risk management strategy only by 1 % of respondents. The survey also collected information about the farmers who have purchased insurance in the previous years. Around 14 % of respondent farmers had purchased insurance before. Only 3 % of the farmers perceived that existing crop insurance could serve as a risk management strategy.

Lack of knowledge and education on crop insurance was mentioned as main reasons for the low popularity of the existing crop insurance schemes (Table 12). Accordingly, nearly 31 % respondents mentioned that they are not aware how crop insurance works. Also, 17 % of the respondents mentioned that no insurance company approached them and made them aware of how it works. Lack of trust on insurance companies was also a commonly mentioned reason during the focus group discussions with farmers. During the survey, 23 % of the farmers has supported this fact. Interestingly, 31 % farmers have mentioned that they do not need insurance as they are small scale farmers. This again highlights the lack of understanding about the insurance mechanism and its potential role as a risk management tool for farmers.

Table 12
Reasons for not Obtaining Crop Insurance

Reason	Percentage of Farmers
Lack of education and awareness on insurance	34
Not required due to small scale of farming operations	31
Lack of trust	23
Not approached by insurance providers	18
Bad experience of fellow farmers	06

Source: Author's calculations using farmer survey data.

With regard to the crop insurance programme bundled with the fertilizer subsidy programme, around 97 % of farmers have received the fertilizer subsidy in 2015 and the majority of them were aware of the compulsory crop insurance programme associated with the fertilizer subsidy. Only 80 % of them have received a proof document for the extra payment they have made to purchase crop insurance. However, only one fourth of the farmers were aware of the amount of the compensation they can receive in a disaster event. It is important that around 65 %

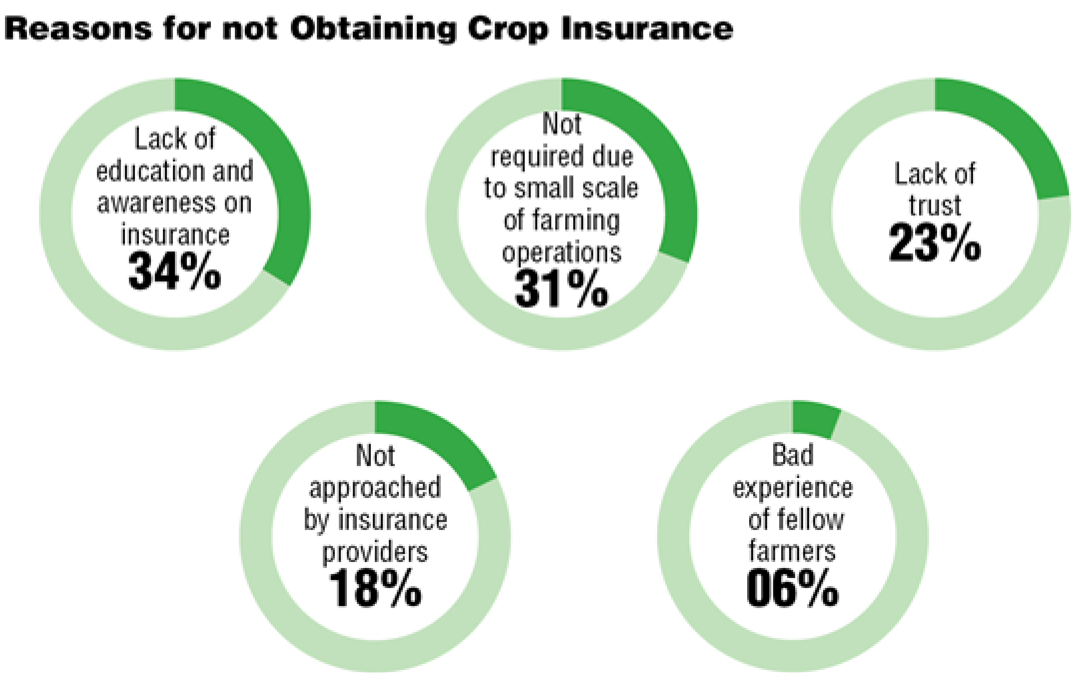


Table 13
Awareness on Compulsory Crop Insurance Programme in Anuradhapura

Divisional Secretariat (DS)	Received a proof document for the payment made	Aware of the compensation received in the event of a disaster	Aware of the risks covered (floods droughts and wild elephant attacks)	Aware of whom to contact in getting the payments
1. Kebithigollewa	99	1	57	35
2. Kahatagasdigiliya	76	14	28	28
3. Thirappane	85	9	29	27
4. Galenbindunuwewa	90	36	48	54
5. Nachchaduva	54	10	12	12
6. Horowpathana	73	47	51	51
7. Kekirawa	73	11	16	20
8. Rajanganaya	100	62	34	53
9. Mihinthale	86	46	48	52
10. Medawachchiya	95	50	50	43
11. Thambuttegama	88	8	10	27
12. Palagala	32	15	15	12
13. Rambewa	100	33	42	100
Total	**80**	**25**	**35**	**36**

Source: Author's calculations using farmer survey data.

farmers were not aware of the specific risks covered by the crop insurance and only 36 % knew whom to contact in claiming the payments. Further, the awareness levels seem to be different across the DS divisions (Table 13). For instance, the degree of awareness is comparatively high in Horowpathana, Galenbidunu Weva and Rajangane DS Divisions. Degree of awareness about the compulsory crop insurance programme was considerably low in the Palagala division. Though specific reasons for division level variations in degree of awareness is not known, it could be mainly attributed to the availability of ground level staff and implementation of awareness and education programmes via farmer organisations.

7. Index Insurance for Sri Lanka

The section attempts to assess the technical feasibility of index insurance using the CHIRPS maps and bad year analysis. It also discusses the challenges for implementing a sustainable index insurance in Sri Lanka.

Table 14
Bad Years Identified by Farmers

Bad Year	Relevant Month	Event
2010	October	Dry period / Drought
2010	November-December	Excess rains / Flood
2011	January-February	Excess rains / Flood
2012	December	Excess rains / Flood
2013	August-December	Dry period / Drought
2014	October-December	Excess rains / Flood

Source: FGDs in sites of study.

7.1 Technical Feasibility of Index Insurance

Technical feasibility of index insurance was assessed using information collected on the bad years identified by farmers during last three decades in lengthy FGDs. Interestingly, all the bad years that farmers identified were because of climate related impacts such as droughts and floods. The discussions covered the topics of cropping calendars, specific impacts following climate related events, risk management strategies, possible role of climate insurance and how insurance can complement/ enhance the existing risk management strategies.

The bad years identified by farmers in different locations were different based on the nature of impact that a particular disaster event has brought in (Table 14). A careful examination of the qualitative findings showed that a few bad years which are more or less common to study locations could be identified. The discussions also revealed the exact months where farmers experienced the event in the identified years. These CHIRPS maps were obtained for the identified years and months.

Interestingly, the rainfall anomalies depicted by the CHIRPS maps for identified months of the identified bad years were found to be fully aligned with farmer's actual experiences. Table 15 shows how the qualitative information and the CHIRPS map illustration are matched with each other. Blue colour shades in the map indicates excessive rainfall anomalies and brown colour shades indicate lack of rain anomalies.

Clear correlation between the qualitative information gathered from farmers on bad years and the rainfall variations depicted by the CHIRPS maps indicates that there is a technical feasibility for developing a marketable rainfall index insurance.

7.2 Challenges in Implementing Index Insurance in Sri Lanka

Timely and continuous availability of data is a key aspect that needs to be addressed in promoting index insurance in Sri Lanka. The empirical evidence from the pilot intervention of index insurance shows that lack of timely rainfall data is a key challenge for implementing index insurance. As at present, the weather stations administered by the Department of Meteorology (DOM), Irrigation Department and other government agencies are not sufficient enough to carry out successful rainfall index insurance in Sri Lanka. Sri Lanka

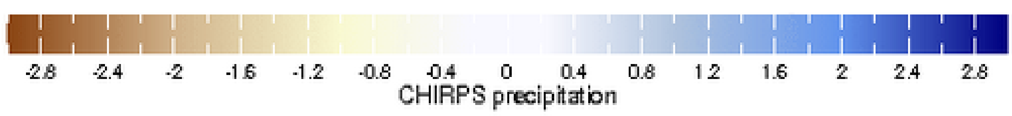
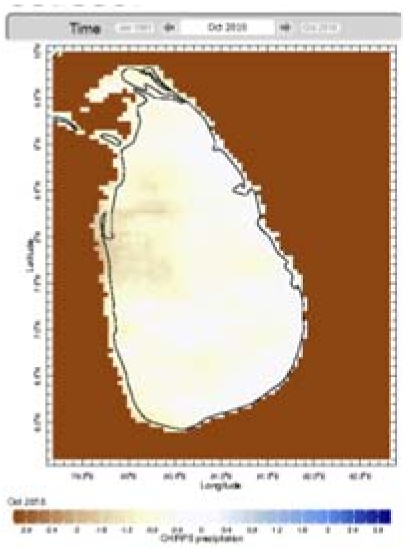
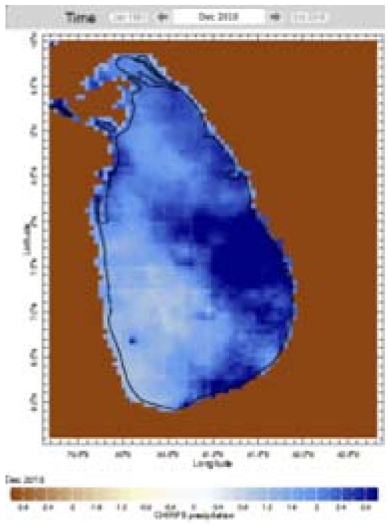
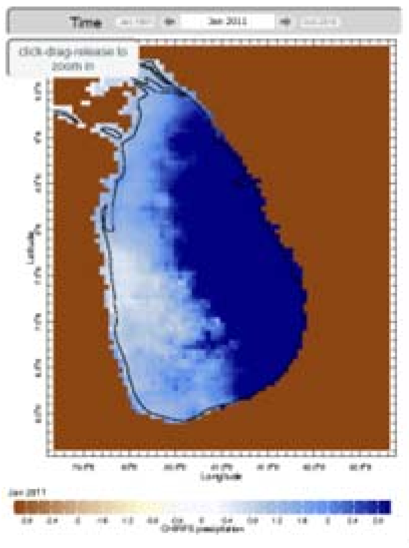
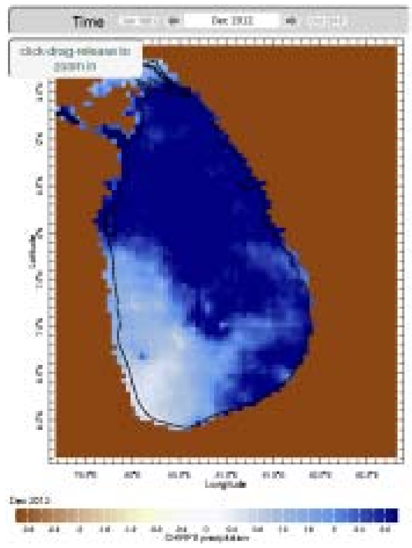
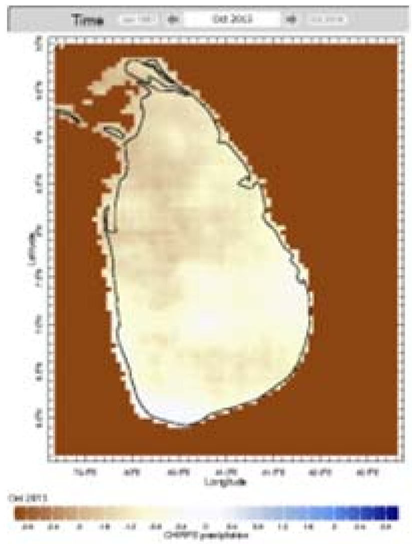
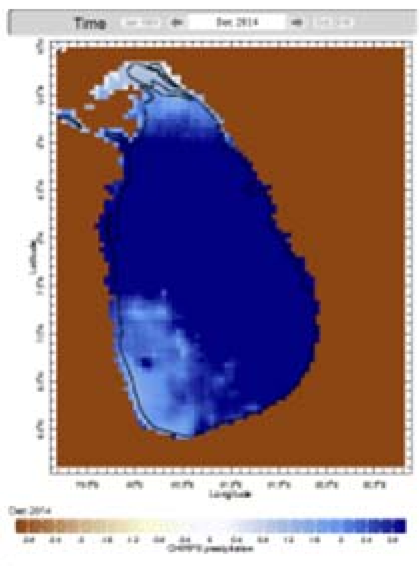


Table 15
Bad Years Identified by Farmers

Year	Months	Farmer Experience	CHIRPs Map
2010	October	Dry period	
2010	November-December	Excess rainfall	
2011	January-February	Excess rainfall	

Year	Months	Farmer Experience	CHIRPs Map
2012	December	Excess rainfall	
2013	August-December	Dry period	
2014	October-December	Excess rainfall	

Source: Author's illustrations.

has had high micro-climatic variation and there are 46 agro-ecological zones in the country despite its small size in terms of the land area (65,610km2). A higher number of rainfall stations will be required in order to carry out a sustained index insurance programme for farmers in Sri Lanka.

The private insurance company which introduced index insurance in Sri Lanka has been facing the issue of scarcity of rainfall data. A particular rainfall station can cover only a radius of 10km for accurate product configurations, as per the assessments carried out by the company with inputs of experts. In addition, there were instances where rainfall reported by the weather stations was different from actual rainfall experienced by the farmers in certain areas located even within a radius of 10km. This is due to high microclimatic variations in the respective areas. The FGDs carried out in the Kurunegala district indicated that the insurance company had to go for field verifications for crop losses due to discrepancies experienced between actual rainfall experienced by farmers and rainfall measured at rainfall stations. Ground level officers had to visit the farm plots which were claimed as damaged. This again had led to an indemnity-based approach.

There have been few attempts to improve rainfall data availability in Sri Lanka in the recent past. A private insurance company has taken an initiative to establish automated rain gauges to obtain accurate data on a timely basis. It is expected to get community participation in measuring rainfalls, in order to increase the trust of farmers regarding readings of rainfall and thereby retain demand for the insurance product. The company is in the process of introducing index insurance using the data gathered from these community-based rainfall stations. A pilot project of this nature was implemented in the Batticaloa district (Box 1).

Further, community-based rainfall stations seem to be a possible solution based on experience from a pilot project in Sri Lanka (Box 2). This calls for the need for creating an effective rainfall data sharing system. Ensuring reliability and validity of data generated through private entities and community-based approaches should receive due consideration in this regard (Osgood et al., 2007).

Lack of education and awareness on existing crop insurance that cover climate risks is a major obstacle for insurance uptake by farmers. When asked about the exact possible role of climate insurance, farmers highlighted the potential role that insurance can play in repayment of agricultural loans. "When affected by a natural hazard, we are facing difficult situations, mainly because we are highly dependent on agricultural loans. Loans are used to buy inputs such as fertilizer, seeds and agrochemicals. We face difficulties in repaying the loans, after a hazard" mentioned farmers during a discussion. This was identified as the common situation across all study sites. Index insurance is a new approach to farmers and therefore, education and awareness elements are particularly necessary in implementing index insurance. Experience from the index insurance pilot programme revealed that comprehensive awareness programmes can play an important role in getting farmers involved with the programme.

Box 1:
Pilot Index-based Insurance in the Batticaloa District

Batticaloa district is one of the areas which were hardly hit by the negative impacts of the civil war for nearly three decades that ended in 2009. Agricultural activities have been carried out in the district amidst continuous disturbances. During the discussions, farmers from different areas of the district revealed that they could undertake proper agricultural and other livelihood activities only after 2009. Thus, the farmers could recollect only two to three years when they were asked about the worst years with climate related risks during the past few decades. Clearly, this is due to the reason that farmers in Batticaloa had been facing life related risks (rather than climate risks) during the conflict period and some had not been even cultivated before the end of the conflict in 2009.

The main agricultural activities of Batticaloa farmers include paddy cultivation and upkeeping of livestock. Similar to other districts in the country, the average paddy extent is around two to five acres. Climate related issues were mentioned as a priority issue they faced since the restart of cultivations. This is mainly related to changes in the rainfall pattern, lengthy dry periods and floods. Problems due to wild elephants and cattle reared by other villagers were also mentioned as significant threats to their cultivation. Selling livestock, pawning jewelries, selling agricultural assets are identified as the common coping strategies following a disaster event.

A private insurance company along with the Oxfam introduced index-based crop insurance in the Batticaloa district on pilot basis in 2015. In order to collect rainfall data, the private insurance company has invested on an automated rainfall station which was technically developed by the University of Moratuwa. The scheme has been launched in two consecutive seasons in 2015. The first season has covered 200 farmers and the second season has covered 300 farmers. Initially, the insurance has been offered at a fully subsidised rate, where Oxfam contributed entirely for the cost of insurance premium.

Farmers have been affected by disaster events during the period they were insured in 2015. Insurance payment has been helpful for them to a certain extent to manage the losses occurred. The most common risk management strategy following a disaster is pawning jewelries. According to the perception of farmers, such strategies can be replaced with insurance, if it caters to their needs and introduced in a transparent manner. Farmers are aware how an index insurance works and as to how they can obtain a payment following a climate related event. During the discussions farmers revealed their satisfaction regarding the compensation payment. They have been made aware, that the insurance scheme will continue and they are supposed to pay the premium if they are willing to get insured in the oncoming seasons.

A clear willingness to purchase index-based insurance in the following seasons was depicted during the farmer discussions. Farmers emphasised for transparency that they should be made well aware of the terms and conditions in the future, as the cost of insurance would be borne by them. An important aspect of willingness to purchase insurance is coupled with the trust factor. Oxfam's involvement has also led to increase farmer's confidence in getting involved in this new programme, as Oxfam had been working with farmers for several years before this intervention.

As agricultural activities were newly commenced/restarted after 2009, the engagement of farmers with agriculture related private companies were low when compared with farmers in the Anuradhapura district. The farmers in the Batticaloa district welcome external assistance, including insurance to develop agricultural activities while improving resilience to droughts and floods. The pilot project has provided the opportunity for farmers to be educated on the concept of index-based insurance and participate it without making an investment from their end.

Source: FGDs and KIIs in Batticaloa.

Box 2

Pilot Project on Community-based Rainfall Stations in Sri Lanka

The concept of community-based weather stations was experimented by the pilot-scale action research study (2015 - 2018) being carried out by the Institute of Policy Studies of Sri Lanka (IPS), in collaboration with the DOM and Janathakshan, which aimed to bridge the climate information and communication gaps among the farming communities in Sri Lanka.

Farmers were provided with necessary equipment and trainings by the DOM to measure, record and report rainfall data using a standard approach. Farmers got engaged with the project with great enthusiasm. The daily rainfall data was duly reported to the DOM during the project period. The pilot project revealed that community-based rainfall stations are an innovative way to address overcome resource constraints associated with government agencies in generating data.

Source: Wickramasinghe (2018).

8. Conclusion

Though the climate insurance products have been offered over long period of time, field level findings show that there is low demand for climate insurance by farmers as a risk management strategy in Sri Lanka. The AAIB and private insurance companies have been offering crop insurance which cover climate risks for many years, despite low uptake rates. Stand-alone climate insurance schemes are not in place in Sri Lanka. The existing crop insurance schemes are linked with agricultural loan schemes provided by formal financial institutes. Almost all farmers who purchase crop insurance have the intention of obtaining agricultural loans from formal financial institutes. The FGDs reveal that in certain instances farmers are even not aware of the fact that they have purchased insurance, since insurance premium is compulsorily deducted by the loan amount, without making farmers notice of same. Thus, the schemes do not function as proper 'voluntary' schemes as at now.

The study examined the reasons for low demand for climate insurance by farmers in Sri Lanka. Lack of awareness and education was a key barrier for climate insurance as an effective climate risk management tool by farmers. Qualitative information gathered through the farmers revealed notable awareness gaps. The analysis showed that there is low awareness on actual mechanism of climate insurance, potential benefits etc. Inadequate marketing and advertising of the existing crop insurance schemes at ground level have failed to create awareness of farmers on climate insurance. The government agencies face financial and human resource constraints to carry out marketing and advertising to increase their clientele.

> "A properly designed index insurance can be viewed as a useful tool in increasing farmer resilience to climate risks in Sri Lanka. The study finds that implementing index insurance is technically feasible in Sri Lanka."

It was difficult to test the affordability of climate insurance on the part of farmers, as farmers have not made effective demand for existing climate insurance schemes as a risk management strategy. However, qualitative information gathered through farmer discussions suggests that farmers are willing to consider improved climate insurance schemes to help them face with increasing impacts of climate risks on agriculture. Further experimental research is required to ascertain detailed information regarding willingness to purchase such improved climate insurance schemes.

A properly designed index insurance can be viewed as a useful tool in increasing farmer resilience to climate risks in Sri Lanka. The study finds that implementing index insurance is technically feasible in Sri Lanka. Index insurance is more transparent in terms of the amount to be compensated. Crop loss assessments involved in indemnity insurance are costly and time consuming and farmers are not satisfied with the compensation paid. In contrast, index insurance when coupled with a rigorous farmer awareness and education component will have the ability to building up farmers' trust on climate insurance. This is particularly important due to the small scale of operations in agriculture activities in the dry zone and other areas of the country.

However, successful implementation of index insurance is challenged due to absence of timely rainfall information and lack of coverage by the available number of rainfall stations. Though there have been attempts by the private sector and community-based approaches, there is no data sharing mechanism in place. The next section presents key policy implications to overcome these issues and challenges, for implementing index insurance as an effective tool for climate risk management in agriculture.

"However, successful implementation of index insurance is challenged due to the absence of timely rainfall information and lack of coverage by the available number of rainfall stations."

9. Policy Implications

Climate insurance has been identified as a possible adaptation measure in the policy documents related to climate change in Sri Lanka. Introduction of innovative risk transfer tools such as climate insurance has been identified as an adaptation action under cross-cutting adaptation needs in the NAP for Climate Change Impacts in Sri Lanka: 2016 - 2025. The NAP is the key policy document for the implementation of climate adaptation activities in Sri Lanka. The Nationally Determined Contributions (NDCs) for climate change also identifies the need for implementing climate insurance. It suggests for introduction of possible insurance schemes to recover the loss and damage to livelihood, properties, infrastructure, agriculture and fisheries, and other affected sectors due to adverse impacts of climate change. Further, the NDCs highlight the need for enhancing the existing automated observational network. This is a vital step forward in improving climate data availability for index-based insurance.

Climate insurance can serve as a tool to break the vicious cycle of debts if carefully designed and implemented effectively. However, the government should have a clear policy regarding climate insurance for farmers in Sri Lanka. The experience with crop insurance shows that Sri Lanka has tested several models of crop insurance, including public insurance, private insurance, compulsory insurance bundled with fertilizer subsidy programme and index insurance. It is vital that government pay special attention to promote climate insurance as part of agriculture and climate change policies in Sri Lanka. Apart from implementing and subsidising its crop insurance programmes, the government has an important role to play in facilitating the effective implementation of the climate insurance through ensuring improved data availability in Sri Lanka. Experience so far is only with regard to isolated efforts for crop insurance by the government agencies and private insurance companies. Experience from other countries (such as from India) shows that public-private partnerships can go a step further in implementing climate insurance as an effective risk management tool for farmers.

A properly designed index insurance seems to be a suitable option for Sri Lanka owing to several reasons. Index insurance will lead to build trust among farmers in accepting insurance as a risk management strategy. Careful implementation of such programme can eliminate most of the issues on the demand side due to poor understanding and lack of trust. Transparency in claim processing will add value to this. As index insurance has similar conditions for all the insured farmers in a given area, it eliminates the problem of adverse selection. As all the farmers are treated equally and claims are processed based on rainfall measurements, it will eliminate the issues of moral hazard. Thus,

“Climate insurance can serve as a tool to break the vicious cycle of debts if carefully designed and implemented effectively.”

index insurance is deemed to be a more appropriate product to deal with covariate risks such as droughts and floods.

A major obstacle in popularising the insurance in Sri Lanka is that farmers get discouraged when they do not receive a benefit in the form of a compensation, in the case of an absence of a drought or a flood. This has to be overcomed by adopting two main strategies. Firstly, the farmers should be made aware of the real concept of insurance and the mechanism as to how it can be useful for farmers. Secondly, it is important to bundle insurance for other development programmes appropriately. As per the study findings, one of the aspects that need to be considered in terms of policy implications is farmers 'inability or limited ability in repaying the credit they obtained from formal/informal sources. During the farmer discussions, it was revealed that insurance will be mostly useful for them loan/ credit repayment following adverse climatic conditions. In this case, the climate insurance can be bundled with agricultural loans obtained from banks and CBOs. The farmer discussions also revealed that real benefit of climate insurance for farmers will arise in terms of agriculture loan repayment.

Improvements in rainfall data availability is a priority area in implementation of index insurance in Sri Lanka. It is vital to take necessary steps to increase the number of weather stations by the relevant government agencies including the DOM for successful implementation of index insurance in Sri Lanka. Improved data availability can also provide complimentary benefits to other climate adaptation activities in Sri Lanka. There have been private level initiatives and pilot projects which attempted to test community-based approaches of measuring rainfall. These attempts have been presently undertaken uncoordinated manner. Ideally effective partnerships between government agencies, private entities and community-based groups could serve an important role in eliminating existing data constraints in implementing index insurance.

Due to microclimatic variations in certain areas in Sri Lanka, the 'basis risk' could be a challenge for upscaling. The private insurance company had adopted a hybrid approach, which supplemented the index approach with indemnity-based approach for verifying claims. This could be the most practical approach at the initial phase of upscaling index insurance in Sri Lanka. Basis risk can be handled to a greater extent by increasing the number of rainfall stations. International experience shows use of satellite data can be a supplementary source for verifying rainfall data. Sri Lanka can experiment this type of new innovations in the future to reach to a practically possible mechanism for implementing climate insurance in Sri Lanka.

Nevertheless, the first step in future interventions in regard to climate insurance should include an essential component of comprehensive farmer education and awareness on the principles of crop/climate insurance and potential benefits. This has to be effectively coordinated via existing institutional framework which comprises of farmer organisations, local agricultural committees and ground level officers. Public-private-community partnerships can well facilitate such interventions and thereby address human and financial resource constraints faced by the government.

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