Smallholder Agribusiness Partnership Program (SAPP)
Ministry of Agriculture

A Study on Insurance and Mitigation Mechanism Available for Agriculture

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Abbreviations

AAIB	Agriculture and Agrarian Insurance Board
CIB	Crop Insurance Board
CICL	Ceylinco Insurance Company Limited
DSD	Divisional Secretariat Division
FAO	Food and Agriculture Organization
FGDs	Focus Group Discussions
GIIF	The Global Index Insurance Facility
GND	Grama Niladhari Division
HARTI	Hector Kobbekaduwa Agrarian Research and Training Institute
KIIs	Key Informant Interviews
NITF	National Insurance Trust Fund
SAPP	Stallholder Agribusiness Partnership Program
WII	Weather Index Insurance

Executive Summary

The Stallholder Agribusiness Partnership Program (SAPP) aims to increase the competitiveness and reduce poverty among Sri Lanka's smallholders. Its main goal is to build a reliable market for rural farmers within the Public-Private-Producer-Partnership mechanism, which would boost household income and improve the quality of the family food. With an objective of 57,500 small holder households, the program has planned to foster commercially-oriented production and marketing system.

Farmers engage in agriculture by assuming the risk of crop failure owing to catastrophic climatic occurrences and the risk of variations in farm gate prices. Since the majority of agricultural products are perishable, marketers run the risk of suffering post-harvest losses. The government has incorporated agricultural insurance as one of its primary strategies for reducing production risk faced by farmers and assuring fair market value for their products.

As a result, for the SAPP activities to continue, an insurance coverage for the program's stakeholders must be introduced. The aim of this study is to compile existing agricultural insurance and mitigation measures, examine them, and give recommendations for how to best incorporate them into the SAP Project.

The consultant is required to gather data on the country's current agricultural insurance and mitigation mechanisms as well as data on the demands for SAPP insurance coverage connected to livestock development, crop development, and c agro enterprises.

Farmers face a wide range of risks, each of which is unique to the country, climate, and local agricultural production techniques. Agriculture is one of Sri Lanka's most sensitive and at-risk economic sector, when it comes to climate change (whether risk). There are additional forms of risks in agriculture than whether risk, such as biological risks, price risks, policy and political risks, etc.

The objective of agricultural insurance are to sustain farmers' income by minimizing negative effects from significant losses and to support increased productivity and resource utilization. In general, risk management techniques like insurance are employed to protect against potential losses. The way insurance works is by transferring a loss risk from one party to another in exchange for a premium or a guaranteed, quantifiable loss in order to avert a larger, potentially catastrophic loss. Traditional insurance and Index insurance are the two main forms of crop insurance procedures.

Agricultural insurance is desperately needed as a risk mitigation strategy since it is more foreseeable from the perspective of those affected and more sustainable from the perspective of the government. By dividing the risk among different entities, it can be managed more effectively. Agricultural insurance premium rate in Sri Lanka can be as 10% of the amount insured, depending on the risks covered.

However, a large majority of stakeholders in Sri Lanka believe that agricultural insurance plans are not cost-effective and that compensation is not enough to recover agricultural damages. As a result, the consultant advised that the minimum cost of cultivation of main crops in Sri Lanka be covered by the sum insured amount. Each crop must have a minimum amount insured value equal to its cultivation costs.

Open access to data is essential for the sector of crop insurance to succeed. National and provincial disaster risk maps already exist, but in order for insurance carriers to more accurately estimate rates, detailed risk maps at the DSD and GND levels must be developed and made available to them. On the other hand, the national economic growth strategy suggests that effective risk forecasting methods can

reduce agricultural damages. Any index-based insurance program also needs a well-developed infrastructure and institutional network arrangements in order to run a successful and efficient insurance system. As a result, the agriculture sector will benefit greatly from government involvement in risk forecasting infrastructure and services. A forward market agreement system must be put into place in conjunction with the anticipated new insurance schemes in order to reduce pricing risk.

Introducing agriculture insurance programs to individual farmers is a time-consuming and inefficient process. On the other hand, due to a lack of knowledge about farm insurance plans, premium collection will be quite low. Therefore, farmer awareness and training activities are required, and they must be carried out by farmer groups, in order to have a well-organized crop insurance policy. A thorough public awareness effort is needed to promote the agriculture insurance scheme.

The indemnity-based nature of all insurance alternatives has a number of well-known disadvantages. Indemnity-based plans usually have high administrative costs that do not show value for money when compared to index-based insurance. Compensations are also slow to pay out, vulnerable to moral hazard and adverse selection, not very transparent and negotiable, and often hard to reinsure because damages must be evaluated individually in the field.

Existing insurance policies are mostly focused on extreme weather occurrences, such as floods, droughts, and wild elephant attacks. While these disasters offer clear and present hazards to Sri Lankan farmers, it's crucial to remember that they're not the only effects of climate change on the country's agriculture. As a result, all agricultural risks must be reassessed in order to limit potential damages under the new insurance

One-tenth (1/10) of the cost of cultivation is the suggested premium. The cost of cultivation, therefore equals the total cost of insurance. The sum insured under the existing (traditional) insurance plan, is less than the cost of cultivation. In order to attract more farmers, it is advised that the proposed insurance system offer a minimum sum insured amount equal to the cost of cultivation. Farmers will be able to obtain at least an amount equal to the cost of cultivation in order to reduce agricultural losses. This is one of the crucial mitigating strategies to be included in the new SAPP insurance program.

The study looked into why farmers in Sri Lanka have a low demand for agriculture insurance. A fundamental hurdle to insurance as an effective risk mitigation strategy was a lack of information and training on crop insurance. Farmers have not made meaningful demand for existing insurance schemes as a risk reduction technique, making it difficult to test the affordability of agriculture insurance on their side. As a result, more instruction is needed, as well as awareness campaigns that might be carried out by government workers who work in the field.

Qualitative information gathered through farmer discussions suggests that farmers are willing to consider improved agriculture insurance schemes to help them face with increasing impacts of different risks on agriculture. It is recommended to any new insurance scheme for SAPP need to focused on at least to recover cost of cultivation. Further experimental research is required to ascertain detailed information regarding willingness to purchase such improved agriculture insurance schemes.

Chapter 1- Introduction

1. Introduction of Stallholder Agribusiness Partnership Program

The Stallholder Agribusiness Partnership Program (SAPP) is designed to contribute Sri Lanka's smallholders' poverty reduction and competitiveness. Its primary objective is to sustainably increase household income and quality of family diet by establishing confirmed market for rural producers under Public-Private-Producer-Partnership (4P) mechanism. The program has planned to promote commercially-oriented production and marketing systems covering a target of 57,500 small holder households.

SAPP has been planned to achieve its objectives through implementing three main activities and all strategies of SAPP are based on agribusiness development, which includes agricultural production and agricultural marketing. Further, it seems that developing partnerships, strengthening institutional setup, providing financial assistance and increasing accessibility to inputs are activities under three components of the SAPP for the development of the agribusiness in the program area. However, investments in agribusiness activities such as agricultural production and agricultural marketing are risky. Agriculture is practiced by farmers taking the risk of crop failure due to devastated climatic incidences, such severe droughts and flood situations and risk of farm gate price fluctuations. Investments in marketing activities are risky due to price fluctuations. As most of agricultural produce are perishable, such as vegetable and fruits, both farmers and businessmen engaged in marketing are faced with risk of post-harvest losses. One of the key alternatives adopted by the government in the agricultural risk management for minimizing the production risk faced by the agriculturalist and ensuring proper value for agro products is the agricultural insurance.

Sustainability of activities implemented by the SAPP is a must to achieve the goal of the SAPP and the SAPP activities are based on risky investments. Continuous engagement in the risky investments is required for achieving the sustainability of the SAPP activities. Farmers or individuals engaged in marketing tend to invest money in these activities, if the investment generates an income exceeding the cost incurred. Thus, there is a risk of losing a part of their income or reducing their income due to incidences of unfavorable climatic situation, pest and disease attacks and price fluctuations. In such an income loss situation, if the investor can be compensated for the damage or the investor can mitigate an income loss, the investor can continuously be engaged in a particular risky activity. Compensation or mitigation for a particular income loss can be made by an insurance scheme. Therefore, introduction of an insurance policy for the stakeholders of SAP program, investing in risky activity is required for the sustainability of the SAPP activities.

To introduce a suitable insurance policy or scheme to the stakeholders of SAPP, it is necessary to find out suitable insurance schemes of those functioning in Sri Lanka and suitable stakeholders from the SAPP. This study is proposed for that purpose.

2. Objectives

This study is proposed to collect existing insurance and mitigation mechanism for agriculture and analyze and provide suggestions to the project and make recommendations for how to best incorporate them in to the SAPP Project.

3. Methodology

According to the scope of the study, the consultant has to collect information on existing insurance and mitigation mechanism for agriculture in the country and information on needs of insurance coverage for SAPP, related to livestock development, crop development and agro enterprise in the country.

The SAPP has been planned to benefit 57,500 households, whom are directly benefitted by the component 01 (Access to Commercial Partnerships - 37,500 beneficiaries) and the component 02 (Access to Rural Finance- 20,000 beneficiaries). Therefore, information required from these beneficiaries were collected.

Before introducing an insurance policy to SAPP beneficiaries, it is necessary to understand the type of insurance coverage required for them. Insurance coverage depends on magnitude of loss or damage to a business, which depends on scale of business, type of business and frequency of occurrence of such damage.

3.1. Data Collection

3.1.1 Primary Data

This study is comprehensively depending on the primary and secondary data. Primary information collected from Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). Additionally, this study used a structured questionnaires to collect necessary primary data and information.

Key Informant Interviews: Key Informants for the study were selected from the identified Senior Officials from insurance industry, Ministry of finance and banking sector, Ministry of Agriculture and Department of Agriculture, Tea Small Holding Authority and project officials of SAPP. For the KIIs, Consultant has used 10 open ended broad thematic questions and finally results were presented as statements. KII's were conducted in parallel to literature review and Focused Group Discussions (FGDs). Information generated through the KII's and FGDs were used to assess on-going agricultural insurance schemes.

Focus Group Discussions: FGDs will be conducted for the selected producer groups on risks factors of agriculture sector. For the FGD sessions, Consultant used 10 open ended broad thematic questions and finally results were presented as statements. In addition, Consultant has used set of questionnaire to collect quantitative information to verify focus group discussions. The SAPP beneficiaries are geographically distributed in three regions: which are Central / North Western / Sabaragamuwa region; North and North Central region and Uva/Southern/Eastern region . Therefore, the study has been based in Kandy,Kurunegala, Ratnapura, Anuradhapura, Polonnaruwa, Ampara, Badulla, Nuwaraeliya and Matara districts. According to the selected geographical locations, total number of focused groups were interviewed is 9 which is distributed over all regions.

3.1.2 Secondary Data

Secondary data were generated through literature survey and collected information on the existing insurance schemes in public and private sectors. These insurance schemes are Agriculture and Agrarian Insurance Board (AAIB) and other private insurance schemes (SANASA and Ceylinco insurance schemes). In addition, documents relevant to this study from Department of Census and Statistics, Annual Reports of the Central Bank of Sri Lanka and other relevant publications were reviewed.

3.2. Data Analysis

Information generated from the collected data is evaluated according to logical point of view. The quantitative and qualitative data have been analyzed using descriptive statistical methods. The proportions of farmers facing climate related and non-climate related risks and uncertainties, adopting different risk management strategies including climate insurance have been calculated. In addition, this study measured the effects of various causes, including disasters, insect infestations, and handling damages in terms of the proportion of output losses and the percentage of affected SAPP beneficiaries.

The objectives and methodology of the SAP program is presented in Chapter 1. This chapter primarily focuses on the study objectives and assignment methods. The techniques for data gathering and analysis are covered in the methodology section.

Chapter 2. - Risk in Agriculture Sector

1. Agriculture Sector

Sri Lanka's agriculture is characterized by a non-plantation sector and a plantation sector. Of the country's approximately 2.3 million hectares of agricultural land, 80 percent is used for non-plantation food crops, comprising rice, maize, fruits, vegetables and other crops that are primarily grown on smallholder farms. The agriculture sector contributes about 6 percent to the national GDP and 27.3 percent of Sri Lankans are employed in the agricultural sector in 2021, according to the Central Bank annual report 2021. (CBSL 2021). About 1.65 million smallholder farmers operate on average less than 2 hectares and contribute 80 percent of the total annual food production. Traditional commercial crops (export agriculture crops) include cinnamon, pepper, cocoa, coffee and others, and are grown on small and medium land holdings as well. Typically, non-plantation crops are grown under irrigated conditions while plantation and export agriculture crops are grown in the rain-fed areas. Monsoonal rainfall patterns shape the agricultural seasons and irrigation patterns. Two thirds of the agricultural area are located in the dry zone, which covers the northern and eastern and southeastern parts of the country, where the bulk of the country's irrigation infrastructure is located.

Risk in agriculture is an unpreventable but a controllable element. Among available strategies for risk management in agriculture, insurance plays an important role and it is vital to share the risk. By means of agricultural insurance, farmers can stabilize farm income which is, in deed the objective of SAPP and investment and guard against disastrous effects of losses due to natural hazards or low market prices. Crop insurance not only stabilizes the farm income but also helps the farmers initiate production activity after a bad agricultural year. It cushions the shock of crop losses by providing farmers with a minimum amount of protection. (HARTI, 2020). In general, insurance is a form of risk management used to hedge against a contingent loss. Transfer of a risk of loss from one entity to another in exchange for a premium or a guaranteed and quantifiable small loss to prevent a large and possibly devastating loss is the way of operating the insurance. Objectives of agricultural insurance are stabilize farmers' income by reducing adverse effects resulting from substantial losses and help to increased production and more efficient use of resources.

2. Type of Risks in Agriculture

Farmers face a wide range of risks, each of which is unique to the country, climate, and local agricultural production techniques. These risks, as well as their consequences for farmers, have been extensively studied and categorised in the literature. Table 1 shows the main risks that farmers encounter.

Table 1: Key Risk Areas Faced by Farmers

Risk	Example	Effect
Weather Risk	Rainfall or temperature variability or extreme events	Lower yields, loss of productive assets or income.
Biological Risk	Pests, disease, contamination	Lower yields, loss of income
Price Risk	Low prices, market supply and demand, volatility	Lower prices, loss of income
Labor and health risks	Illness, death, injury	Loss of productivity, loss of income, increased costs
Policy and Political Risk	Regulatory changes, political upheaval, disruption of markets, unrest	Changes in costs, taxes, market access

Weather risk : In the case of access to finance, even if the underlying weather risk is mitigated through the purchase of an insurance product or the installation of irrigation, the lender still faces a number of risks. For example, the farmer could just sell the product and not repay the bank, or harvest prices could drop to the point where the revenue is insufficient to repay the loan, or the crop could be decimated by locusts, leaving no crop to sell at the due repayment date.

Biological risk: The issue of biological risk in agriculture is one that should be taken seriously. For example, if an outbreak of aflatoxin in maize occurs in a particular province or district, potential buyers may impose a purchase ban. Farmers will be harmed by the country's market access limitations, even if they have well-managed this risk and their maize is aflatoxin-free. As a result, considering risk throughout a supply chain allows for a more comprehensive risk assessment and management.

Price risk: Price fluctuation is the third and most serious risk. Reduced harvest quality, an unanticipated increase in the quantity of a certain homogeneous product, and the removal of import restrictions are all major factors that lead to price risk. As a result, good agricultural supply chain management is critical for delivering the correct products (quantity and quality), in the right quantities, to the right place, at the right time, and at a competitive price, as well as reducing price risk.

Labour and health risk: Farmers exposed to toxic chemicals and chemical poisoning, kidney disease, leptospirosis (often known as rat fever), machine accidents, elephant attacks, and exposure to high temperatures are among the significant health risks. Chemical poisoning is frequently cited as a serious occupational health risk, with vision, skin, and breathing problems all being linked to improper chemical use. Some of the above-mentioned health hazards can be mitigated by taking precautions.

Policy and political risk: Uncertain monetary, fiscal, and tax policies; uncertain regulatory and legal policies or enforcement; uncertain policies on trade, market, or land and tenure systems; governance-related uncertainty; and weak institutional capacity to implement regulatory mandates are some of the major policy issues and changes. Furthermore, geopolitical instability is a significant risk factor that affects all economic sectors.

2.1. Weather Risk in Agriculture

The effects of a given weather event vary depending on the type of agricultural system, changeable water balances, soil and crop type, and other risk management methods available (such as irrigation). Furthermore, poor infrastructure (such as poor drainage) and mismanagement can exacerbate the harmful effects of meteorological occurrences. There are two primary forms of risk to consider when it comes to weather risk management.

1. Sudden, unforeseen events (for example, heavy rain).
2. Cumulative events that occur over an extended period (for example, drought).

The effects of either of these categories of risk differ greatly depending on the crop type, variety, and timing of occurrences. Table 2 lists the most important weather risks. Annex 2 shows a detailed damage assessment for paddy farming due to excessive rain. (Ref. Climate Resilience Improvement Project).

Short-duration extreme weather occurrences (for example, a short period of high temperature) can produce direct crop damage that is severe. Physical inspection can be used to evaluate these damages right away. On the other hand, while the end result of a chain of events can be severe, much of the damage occurred earlier in the crop development process. Except for the most extreme catastrophes, relationships between meteorological events and damage are typically impossible to model (Please refer Annex 2 for paddy damage assessment). This flood damage example for paddy is directly extract from the "Climate Resilience Improvement Project" – Batticoloa Flood Damage Assessment Report (Mundeni aru Basin -2021.

The best correlations exist for rain-fed crops planted in locations (Example: Maize farming in Ampara district) where there is a clear sensitivity of the crop to shortfalls in available water and clearly defined rainy seasons in the case of cumulative rainfall deficit (drought). Droughts, on the other hand, are a common occurrence in tropical crop production, where both floods and droughts can occur in the same year.

Table 2: Main Weather-Related Risks Affecting Agriculture

Weather Risk Event	Impact
Drought (rainfall deficit)	1. Crop varieties adapted to mean rainfall and water balance. 2. Rain-fed agriculture predominates globally. 3. Annual or multiannual. 4. Key risk to livestock
Excess rainfall and flood	1. Excess rainfall causes direct damage and indirect impacts. 2. Riverine, flash, coastal floods. 3. Watershed management, drainage, irrigation have impact on flood
High temperatures	1. Impact on evapotranspiration and related to drought. 2. Seasonality and vulnerability to crop stages.
Wind	1. Cyclonic severe events (hurricane or typhoon).

Source: World Bank Discussion Paper 50- 2011

2.2. Weather Risk Management Strategies and Levels of Operation

Farm households and communities are encouraged to create and improve solutions to cope with and manage weather risks since weather has such a strong impact on their livelihoods. There are three types of risk management solutions available to households.

1. **Crop and labor diversification** (on and off farm), risk pooling arrangements among peers or family members, sharecropping, investing in semi liquid assets such as livestock or buffer stocks, farmer self-help groups, and moneylender loans are all risk management strategies used by households and communities.

2. **New technologies**, improved seed types, formal financial services, such as savings, lending, and insurance, risk-sharing arrangements with input suppliers and wholesalers, and information

technology tools are all methods created by markets to help farm households manage weather risks.

3. **Governments** invest in farm households to assist them in coping with weather risks. Governments can provide infrastructure, such as roads, electricity, and water; educational and extension services; research and development money to improve agricultural technologies; weather data and information systems; and disaster relief.

While many of the measures listed above can assist households in coping with the effects of low and moderate weather risks, they are unlikely to be helpful in the event of larger weather shocks. For a variety of reasons, major calamities render household plans ineffective.

First, diversification methods will not be sufficient to safeguard households in the event of a big disaster that impacts all farm revenue sources. Crop diversification schemes may fail as a result of catastrophic weather, as households are likely to lose both cash and subsistence crops. Diversification plans for labor can also fail, if labor revenue is dependent on a successful crop. Laborers who make living, harvesting, transporting, or processing local goods will also be harmed by a disaster that disrupts farm production.

Second, catastrophic weather occurrences affect entire communities, resulting in the breakdown of intercommunity risk-pooling agreements. If everyone is affected by the same catastrophic disaster, strategies of reciprocity and risk pooling among neighbors and family members will fail. Moneylenders, input suppliers, and wholesalers are all liable to suffer losses as a result of defaults, as does the rest of the community. As households deal with losses, certain savings strategies, such as owning cattle, are likely to fail as a result of multiple households attempting to sell livestock at the same time, lowering local prices.

Finally, the risk of weather shocks limits the development of formal lending and insurance services for agricultural production, as local lenders and insurers operating in a single geographic area are often hesitant to extend loans and insurance to farmers because their losses would be too great if a catastrophic weather event occurred. Banks and insurers may experience high rates of loan defaults or indemnity payouts as a result of weather shocks. As a result, many farm households are unable to obtain formal credit or weather insurance due to the high risk of catastrophic events for local financial service providers.

2.3. Risk Management, Transfer and Mitigation

Agriculture is one of Sri Lanka's most sensitive and at-risk economic sector, when it comes to climate change (whether risk). However, except whether risk, there are other types of risks in agriculture and described in above Table 1. (i.e. biological risk, price risks etc.). Climate change has had a variety of affects on agriculture over the last few decades rather than other types of risks and therefore, above section 2.1 has discussed climate risks in details, including irregular rainfall patterns and flood risk, rising air temperatures and more frequent and powerful extreme weather events. Heat stress, water scarcity, drainage issues, and saltwater intrusion, among other factors, have contributed to and continue to decreases in agricultural production, yield, and revenue. Crop insurance, often known as agriculture insurance, protects against the loss of expected crop yields. On the issue of risk management, there is a wealth of information available. For the purposes of this study, the consultant employed three distinct risk management approaches: mitigation, transfers, and coping, as well as a brief description of each are given in below sections.

Mitigation : Mitigation is the process of reducing or limiting the negative effects of hazards and disasters. Crop and livestock diversification, income diversification, soil drainage, mulching, use of resistant seeds, avoidance of risky practices, and crop calendars are just a few of the risk mitigation strategies available.

Transfer: The transfer of the potential financial implications of specific risks from one party to another is referred to as transfer. While insurance is the most well-known form of risk transfer, informal risk transmission among families and communities is particularly important in poor nations.

Coping: Coping is the process of increasing one's ability to endure and manage catastrophes by pre-planning and the use of informal and formal processes in order to maintain production and livelihoods after a disaster. Despite the fact that coping is an after-the-fact action, it is feasible to plan and prepare for coping activities in advance. This is typically financially advantageous, as the capacity to respond swiftly to events decreases losses.

Facilitating the use of market-based approaches can reduce the needs and scope for government interventions and thereby decrease the costs incurred by government. As a result, several governments are actively promoting risk management and insurance based on the market (Public, Private or Public Private Partnership).

3. Insurances as Mechanism of Risk Management or Transfer

3.1. Insurance Definition

Agricultural insurance is a special line of property insurance applied to agricultural sector, but it is not limited to crop insurance, applies to livestock, forestry, aquaculture, greenhouses etc. Objectives of agricultural insurance are stabilize farmers' income by reducing adverse effects resulting from substantial losses and help to increased production and more efficient use of resources. In general, insurance is a form of risk management used to hedge against a contingent loss. Transfer of a risk of loss from one entity to another in exchange for a premium or a guaranteed and quantifiable small loss to prevent a large and possibly devastating loss is the way of operating the insurance.

3.2. Crop Insurance Techniques

According to the World Bank and FAO (2011), there are two types of crop insurance techniques:

1. Traditional insurance
2. Index insurance

Aforementioned two insurance techniques can be classified into sub categories as following Figure 1. This study is focused on the analysis of farm level risks, agricultural risk assessment, risk management strategies and provide suggestions to the SAP project to launch new agricultural insurance scheme.

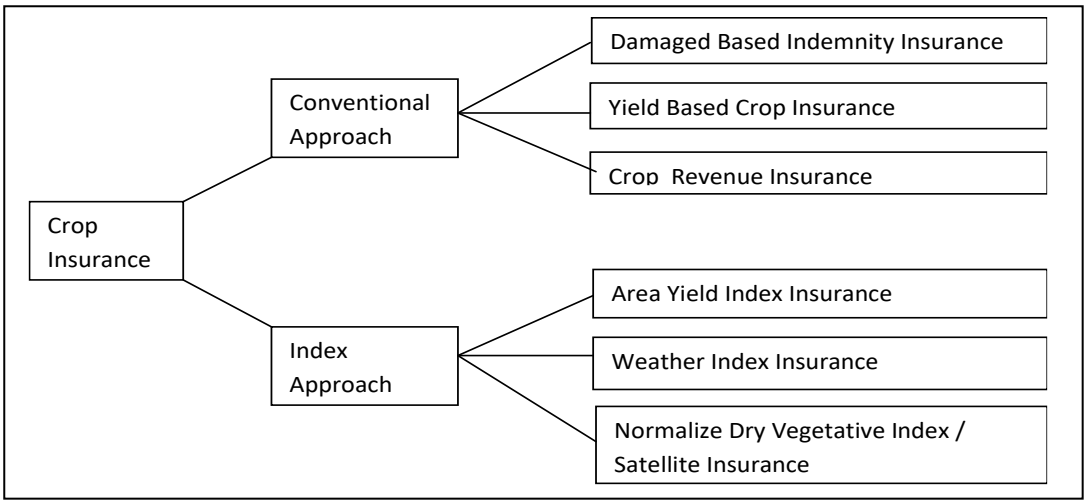

Figure 1: Types of Crop Insurance Schemes
Sources: Research Report No. 231, HARTI, 2020 and followed by World Bank (2011) and FAO (2011).

Conventional insurance: Damage-based indemnity insurance is crop insurance in which the insurance claim is calculated by measuring the percentage damage in the field, soon after the damage occurs. The damage measured in the field, less a deductible expressed as a percentage, is applied to the pre-agreed sum insured. Yield-based crop insurance is coverage in which an insured yield (for example, tons/ha.) is established as a percentage of the farmer's historical average yield. Crop revenue insurance takes into account both the crop yield and loss of market price (FAO, 2011).

Index based insurance: Agricultural index-based micro insurance is an affordable risk management tool for smallholder farmers with minimum government involvement, and index-based insurance products in agriculture have a lot of potential. Meteorological data (rainfall, temperature, wind speed, etc.), satellite photos, area yield, price, and even livestock fatality rate can all be utilized as indices.

Under the Area yield index insurance approach, the indemnity is based on the realized average yield of an area. (i.e Kg./acre or Kg./hectare in specific district). The insured yield is established as a percentage of the average yield for the area. This type of index insurance requires historical area yield data. In connection with Weather Index Insurance (WII), the indemnity is based on realizations of a specific weather parameter measured over a pre-specified period of time at a particular weather station. The insurance can be structured to protect against index realizations that are either so high or so low that they are expected to cause crop losses.

One of Sri Lanka's first experiences in index insurance for agriculture was a pilot for the tea sector by SANASA Insurance Company with technical assistance from the International Finance Corporation (IFC) in 2011-2014. The pilot was for smallholder tea farmers in Ratnapura district, who relied entirely on rainfall as the source of water for their cultivation. This was an opportunity to experiment with an index insurance product based on rainfall data, which has been popularly deployed in other parts of the world. This pilot resulted in a commercially successful product with positive correlation to the farmers' actual experience. The main prerequisite for the pilot was a reliable source of rainfall data. (World Bank -2019).

The WII was launched to the Batticaloa district in the 2014/15 maha season for paddy, with premium subsidies provided by OXFAM. The WII scheme was initially offered at a totally subsidised rate, with Oxfam covering the entire cost of the insurance payment. Oxfam also supported the installation of a meteorological station and technical assistance from the University of Moratuwa, which is coordinated by Ceylinco insurance company. Implementation cost for the weather station was Rs. 150,000. The

Batticaloa district had four weather stations: Karadiyanaru, Kiran, Vakarai, and Vellawalai. Each weather station is responsible for a 15-kilometer radius surrounding it. Officers of Oxfam worked with insurance company agents to identify places that would be suitable for the launch of a weather index insurance plan. However, due to technical issues, the weather station in Vellawalai is now unavailable. With the aid of Oxfam, the first WII scheme was implemented in the 2016/17 maha season in the necessary areas around the Karadiyanaru weather station. In the first season, Oxfam paid the entire premium, while in the second season, they only paid half. Farmers must carry the premium on their own beginning in the third season. The WII initiative began in the 2017/18 maha season in the Vellavali, Kiran, Vakarai, and Mahaoya areas. It has been operating in the Batticaloa district until today. However, at present the number of venues has increasingly declined. The case study of Batticoloa district is given in following box.

Case Study – Batticoloa District

***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: Agriculture Research Series No. 200, May 2019 – Institute of Policy Studies of Sri Lanka.

4. History of Agricultural Insurance in Sri Lanka - from Initiation up to Now

Agricultural insurance in Sri Lanka started in 1958 as a pilot project for paddy cultivation in five districts. It was then provided with a legal framework by the 1961 Crop Insurance Act and expanded by the 1973 Agricultural Insurance Law that also established the Crop Insurance Board (Policy Brief, 2019). In 1999, the Crop Insurance Board (CIB) was replaced by the Agriculture and Agrarian Insurance Board (AAIB), and in 2006 the government created the National Insurance Trust Fund (NITF) as well. Currently, Sri Lankan farmers can insure most of their crops through the conventional crop insurance schemes conducted by the government-owned Agricultural and Agrarian Insurance Board (AAIB).

The AAIB is the Ministry of Agriculture's major agricultural insurance institution. It has provided insurance for cultivation crops since 1973 and in its current form since 1999. The AAIB's insurance plans are designed to safeguard farmers against natural disasters. Paddy and other field crops are covered under these indemnity-based insurance plans, which also include insurance for floricultural products, paddy storage, and livestock.

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 (Institute of Policy Studies – 2019).

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. 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 hat are considered as important, majority farmers are automatically enrolled in the insurance programme when they obtained the government fertilizer subsidy. (Institute of Policy Studies – 2019).

Over the years, a number of acts and laws regarding agricultural insurance have been enacted, including the Crop Insurance Act No. 13 of 1961, the Agricultural Insurance Law No. 55 of 1979, the Farmers' Pension and Social Security Benefit Scheme Act No. 12 of 1987, the Agricultural and Agrarian Insurance Act No. 20 of 1999, the Sri Lanka Disaster Management Act No. 13 of 2005, and the National Insurance Trust Fund Act No. 28 of 2006.

In 2006, the Ministry of Finance established the National Insurance Trust Fund (NITF), which was enlarged in 2007. It is in charge of the indemnity-based National Agricultural Insurance Scheme, which covers drought, flood, and wild elephant damages on present paddy farming. It also covers the costs of potato, big onion, maize, chili, and soya bean inputs up to LKR 10,000 per acre. Under the Agricultural Loan Protection Scheme of the NITF, regulated financial institutions guarantee crops up to a maximum of LKR 10,000 per acre of paddy for natural disasters. The crop levy collected from all financial institutions is used to fund both the National Agricultural Insurance Scheme and the Agricultural Loan Protection Scheme (as per gazette notice 1825/23 of 2013).

SANASA Insurance Company Limited and Ceylinco Insurance Company Limited are the two largest agriculture insurance providers in the private sector. Ceylinco House, Co-operative Insurance Company Limited, Softlogic Life Insurance PLC, LOLC General Insurance Limited, HNB Insurance, and Continental Insurance Lanka Limited are among the private firms that provide agriculture insurance. The SANASA Insurance Project, which began in 2011, intends to boost smallholder farmers' production and living circumstances in Sri Lanka, ultimately improving the country's food security. The Global Index Insurance Facility (GIIF) of the World Bank Group and SANASA Insurance teamed in June 2011 to develop an index-based insurance product for rice and tea producers. They drew tea growing areas for weather stations based on 30-years of meteorological data and precise agricultural maps to assure the measurement of reliable local weather data, which varies greatly in the region. The project team also took into account the knowledge of local farmers, linked their financial condition, and improved their comprehension of insurance products. According to the previous experiences of SANASA indexed based insurance product, premium value is 8.5% of sum insured amount and 20,000 farmers were insured.

SANASA's strong marketing of the program was key to its success. Local representatives with influence on the farming societies were selected and promoted the project in road-shows, radio spots and even a docudrama to explain how index-insurance can serve as an effective risk-management tool. These initiatives were supplemented by activities to further build the capacity of the local SANASA Societies. In August 2013, SANASA was awarded with the first prize from the National Agribusiness Council of Sri Lanka for its index-based crop insurance product that has become an essential aspect in the firm's contribution to the development of Sri Lanka's rural community.

Ceylinco Insurance Company Limited (CICL) is a significant insurance provider in Sri Lanka and the first to join the agriculture insurance market. In 1992/93, it ran a pilot program named "Govi Rakshana," and subsequently began giving insurance to farmers after the Agrarian and Agriculture Insurance Act of 1999 authorized commercial businesses to do so. A paddy crop insurance scheme, subsidiary crop insurance schemes for cowpea, soya bean, green gram, ground nut, big onion, red onion, and chilies, insurance schemes for seasonal crops (gingerly, maize), perennial crops (pineapple, banana, cashew), plantation crops (sugar cane, coconut, rubber), livestock, farm implements, and life insurance for farmers are among the insurance schemes currently operated by CICL. All of these insurance plans are based on indemnification.

5. Current Agricultural and Mitigation Schemes in Sri Lanka

5.1. Current Agricultural and Mitigation Scheme in Sri Lanka by AAIB

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. Links have been established between the AAIB and banks which provide agricultural loans to farmers. Farmers, banks, and agricultural insurance companies in Sri Lanka are unfamiliar with the Weather Index Insurance (WII) system. The AAIB has recently attempted to create a weather index insurance system.

Agricultural and Agrarian Insurance Board in Sri Lanka introduced the following insurance schemes details are given following section.

1. Introduction of Index Base Insurance Project May 2016, funded by International Finance Corporation affiliated to the World Bank. Estimated amount is US $ 1.43 million and International Monetary Corporation is provided technical assistance as a grant.

2. Introducing new insurance schemes to reduce the risk of local agriculture and increase the financial stability of the institution.

3. Compulsory crop insurance scheme as per 2017 budget proposal and Introduction of subscription insurance schemes for residual crops. It was proposed to provide an insurance cover of Rs. 40,000 per acre to reduce the disaster management expenditure on six major crops such as paddy, maize, soya bean , big onion, potato and chilli. (Ministry of Agriculture-2020).

4. The AAIB has been given the full right to insure the immovable and movable property of the farmers and in addition to the existing Social Security Schemes, the introduction and implementation of third party Insurance for farmers' motor vehicles has been carried out. We have been able to reduce the rural unemployment rate by setting up an agent network to introduce this third party insurance.

5. For the year 2020 Ministry of Agriculture has been allocated Rs. 1514 million to AAIB to introduce a contributory insurance scheme for farmers under the Expenditure Head -118 and total amount was utilized and financial progress is 100%. The AAIB has been insured 139,291 Farmers and 186,296 acres. For the year 2021 Rs. 1000 million was allocated for the Contributory Insurance Scheme for farmers.

5.2. Current Agricultural and Mitigation Scheme in Sri Lanka by Private Insurance Companies

The private insurance business under the SANASA and Ceylinco insurance companies, which has a good reach of over one million members through its savings and credit institutions and has good farmer societies and community-based organizations all across the island. They launched the WII program in 2010 under the general insurance departments. The World Bank Group, with the help of the Global Index Insurance Facility (GIIF), began working in Sri Lanka in 2011 to stimulate the weather-related index

insurance market through a combination of institutional and smallholder-farmer capacity development and awareness raising operations. (Ref: HARTI Report No. 231)

SANASA and Ceylinco insurance companies intends to develop the weather index insurance market in Sri Lanka through a combination of capacity building and awareness creation to minimize income loss due to unfavorable weather conditions. Development of a simple, flexible, and economical weather index-based insurance product that will respond to a variety of client demands for food crops in Sri Lanka. The trial initiative, which spanned two districts in Kurunegala and Kalutara, enlisted 570 paddy farmers in two sites. The first insurance period in Kurunegala and Kalutara districts began in the 2010/11 Maha season and covered nine areas with 2,241 paddy farmers. WII has been functioning in Kurunegala, Anuradhapura, Matale, Kandy, and Hambantota districts since the 2011/12 Maha season until the 2014 Yala season. However, lack of consistent meteorological data and other operational issues, WII ceased operations in certain districts. The following Table 3 shows the implemented districts, locations and number of paddy farmers covered under the WII scheme.

Table 3: Implemented Districts, Locations and Number of Farmers in WII.

Year/season	Implemented Districts	Locations Covered	Number of Farmers
2010 yala	Kurunegala, Kalutara	2	570
2010/11 maha	Kurunegala, Kalutara	9	2241
2011 yala	Kurunegala	10	1904
2011/12 maha	Kurunegala, Matale, Kandy, Hambantota ,Anuradhapura	12	3337
2012 yala	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	10	2908
2012/13 maha	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	12	2617
2013 yala	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	16	3257
2013/14 maha	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura	16	3105
2014 yala	Kurunegala, Matale, Kandy, Hambantota, Anuradhapura, Batticaloa	16	2810
2014/15 maha	Batticaloa	16	3435
2015 yala	Batticaloa	16	2151
2015/16 maha	Batticaloa	16	2986
2016 yala	Batticaloa	16	2448
2016/17 maha	Batticaloa	9	1621
2017 yala	N.A	N.A	N.A
2017/18 maha	Batticaloa,Vavuniya, Trincomalee	11	1717
2018 yala	Batticaloa,Vavuniya, Trincomalee	11	2396

Source: Research Report No. 231, HARTI, 2020

5.2.1. Criteria and enrolment process of WII of private insurance companies

The WII scheme is open to paddy farmers who cultivate land within a 15-kilometer radius of weather stations. Farmers can be protected from the dangers of low or high rainfall, as well as flash rains, under the WII system (high rainfall occurred in continuously within four days). Insured period is valid for a

season. For example, during the yala season insurance period is 110 day. Insurance period is divided by three stages as following Table 4.

Table 4: Insurance Period for Paddy with Stages

No. of Days	Stage
40 Days	Stage 1
40 Days	Stage 2
30 Days	Stage 3

Before the season begins, farmers must insure their paddy fields. Farmers must subscribe to the insurance system (SANASA or Ceylinco) before the end of the month (31 May). For the yala season, this began on May 20th. Farmers must complete out a basic form, and the original form with the signature of the authorized officer is issued shortly after the Rs. 3000 premium per acre is paid. Furthermore, the authorized officer issues a summary of the insurance policy document to the insured farmer at that time. The insurance policy document contains the benefits of the insurance system, as well as the laws and regulations. Finally, the private insurance company issues the farmer association a confederate insurance deed with the names of covered farmers as well as their insurance policy numbers.

The Meteorological Department charges the private insurance business, Rs.30.00 per month for historical weather data (Rs.300.00 per year). They must pay the Department, Rs.45 per month to get updated weather data from a weather station (Rs.450.00 per year)

5.2.2. Details of premium under the private insurance companies

The private insurance firm (SANASA and Ceylinco) has set a restriction of three acres per person per season to provide maximum services for all participants of the WII scheme. As a result, a person must pay the maximum premium of Rs. 9,000 for three acres (Rs. 3,000 each acre), with a total benefit of Rs. 90,000 for three acres (Rs. 30,000 per acre). A farmer can buy as many insurance units as he wants to cover his production costs. The paddy lands have ten units per acre. The premium is 10% of the insured amount. If a farmer insures only one unit, he must pay a premium of Rs. 300 and is eligible for reimbursement of Rs. 3000 per unit. The minimum sum insured for a single unit is Rs. 3000, with a Rs, 30,000 amount per acre. Farmers must also pay a tax of Rs.47.42 in addition to the premium. Table 5 is shown premium and sum insured amount of this WII scheme.

Table 5: Extent of Paddy Lands, Premium and Sum Insured

Extent of Land (Ac.)	Insurance Premium (Rs.) Without tax	Sum Insured (Rs.)
1	3000	30,000
1/4	1500	15,000
1/2	750	7,500
1/8 or less	375	3,750

Source: Research Report No. 231, HARTI, 2020

The premium rates and sum insured amount can be established according to the above table or unit wise. Farmers can also sign up for a month's worth of service for the entire season.

1. Three months make up the season. If the farmer simply wants to insure for the first month, he can do so for Rs.1000/ac.

2. If the farmer is eligible for the first month's claim, he can get it at the end of the season.
3. Farmers can pay the payment in monthly installments or in one lump sum.
4. If a farmer simply wants to insure his land for the first, second, or third months of the season, he can do so.

5.2.3. Claim handling procedure of private insurance companies

If the total rainfall throughout the season was less than or more than a certain threshold level, insured farmers are entitled for claim payment. The trigger level at which the contract begins to pay out, as well as rainfall data recorded in the particular weather station, must be taken into account. Farmers are made aware of daily rainfall data acquired from the relevant meteorological station for a specific season by posting it on the farmer organization's notice board. In addition, the list of farmers who are qualified for compensation is posted on the same notice board. As a result, no request for compensation is necessary, and farmers can have their indemnity credited to their bank account within one month of the end of the season.

5.2.4. Other Benefits of private insurance companies

1. If a contributor dies in an accident or becomes permanently incapacitated, he or she would receive Rs.6000 per insurance unit.
2. For the flash showers, indemnity will be paid.
3. When a farmer is hospitalized for rat fever, up to Rs.6000 in medical expenditures can be paid, or he can obtain Rs.200 per day for up to 15 days of hospitalization (per unit).
4. If the numbers of insurance units are increased, the benefits also increase accordingly.

If a farmer pays Rs.450 per unit as an insurance premium (per 1/8 ac. or less), he will receive more benefits than those listed above. The following are the details:

1. If a farmer obtains up to five units, he is eligible for a death gratuity of Rs. 5000 per unit, with a maximum of Rs. 30,000.
2. If a farmer subscribes for more than five units, a gratuity of Rs.2000 is paid for each additional unit, with a maximum death payment of Rs.40000 for ten units.
3. If a farmer purchases more than ten units, a death gratuity of Rs. 1000 is paid for each additional unit up to a maximum of Rs. 50,000.

When rainfall falls below or exceeds an agreed-upon threshold (trigger point) based on automated weather station recordings, the policy holder will get a payout. Compensation granted to eligible farmers should be approved by a committee made up of three members of the farmer group and two insurance company officers.

Drought, excessive rain, and flash rains are the main causes. The product trigger was modified based on field feedback and observed variations in weather. For different phases of the paddy crop, different weather stations, and different areas, multiple trigger levels exist. For the flash showers, there is also remuneration (if 75 percent of the necessary rain for the relevant stage is received within four days it is called flash rain).

It is deemed eligible for compensation if the paddy is destroyed by floods induced by rainfall in other places that is not reported in the appropriate meteorological station. If the total amount of rain throughout the insurance period is less than or equal to a predetermined threshold, a claim will be paid without the need for a survey or field evaluation, resulting in a faster claim settlement.

6. Performance of the Weather Index Insurance Scheme for Paddy

The WII plan began as a pilot initiative during the 2010 yala season, and there is no record of a claim payment. The private insurance business had to pay a substantial amount in claims due to damages in the Batticaloa district during the 2016/17 maha season. As a result, the WII plan was not implemented for the 2017 yala season. It demonstrates that, following a series of large claim payments, private insurers are hesitant to continue with the crop insurance plan due to financial uncertainty. The performance of the WII paddy scheme is depicted in the Table 6 below. The premium rate is based on a ten percent of the money insured under the private insurance companies (SANASA and Ceylinco) and targeted crop is paddy. In the last eight year period, paddy farmers were received compensations for 13 seasons out of 15 cultivation seasons and this is a reasonable benefit for the farmers.

Table 6: Premium Amount and Claim Paid

Season	Premium Collected (Rs.)	Claim Paid (Rs.)
2010/11 maha	672,300	1,058,706
2011 yala	528,600	316,425
2011/12 maha	1,001,100	231,473
2012 yala	872,400	690,000
2012/13 maha	1,157,400	2,376,384
2013 yala	2,110,100	657,950
2013/14 maha	2,005,200	5,330,938
2014 yala	1,853,500	444,000
2014/15 maha	1,639,700	307,435
2015 yala	1,403,528	0
2015/16 maha	1,240,020	10,796
2016 yala	2,059,800	0
2016/17 maha	3,242,000	11,347,000
2017 yala	N.A	N.A
2017/18 maha	5,151,000	6,181,200
2018 yala	3,594,000	3,000,000

Source: HARTI 2018

7. Calculation of Important Ratios

As listed below, four major ratios were used to assess the performance of the Weather Index Insurance scheme:

1. Loss Ratio
2. Paid Rate Ratio
3. Expenses Ratio
4. Participation Ratio

7.1. Loss Ratio

Loss ratio expressed as a percentage, the proportionate relationship between incurred losses and earned premiums. "The loss ratio reflects the insurance company's percentage loss on claim settlement relative to the premium received during a certain time." The formula for calculating the Loss Ratio is as follows:

$$Loss\ Ratio\ = \frac{Indemnities\ Paid\ (Rs.)}{Premium\ Collected\ (Rs.)}$$

The loss ratio analysis can be used in formalizing the financial stability of a crop insurance scheme. Under the weather index insurance scheme for paddy, the minimum premium rate is Rs.300.00 per unit and maximum premium rate is Rs.3000 per 10 units or one acre of land. According to the amount of premium collected and indemnities paid by the private insurance companies (SANASA & Ceylinco), and consultant calculated the gross loss ratio. At the preliminary season (2010/11 maha), the commitment on claims far exceeded the premium collection. In the last eight year period, there were only five (5) seasons where payment of indemnities was over and above the premium collection. The Loss Ratio of SANASA and Ceylinco crop insurance business from 2010/2011 maha through 2018 yala season is shown in the Table 7 below.

During those 5 seasons, the gross loss ratio was more than one. The largest gross loss ratio was recorded in maha 2016/17, when the insurance company was required to pay large indemnities for damages reported in the Batticaloa district due to drought circumstances. Overall, this circumstance demonstrates that the private insurance firm has great financial stability, allowing the WII plan to operate throughout the year. The company had previously experienced big payouts and wanted reinsurance to protect its balance sheet in the event of widespread losses.

Table 7: Loss Ratio Analysis of Paddy Crop Insurance Business – Private Companies

Season	1 . Premium Collected (Rs.)	2. Claim Paid (Rs.)	Difference between 1-2 (Rs.)	Gross Loss Ratio
2010/11 maha	672,300	1,058,706	-386,406	1.57
2011 yala	528,600	316,425	212,175	0.60
2011/12 maha	1,001,100	231,473	769,627	0.23
2012 yala	872,400	690,000	182,400	0.79
2012/13 maha	1,157,400	2,376,384	-1,218,984	2.05
2013 yala	2,110,100	657,950	1,452,150	0.31
2013/14 maha	2,005,200	5,330,938	-3,325,738	2.66
2014 yala	1,853,500	444,000	1,409,500	0.24
2014/15 maha	1,639,700	307,435	1,332,265	0.19
2015 yala	1,403,528	0	1,403,528	0.00
2015/16 maha	1,240,020	10,796	1,229,224	0.01
2016 yala	2,059,800	0	2,059,800	0.00
2016/17 maha	3,242,000	11,347,000	-8,105,000	3.50
2017 yala	N.A	N.A	N.A	N.A
2017/18 maha	5,151,000	6,181,200	-1,030,200	1.20
2018 yala	3,594,000	3,000,000	594,000	0.83

Source: HARTI 2018

The following Table 8 shows the implemented AAIB's various insurance schemes in 2020. The premium income, total compensation, and loss ratios are shown in following table.

Table 8: Loss Ratio Analysis of Agriculture Insurance Business – AAIB

Insurance Scheme	1 . Premium Collected (Rs.mn.)	2. Claim Paid (Rs. mn.)	Difference between 1-2 (Rs.mn)	Gross Loss Ratio
Compulsory crop insurance	46.03	3,440.63	3,394.60	74.75
Kethata Aruna paddy cultivation insurance	-	-		0.00
Paddy cultivation insurance (Commercial)	0.05		-0.05	0.00
Other crop insurance	2.12	0.19	-1.93	0.089
Livestock insurance	4.33	4.06	-0.27	0.94
Suwasetha / Accident insurance	10.05	0.03	-10.02	0.003
Agro equipment / Warehouse insurance	-	-		0.00
Third party insurance	279.1	-		
Total	341.7	3444.92	3,382.33	10.08

Source: Ministry of Agriculture -2020

7.2. Paid Rate Ratio

Another crucial ratio to consider when evaluating the effectiveness of an agricultural insurance system is the paid rate. The insurance company's claim payment is computed proportionately. The formula for calculating the Paid Rate Ratio is as follows:

$$Paid\ Rate\ Ratio\ = \frac{Indemnities\ Paid\ (Rs.)}{Maximum\ Liability\ (Rs.)}\ \text{X}\ 100$$

According to the 2010 to 2018 paddy farmers insurance data of SANASA & Ceylinco, consultant has calculated the paid rate ratios. Only three seasons were recorded with a paid rate ratio of 20% or higher. In the 2016/17 maha season, the ratio was at its highest (35%) and was around 27% in the 2013/14 maha season. The Paid Rate Ratio from 2010/2011 maha to 2018 yala season is shown in the Table 9 below.

Table 9: Paid Rate Analysis

Season	Claim Paid (Rs.)	Maximum Liability (Rs.)	Paid Rate (%)
2010/11 maha	1,058,706	6,723,000	16
2011 yala	316,425	5,286,000	3
2011/12 maha	231,473	10,011,000	3
2012 yala	690,000	8,724,000	8
2012/13 maha	2,376,384	11,574,000	21
2013 yala	657,950	21,101,000	4
2013/14 maha	5,330,938	20,052,000	27
2014 yala	444,000	18,535,000	3
2014/15 maha	307,435	16,397,000	2
2015 yala	0	14,035,275	0
2015/16 maha	10,796	12,400,201	0
2016 yala	0	20,598,000	0
2016/17 maha	11,347,000	32,420,000	35
2017 yala	N.A.	N.A.	N.A.
2017/18 maha	6,181,200	51,510,000	12
2018 yala	3,000,000	35,940,000	9

Source: HARTI 2018

7.3. Expenses Ratio

The expense ratio is the percentage of premium used by insurance companies to cover all costs associated with acquiring, writing, and servicing insurance, as well as reinsurance. The total expenses included both operational and administrative costs. The WII scheme plays a minor role in the private insurance company's insurance business (The WII are operating under the general insurance departments). Therefore, identifying the cost of acquiring, writing, and servicing insurance and reinsurance costs only for the WII scheme is difficult. In generally, company earns Rs.100 in premium, they must pay Rs.20 in administrative costs. Based on this principle, companies expenses were computed for the period of 2010/2011 maha to 2018 yala season for paddy insurance business (SANASA and Ceylinco) and shown in the Table 10 below.

$$Expenses\ Ratio\ = \frac{Total\ Expenses\ (Rs.)}{Premium\ Collected\ (Rs.)}\ * 100$$

Tab**le 10: Tentative Expenses for Paddy Insurance Business**

Season	Premium Collected (Rs.)	Expenses (Rs.)
2010/11 maha	672,300	134,460
2011 yala	528,600	105,720
2011/12 maha	1,001,100	200,220
2012 yala	872,400	174,480
2012/13 maha	1,157,400	231,480
2013 yala	2,110,100	422,020
2013/14 maha	2,005,200	401,040
2014 yala	1,853,500	370,700
2014/15 maha	1,639,700	327,940
2015 yala	1,403,528	280,706
2015/16 maha	1,240,020	248,004
2016 yala	2,059,800	411,960
2016/17 maha	3,242,000	648,400
2017 yala	N.A	N.A
2017/18 maha	5,151,000	1,030,200
2018 yala	3,594,000	718,800

Source: HARTI -2018

7.4. Participation Ratio

There are two techniques to evaluate participation analysis:
1. Farmer participation based on acreage (area insured/area sown)
2. Farmer participation is based on number of farmers.

The following is a simple participation ratio calculation:

$$Participation\ Ratio\ = \frac{Number\ of\ Insaured\ Farmers\ in\ WII}{Number\ of\ Paddy\ Farmers}\ \text{X}\ 100$$

The WII program did not have a participation ratio in terms of acreage, because paddy lands were insured on a unit basis. In terms of the number of farmers, the participation ratio is determined roughly. The National Fertilizer Secretariat provided the number of paddy farmers (name list) in Sri Lanka by season, because they are assisted with fertilizer subsidy programs at different times of the year. Table 11 shows that farmer participation in the WII is less than 0.5% of total paddy farmers in Sri Lanka. It is evident that, although having a high number of farmers and farmer organizations, the private insurance business (SANASA & Ceylinco) could only serve a limited number of paddy farmers through the WII system. When compared to the entire number of paddy farmers in Sri Lanka, the WII scheme benefits less than 0.5%. It is concluded that the WII scheme is not currently a popular or advanced insurance program.

Table 11: Farmers and Participation Ratio

Season	No. of Insured Farmers in WII	Number of Paddy Farmers	Participation Ratio %
2012 yala	2,908	652,281	0.45
2012/13 maha	2,617	1,044,343	0.25
2013 yala	3,527	658,560	0.54
2013/14 maha	3,105	941,792	0.33
2014 yala	2,810	538,048	0.52
2014/15 maha	3,435	998,710	0.34
2015 yala	2,151	705,370	0.30
2015/16 maha	2,986	910,320	0.33
2016 yala	2,448	760,347	0.32
2016/17 maha	1,621	846,537	0.19
2017 yala	N.A.	558,931	0.00
2017/18 maha	1,717	882299	0.19

Source: HARTI 2018 and National Fertilizer Secretariat

The Chapter 2 discussed the details of agriculture sector in Sri Lanka, type of risks in agriculture including 5 types of risks, weather risk management strategies and levels of operation, risk management or transfer and mitigation, crop insurance techniques, history of agricultural insurance in Sri Lanka, current agricultural and mitigation scheme in Sri Lanka by institute AAIB and private insurance companies and discussed important agricultural insurance sector ratios in details.

Chapter 3 - Views of Stakeholders

1. Process of Stakeholder Consultation

According to the scope of the study, the consultant has to collect information on existing insurance and mitigation mechanism for agriculture in the country and information on needs of insurance coverage for SAPP. This study is comprehensively depending on the primary and secondary data. Mainly, secondary data and information is based on existing documents, data bases and line agency information. Primary data were collected through Key Informant Interviews (KIIs) and Focused Group Discussions (FGDs). This qualitative information was supported to the quantitative assessment and validated. In addition, some quantitative data from SAPP beneficiaries were collected through structured questionnaire survey.

Following 10 concerned questions were used to collect qualitative information from KIIs and FGD sessions. Finally, following questioners were summarized as statements for easy reference and presented in respective tables.

1. What is your general idea on agricultural insurance schemes in Sri Lanka, their cost effectiveness and level of compensation?

    1.1. Agriculture insurance schemes are not cost effective and compensation is not sufficient to recover agricultural damages.
    1.2. Agriculture insurance schemes are cost effective and compensation is sufficient to recover agricultural damages.

2. As this is special insurance scheme in Sri Lanka, please state your point of view on insurance premium
    2.1. Insurance premium is not sufficient to recover operational cost.
    2.2. Insurance premium is sufficient to recover operational cost.

3. Is there a relationship between economic welfare and the Insurance participation rate and incremental production?

4. Do you have any knowledge of how agricultural insurance schemes might help to achieve economic development targets through food security?

5. Do you believe that agriculture insurance schemes reflect value for money and expense ratios?

6. What is the value of using public funding for the farmer's insurance schemes?

7. How can insurance losses be reduced without increasing premiums for farmers?

8. Do you believe that farmer organisations' group-based insurance premium contributions and reduced operating costs result from the high participation rate?

9. Do you think crop insurance schemes help to increase the product output and reduce the price risk?

10. Do you think that the crop insurance schemes are essential for the fertilizer subsidy program?

2. Results of Focused Group Discussions

Results of FGDs are presented in following Table 12 and discussion is presented in following section.

Table 12: Results of FGDs

S/N	Topics Discussed	FGDs Results	
		Yes	No
1	Agriculture insurance schemes are not cost effective and compensation is not sufficient to recover agricultural damages.	97%	3%
2	Insurance premium is not sufficient to recover operational cost.	38%	62%
3	There is a relationship between insurance participation rate, incremental production and economic welfare.	63%	37%
4	Achievement of national economic development targets through food security via agricultural insurance schemes.	52%	48%
5	Reflect in value for money and expenses ratios of agricultural insurance schemes.	38%	62%
6	Usefulness of the utilization of public funds for farmer insurance scheme.	57%	43%
7	Insurance loss minimization approach without increasing premium for farmers.	62%	38%
8	Group based (farmer organization) insurance premium contribution and minimization of operational cost due to high participation rate.	66%	34%
9	Crop insurance schemes help to increase product output and minimize the price risk.	41%	59%
10	Crop insurance schemes are essential for the fertilizer subsidy program.	48%	52%

The total number of respondents for the FGDs was 115, with 110 of them being farmers and 05 being small-scale business owners cum farmers, who collect and sell agricultural products. Additionally, the consultant employed a series of questionnaires to gather quantitative data from farmers to support the findings of focus group discussions and results are presented in Table 15-31 and questionnaire is presented in Annex 2. Male participants made up 81 percent of the total respondents, while female participants made up 19 percent. In terms of the age distribution of total respondents, it was discovered that the age range of 40 to 49 years had the highest percentage of respondents (46%). Respondents in the FGDs between the ages of 30-39 were in the very minimum, accounting for only 9% of the total, but they are engaged in a variety of economic activities, including agricultural activities, as a source of part-time income. Furthermore, the age group of the second highest respondent was 50-59, which accounted for 31% of the total. There was also a minimum of 14% in the 60-69 age group. However, no individuals under the age of 29 were included in the study.

According to the literacy rate analysis, 100% of the participants can read, write, and comprehend. Four of the 115 respondents had completed university studies and were currently engaged in the government sector as their primary source of income in addition to farming activities. There were 36 respondents who studied up to GCE advanced level and 42 respondents, who studied up to GCE ordinary level. The rest of the respondents had formal school education to varying degrees. To safeguard the respondents' privacy, the FGD team was not given any more educational information and was only asked a few questions.

Respondents stated during the focus groups discussions that agriculture insurance programs are not cost effective. Furthermore, based on previous experiences, compensation is insufficient to recuperate their agricultural losses. Out of total 97% of those, who respondents said they were dissatisfied with the compensations paid by insurance firms. On the other hand, farmers are not fully agreed to increase insurance premium to recover operational cost. This was a key theme in the FGDs, and 62% of farmers were opposed to raising insurance premiums. Only 38% of respondents said that an increase of 8% to 10% is required.

Furthermore, the majority of farmers expressed dissatisfaction with the farmer participation rate in crop insurance systems. 63% of farmers said there is a definite association between insurance participation rate and incremental production during the focus groups discussions. Finally, they agreed that it would have an impact on the country's economic well-being. However, 37% of farmers disagreed with this thematic concept, owing to the fact that some farmers were not insuring their crop areas, but producing incremental output. However, they (37%) believed that the increased output will have an impact on the country's economic well-being.

Agricultural insurance plans were mentioned by only a few respondents as a risk management approach. They were unable to recover at least 50% of their crop losses in the past, based on their previous experiences. As a result, it was stated that agricultural insurance systems do not reflect value for money or expense ratios. Out of the total respondents 62% were disagreed with the value for money of existing agriculture insurance plans.

The majority of respondents agreed to use public funds for farmer insurance plans during the focus group discussions. A total of 57% of respondents agreed, while 43% disagreed. Their main point was that the government should cover all croplands and farmers, since they contribute directly to national food security. Furthermore, they stated that paying the full cost of insurance to incentivize farmers is more cost effective than importing foods and will help to strengthen national food security. (For example, rice). Few farmers are well educated, and the highlighted amount of imported food is nationally stressed. As a result, this argument is quite valuable.

It is important to highlight that farmers were not agreed to increase insurance premium. They clearly said that the state sector must pay the whole insurance payment on behalf of farmers. During the focus group discussions, 38% of farmers agreed to raise insurance premiums in order to prevent insurance companies from going out of business. 62%, on the other hand, are not in agreement and are unwilling to pay higher costs.

Furthermore, 66% of respondents believe that group based (farmer organization) insurance premium contribution is significant, and that it will assist insurance firms reduce operational costs by increasing farmer involvement in agricultural insurance schemes. However, 34% of respondents stated that this is primarily applicable to paddy producers. As a result, 34% of respondents stated that no insurance firm approached them and that they were not interested in insuring them. On the other hand they have no confidence about the compensation payment.

Out of the total number of respondents, 41% agreed to enhance agricultural production through crop insurance programs, but they lacked information about price risk and how to mitigate it through insurance. However, 59% of respondents were opposed to “enhance agricultural production through crop insurance programs”. Their main point is that, without insurance plans, farmers would produce agricultural outputs with no insurance companies involved to offset price risks.

Crop insurance systems are important for the fertilizer subsidy program, according to 48% of respondents. However, 52% of them stated that it is not essential because insurance firms do not want to help small-

scale farmers unless they are paddy farmers. As a result, obtaining insurance coverage is a time-consuming process that will ultimately effect eligibility for fertilizer subsidies.

3. Results of Key Informant Interviews

Results of KIIs are presented in following Table 13 and discussion is presented in following section.

Table 13: Results of KIIs

S/N	Topics Discussed	KIIs Results	
		Yes	No
1	Agriculture insurance schemes are not cost effective and compensation is not sufficient to recover agricultural damages.	92%	8%
2	Insurance premium is not sufficient to recover operation cost.	53%	47%
3	There is a relationship between insurance participation ratio, incremental production and economic welfare.	68%	32%
4	Achievement of national economic development targets through food security via agricultural insurance schemes.	58%	42%
5	Reflect in value for money and expenses ratios of agricultural insurance schemes.	43%	57%
6	Usefulness of the utilization of public funds for farmer insurance scheme.	52%	48%
7	Insurance loss minimization approach without increasing premium for farmers.	27%	73%
8	Group based (farmer organization) insurance premium contribution and minimization of operational cost due to high participation ratio.	76%	24%
9	Crop insurance schemes help to increase product output and minimize the price risk.	46%	54%
10	Crop insurance schemes are essential for the Fertilizer subsidy program.	51%	49%

Total number of selected respondents for KIIs was 20 and out of them 6 were SAP project related officials. Out of total respondents, 06 of them were female and 14 were male participants. Majority them of respondents are studied up to university degree level.

During the KII sessions, consultant has found following key important areas.

A total of 92% of the overall respondents were dissatisfied with the payment procedures of compensations by insurance companies. As a result, they agreed that farm insurance programs are ineffective and that compensation is insufficient to compensate for agricultural losses. On the other hand, respondents are not fully agreed to increase insurance premium to recover operational cost. A total of 47% of respondents said they were opposed to raising insurance premiums because it would add to the burden on farmers.

In sum, 68% of respondents stated that there is a clear relationship between insurance participation ratio and incremental productivity, while 32% disagreed. They stated that the vast majority of farmers contribute to agricultural production without any type of crop insurance. However, all farmers contribute to the nation's economic well-being, making it impossible to categorize this topic.

Agricultural incremental output is a critical component of achieving national economic development and food security goals. Out of the total number of participants, 58% were agreed, however 42% of crucial respondents disagreed. Their main point was that the vast majority of farmers contribute to national economic development and food security goals without receiving any insurance coverage.

Out of total respondents 57% were not agreed with value for money and existing agricultural insurance schemes and only 43% were agreed with value for money and current agricultural insurance schemes. Finally, they were mentioned that agricultural insurance schemes are not reflecting value for money and its expenses rates of agricultural insurance schemes

At KII sessions, the majority of respondents agreed to use public monies for farmer insurance programmes. A total of 52% of respondents were agreed, while 48 percent disagreed. However, all respondents agreed that the state sector should be involved in insuring all crop areas and farmers. Because, farmers are directly contributing to Sri Lanka's food security, the state sector should contribute at least 50% of the funds for crop insurance.

Increasing insurance premium is an additional financial burden to farmers. According to the findings of key informant's interviews, 73% of them were not agreed to increase insurance premium to minimize the loss of insurance companies. However, only 27% were agreed to increase insurance premium and they mentioned that state sector has to involve paying at least 50% of insurance premium on behalf of farmers. Some of them were mentioned that, state sector need to involve paying full insurance premium on behalf of farmers due to contribution of national food security.

The importance of group-based insurance premium contribution was noted by 76% of respondents in order to reduce insurance firms' operational costs. Because a higher farmer involvement rate reduces operational costs, while also reducing premium collecting time. Only 24% of respondents were stated that this is primarily applicable to paddy growers. As a result, insurance companies must approach farmers who are active in a variety of field crops.

Crop insurance scheme will help to increase agricultural production. Out of total respondents, 46% of respondents were agreed to this concept. But 54% of respondents were not agreed. However, majority of respondents were mentioned that farmers do not have sufficient knowledge on agricultural risk, except crop damages. Specially, risk of price drop and loan repayment risks due to crop damages. But insurance companies are also not providing sufficient details regarding the insurance coverage and this is major drawback of agricultural insurance schemes. Some of key informants were argued that farmers are producing agricultural outputs without any insurance coverage and no any involvement to mitigate price risks by government.

Crop insurance systems are only necessary for the standard (quality) fertilizer subsidy program to maintain all required criteria, according to the 51% of total respondents. If fertilizer does not meet the acceptable quality standards, farmers are not required to pay insurance coverage, and the government is forced to pay. However, this is a contentious issue, and several of them did not respond. However, 49% of them stated that it is not essential, but avoided mentioning the current fertilizer issue as a reason.

4. Overall Summary of the Results of KIIs and FGDs.

The following table summarizes the views of stakeholders qualitative information. All of the KIIs and FGDs were organized around ten questions as per the above section 1 and as seen in the Table 14 below. The following findings were utilized to design agriculture insurance mitigation mechanisms.

Table 14: Results of KIIs and FGDs

S/N	Topics Discussed	Results of KIIs and FGDs	
		Yes	No
1	Agriculture insurance schemes are not cost effective and compensation is not sufficient to recover agricultural damages.	94.5%	5.5%
2	Insurance premium is not sufficient to recover operation cost.	45.5%	54.5%
3	There is a relationship between insurance participation ratio, incremental production and economic welfare.	65.5%	34.5%
4	Achievement of national economic development targets through food security via agricultural insurance schemes.	55%	45%
5	Reflect in value for money and expenses ratios of agricultural insurance schemes.	40.5%	59.5%
6	Usefulness of the utilization of public funds for farmer insurance scheme.	54.5%	45.5%
7	Insurance loss minimization approach without increasing premium from farmers.	44.5%	55.5%
8	Group based (farmer organization) insurance premium contribution and minimization of operational cost due to high participation ratio.	71%	29%
9	Crop insurance schemes help to increase product output and minimize the price risk.	43.5%	56.5%
10	Crop insurance schemes are essential for the Fertilizer subsidy program.	49.5%	50.5%

5. Results of Questionnaire Survey of Beneficiaries in SAPP Area

The SAPP beneficiaries are geographically divided into three regions: the Central/North Western/Samaragamuwa region; the North and North Central region; and the Uva/Southern/Eastern region with covering 9 districts. A total of 180 respondents were surveyed in entire districts. Summary findings of the questionnaire survey are shown in Tables 15 to 31, and a complete set of questionnaire is shown in Annex 1.

Table 15: Types of Crops Cultivated in All SAPP Districts

Question	Crop	Total
What are crops you cultivate as an agribusiness?	Perennial	0
	Seasonal	180
	Both	
	Total	**180**

Note: All the surveyed farmers are engaged in seasonal crops.

Table 16: Types of Seasonal Crops

Question	Crop	No. of farmers
Types of seasonal crops	Paddy	104
	Maize	15
	Cowpea	0
	Green Gram	1
	Black Gram	0
	Vegetables	60
	Total	**180**

Out of 180 farmers 104 are paddy farmers, while 60 farmers are engaged in vegetable cultivation and third highest is maize farmers. Details are shown in above Table 16. The Ampara district reported having the largest percentage of paddy growers (9.5%), while the Polonnaruwa district was the second-highest percentage (8.9%). The smallest representation of paddy farmers was found in the districts of Kandy (2.8%) and Nuwaraeliya (2.8%).

Table 17: Average Extent of Seasonal Crops per Farmer

Question	Crop	Avg. Extent (ac.)
Average extent of each crop cultivated (ac.)	Paddy	1.61
	Maize	0.24
	Cowpea	0.00
	Green Gram	0.03
	Black Gram	0.00
	Vegetables	0.28

The average area of seasonal crops per farmer is shown in Table 17. Paddy reported the highest extent, and the average extent per farmer is 1.61 ac. Ampara district had the highest paddy extent per farmer, which was 3.5 acres. Kandy and Nuwaraeliya districts both reported 0.5 acres per farmer.

Table 18: Average Cost of Cultivation per ac.

Question	Crop	Average Cost (Rs. \ac.)	Range (Rs.\ac.)
Average cost of cultivation (acre) of each crop	Paddy	87444	80000-95000
	Maize	97667	92000 -107000
	Cowpea	0	
	Green Gram	110000	
	Black Gram	0	
	Vegetables	196111	180000-245000

The Table 18, above provides the average cost of cultivation per acre. The survey's findings indicated that vegetables had the highest average cultivation cost, which was Rs. 196111 per acre. However, the average cost of vegetable cultivation varies by district and ranges from Rs. 180000 to Rs. 245000 per acre, with Nuwaraeliya district reporting the highest cost.

The majority of respondents have experienced crop losses as a result of drought, and the average loss for all of their crop areas is Rs. 291,111. However, they were unable to express it on extent basis. Farmers who have experiences with flood damages, they have records with extents as acres. However, floods were

the cause of the greatest losses, with paddy being the crop most severely impacted, with an average damage being 1.5 acres. Details of the crop damages are presented in Table 19.

Table 19: Average Crop Damage Values

Question	Damage Type	No. of Respondents	Avg. Damage Value (Rs.)
Have you experienced of any crop damages?	Drought	131	291111
	Flood	100	345000
	Pest Attacks	45	169444
	Diseases	N.A.	N.A.
	Wild Animals	44	176250

Details of average farm gate prices are shown in following Table 20. For this question, farmers were given responses only for the paddy and vegetables.

Table 20: Average Farm Gate Price

Question	Crop	Total	Average Price (Rs.\Kg.)
Average farm gate price for each crop produce (Rs. per kg)	Paddy		101
	Maize		0
	Cowpea		0
	Green Gram		0
	Black Gram		0
	Vegetables		182

Paddy prices between Rs. 100 and Rs. 102 per kilogram. Ampara recorded a price of Rs. 101 per kilogram, while Anuradhapura and Polonnaruwa reported a price of Rs. 102 per kilogram. Only 100 rupees per kilogram were recorded for the remaining districts.

Table 21: Breakeven Prices

Question		Yes	No
Are you able to receive a price for each crop, which is above the breakeven price? Yes/No	Paddy	89%	3.3%
	Maize	100%	0%
	Cowpea		
	Green Gram		
	Black Gram		
	Vegitables	81%	19%

The survey's findings show that 81% of vegetable farmers, 89% of paddy farmers, and 100% of maize farmers all receive prices above the amount at which they break even. However, 3.3% of paddy farmers and 19.3% of vegetable farmers said their experiences with breakeven pricing and details provided in Table 21 above.

In connection with the aforementioned query, the primary reasons why farmers did not get payments beyond the breakeven prices for the aforementioned crops are compiled in Table 22, along with their reasons.

Table 22: Reason for not Receiving a Correct price

Question	Reasons	Percentage
What would be reason for not receiving a price above breakeven price?	Excess Supply	0.6
	Quality of produces	2.8
	Buyers make the price	22.2

Only 46 of the 180 farmers responded to the consultant, while the others received no explanation or remarks. Paddy farmers in the Anuradhaputa district, however, claim that they are not getting the right price because purchasers are directly influencing the price.

Responses to the question "Frequency of not receiving a price above breakeven price for your agricultural produce" were not received from respondents from any of the districts. Additionally, the consultant listed common causes like rain (bad weather), excess supply, and lack of transportation. The consultant was mostly questioned separately about paddy, maize, green gram, cowpea, black gram and vegetables.

Table 23: Type of Mitigation Measures

Question	Crop	Insurance	Compensation by the Government
Type of mitigation measure farmers take for crop losses	Paddy	63%	37%
	Maize	87%	13%
	Cowpea		
	Green Gram		
	Black Gram		
	Vegetables		

Only 119 out of the 180 farmers responded to the consultant. Ratnapura and Nuwaraeliya farmers were not given any response for any crop. Farmers have taken insurance coverage only for paddy and maize. Except for Kurunegala and Nuwaraeliya, all other maize farmers have taken insurance coverage. As a percentage, 63% of paddy farmers and 87% of maize farmers have taken insurance coverage as mitigation measures for crop losses. However, 37% of paddy farmers and 13% of maize farmers have some experience of getting government compensation for crop losses. Table 23 shows the summary of responses.

Table 24: Name and Type of Insurance Scheme

Question	Name	Type	Percentage (%)
If insurance is used, name of agricultural insurance scheme	AAIB	Indemnity	21
	SANASA	Indemnity	0
	Ceylinco	Indemnity	23

Farmers have taken insurance coverage from Ceylinco (23%) and AAIB (21%). Only 79 farmers out of 180 respondents have opted for insurance indemnity coverage. However, 66 of them are paddy farmers, while the remaining farmers grow maize as a supplemental crop. The typical loss coverage is 34% of the overall loss, although it only applies to paddy. The average premium per acre per season is Rs. 3640, while the face value is Rs. 38000. Table 24 presents the type of insurance and percentages.

Table 25: Reasons for Not Taking Insurance Policy

Question	Reason	Percentage
If insurance policy is not bought for mitigating risk of crop losses, what are the reasons?	Big premium amount	62
	Small damage paid amount	54

Two factors prevent farmers from taking agriculture insurance. There is a significant premium payment and a little damage amount for agricultural damages. The viewpoints of farmers are shown in Table 25 above.

Table 26: Type of Animals and Purpose

Question	Animals	Percentage %	Purpose and Percentage (%)
What animals you rear as an agribusiness?	Cattle	26	Cattle - Milk - 26%
	Goat	2	Goat - Milk & Meat -2%
	Poultry	0	

26% of farmers rear cattle as a kind of agribusiness, and 2% of farmers rear goats. In other words, out of all the respondents, 47 farmers and 4 farmers, respectively rear cows and goats. Responses of farmers are shown in above Table 26.

Table 27 below shows the average number of animals per person. Ampara and Kurunegala have the highest recorded numbers of cattle (10) and goats (12) per person, respectively. The average cost of production per liter of cow milk is Rs. 39.00, with Kandy recording the highest cost of production (Rs.\ lit = 47.00) and Anpara and Kurunegala reporting the lowest (Rs.\lit = 32.00).

Table 27: Average Number of Animals per Person and Cost of Production

Question	Animals	Average per Person	Average Production Cost
Average Number of animals per person	Cattle	5	Cow milk (Rs\lit) = 39.00
	Goat	10	
	Paultry	0	

Farmers in Ampara, Kurunegala, Anuradhapura, and Polonnaruwa have reported losing 50% of their monthly milk production during a period of 2-3 three months due to dry whether condition. Please refer Table 28.

Table 28: Damage and Losses

Question	Reason	Locations	Amount Lost
Have you experienced of any damage/ loss?	Milk production loss due to drought	Kurunegala, Ampara, Anuradhapura and Polonnaruwa districts	Nearly 50% loss of milk production

The average farm gate price per liter of milk is shown in Table 29 along with average daily and monthly milk production. The cost of a milk liter at the farm gate might range from Rs. 62,000 to Rs. 85,000. The average farm gate price is Rs. 71. The highest farm gate price per liter, recorded from Ratnapura, is Rs. 85.00, and the lowest, reported from Ampara, is Rs. 62.00.

.**Table 29: Production and Fame Gate Price**

Question	Production \Price	Average
If not any damage, average animal production (kg/mt per year, number of eggs/herd/year)	Lit.\day	18
	Lit.\month	450
	Farm Gate Price (Rs.]\Lit)	71

“Are you able to receive a price for each product (i.e. milk) which is above the breakeven price”? were answered "yes" by responders from every district. All farmers (100%) are receiving prices above the breakeven price, according to all respondents.

According to the field survey primary results, 47 of the 180 respondents are involved in cattle rearing. Insurance coverage is the major type of mitigating mechanism used to recoup losses or damages to the animal husbandry business, and 28 out of 47 farmers, or 60%, have insurance policies. Although the majority of them are in the Ampara district, however, 19 farmers or 40% of them do not have insurance coverage for their animal husbandry business and majority of them are in the Ampara district. Table 30 along with the type of mitigation measures.

Table 30: Type of Mitigation Measures

Question	Insurance %	Compensation %
Type of mitigation measure farmers take for losses/damages to animal husbandry business	60	40

According to the respondents, Ceylinco Insurance Company's convenient services led to 100% of them purchasing insurance policies from them. The two districts with the highest recorded numbers of insurance policy holders are Badulla (6) and Nuwaraeliya (6), with Kandy district coming in second (4). The premium value of cows depends on a number of important life characteristics. According to the respondents, the premium range is instead between Rs. 5,000 and Rs. 15,000, while the face value range is between Rs. 50,000 and Rs. 150,000. The Table 31 shows the basic details.

Table 31: Type of Insurance Schemes and Service Providers

Question	Name	Type	Percentage	Period
If insurance is used, name of agricultural insurance scheme	AAIB			
	SANASA			
	Ceylinco	Indemnity	100 %	1 Year

The Chapter 3 discussed the views of stakeholders and procedures followed to collect qualitative information from KIIs and FGDs, Results of FGDs and KIIs and overall summary of qualitative information, Results of Questionnaire Survey of Beneficiaries in SAPP Area and quantitative analysis.

Chapter 4. Recommendation

1. Subsidized Insurance Premium

Agricultural risk mitigation strategies that are more predictable from the standpoint of the impacted and more sustainable from the perspective of the government are urgently needed. The risk can be better handled by distributing it across entities (public and private) with the capacity to absorb it, turn it into an economic opportunity, improve packaging and delivery, and eliminate confusion about the degree of relief compensations. Crop insurance can be used as a risk mitigation technique to help create resilience in such a situation.

According to worldwide experience, government premium subsidies for agricultural practices in China is 40% by the government, 25% by the provincial government, and 35% by the farmer. In India, the central and state governments account for 75% of the total. In Austria, the federal government contributes 25% and the regional governments contribute 25%. Thailand subsidizes 50% of insurance premium. (Shweta Sinha1 and Nitin Kumar Tripathi -2014).

Depending on the risks covered, agricultural insurance premiums in Sri Lanka are close to 10% of the sum assured. The insurance premium for a paddy acre is Rs. 3000, with a sum insured value of Rs. 30,000, or 10 times the premium in 2020, according to the HARTI Study Report 231 of 2020. The consultant assessed the premium for the year 2022 to be Rs. 3308 per acre of paddy based on the aforementioned premium value.

The Department of Agriculture released its report on the average cost of cultivation for 2018 in July 2019. (Volume 75, No. 105). In column 2, published values are listed. According to the HARTI-2020, Sri Lanka's agricultural insurance premiums are about 10% of the sum assured. Therefore, based on the anticipated cost of cultivation in 2022, the consultant has evaluated the premium value (column 3) for each crop. The sum insured values are presented in Column 4 and correspond to the cost of cultivation in 2022. Based on premium values given in column 3, the consultant suggested that the 60% of government (column 5) and 40% of farmer contribution for the premium values (column 6). The farmer may now recoup at least the cost of cultivation of each crop. However, the stated values must be updated annually. Please note that the values for 2022 are estimates based on changes in real prices in that year and that all extremes have been avoided.

For some crops, the government might provide premium subsidies of 60%, allowing farmers to pay 40% of the premiums, while the insurer assumes the full risk. This is the most important mitigating strategy to support farmers and self-sufficiency in agricultural products. Table 32 below estimates a proposed premium subsidy program for a variety of crops by consultant.

Table 32: Premium and Proposed Subsidy Scheme

Crop (1)	Avg. Cost (Rs./ac.)	Premium (Rs/ ac.)	Sum Insured (Rs./ac.)	Government Subsidy (60%)	Farmer Contribution (40%)
	2018 (2)	2022 (3)	2022 (4)	2022 Proposed (5)	2022 Proposed (6)
Paddy	37260	4529	45290	2717	1812
Maize	76414	9288	92882	5573	3715
Cowpea	37158	4517	45166	2710	1807
Big Onion	228641	27791	277915	16675	11117
Green Chile	257275	31272	312719	18763	12509
Red Onion	266121	32347	323472	19408	12939
Gingerly	19493	2369	23694	1422	948
Soya bean	64926	7892	78918	4735	3157
Manioc	60307	7330	73304	4398	2932
Potato	363071	44132	441315	26479	17653
Sweet Potato	114318	13895	138954	8337	5558
Bitter Guard	239331	29091	290908	17454	11636
Brinjall	181182	22023	220228	13214	8809
Cabbage	197131	23961	239614	14377	9585
Carrot	210812	25624	256243	15375	10250
Tomato	267319	32493	324928	19496	12997

Source: (1), (2). Cost of Cultivation - 2018 Dep.of Agriculture (Volume 75, No. 105, July 2019).
(3). Estimated by consultant based 2022 cost of cultivation data.
(4). Estimated by consultant and this is equal to cost of cultivation 2022.
(5),(6). Proposed by the consultant to recover cost of cultivation.

Agriculture insurance schemes are not cost effective, and compensation is insufficient to recover agricultural damages, according to 94.5% of participants in KIIs and FGDs. As a result, the consultant recommended that the minimum cost of cultivation of the principal crops indicated in the Table 32 above be recovered and premium values and minimum sum insured values were determined accordingly. The minimum sum insured values of each crop are equal to the cost of cultivation in this computation and proposed by consultant to the SAP project.

2. Risk Forecasting and Government Intervention

For the success of agriculture insurance sector, open access to data is critical. Disaster risk maps exist at the national and provincial levels, but precise risk maps at the DSD and GND levels must be created and made available to insurance providers in order to more properly predict premiums. Furthermore, authorities find it difficult to measure and quantify the scope and amount of damages caused by natural disasters due to a lack of critical data and data-sharing procedures. On the other side, technical expertise and knowledge gaps exist, such as in the development of vulnerability maps and precise weather forecasts.

Agriculture insurance models that are more modern and comprehensive (in terms of GND and DSD) and suited to each agricultural region would be beneficial. Research into topics such as rainfall modeling and simulation to improve index design, geostatistics, seasonal forecasting, approaches for modeling risk over

time and space, or modeling long-term processes and patterns has a lot of potential and will be a significant mitigation tool. As a result, the government sector must invest in rebuilding the most accurate catastrophe risk maps in order to reduce agricultural losses, while also upgrading them on a regular basis (seasonal wise). Combined with annual and seasonal cropping patterns, more study and development of satellite-based index insurance will help to decrease disaster risk.

Risk forecasting is the most effective method for reducing insurance losses while keeping farmer premiums at minimum amount. Out of total, 44.5% of those polled in the KIIs and focus groups agreed that insurance loss reduction should be pursued without raising farmer premiums. In addition, 56.5% of respondents said they didn't agree on how much risk and insurance coverage should cost. They believe crop insurance plans are ineffective in mitigating the risk of price drops caused by increased product output. With reliable risk forecasting techniques and public expenditures, the government can limit agricultural damages, according to the national economic growth strategy. In addition, to operate an efficient and effective insurance system, any index-based insurance program requires a well-developed infrastructure and institutional network arrangements. As a result, government engagement in risk forecasting infrastructure and services will be a valuable mitigation strategy for the agriculture industry. In conjunction with the planned new insurance schemes, it is necessary to implement a forward market agreement system to limit price risk.

3. Farmer Awareness Programs

A well-organized agriculture insurance policy necessitates farmer awareness and training initiatives, which must be carried out by farmer groups. To market the agriculture insurance program, a comprehensive public awareness campaign using the media, posters, and leaflets is required. Because farmers are unaware of the various insurance programs available to them and how they can benefit them. There is a lack of understanding among farmers, as well as considerable confidence about the utility of existing crop insurance schemes.

Due to the high participation rate, 71% of respondents agreed to a group-based (farmer organization) insurance premium contribution and the minimizing of operational costs during KIIs and FGD sessions. Visiting individual farmers to introduce agricultural insurance schemes is time consuming exercise and it is not cost effective. On the other hand, premium collection will be very less due to lack of awareness on agricultural insurance schemes. As a result, the participation ratio will be kept to a bare minimum. As a result, a joint strategy is required to offset agricultural losses. During the field survey 62% of farmers mentioned that current premium amount is unbearable and 54% mentioned that paying smallest damage amount for their crops.

Furthermore, the causes for Sri Lankan farmers' low demand for crop insurance were investigated in this study. Agriculture insurance's effectiveness as a risk management tool was hampered by a lack of awareness and education. As a result, the government must become involved through field-based officials in order to inform and train farmers about the crop insurance program. As a risk mitigation approach, there will be effective demand for existing or new farm insurance plans.

4. Value for Money and Participation Ratio

All of the insurance options are indemnity-based, which has a number of well-known drawbacks. In comparison to index-based insurance, indemnity-based plans frequently have substantial administrative costs that do not reflect value for money. Furthermore, because damages must be assessed individually in

the field, compensations are slow to disburse, subject to moral hazard and adverse selection, not very transparent and negotiable, and are generally difficult to reinsure. During the KIIs and FGDs, 59.5% of participants stated that current agricultural insurance programs do not provide good value for money. As a result, present or planned new insurance systems must reflect value for money by requiring a larger farmer participation percentage in order to minimize operational and administrative costs.

According to the results of the questionnaire survey, 63% of paddy farmers and 87% of maize farmers are members of the indemnity insurance system, but the remaining farmers are waiting for government compensation. Only 60% of animal husbandry farmers are obtained insurance coverage to reduce their losses and damages.

An affordable and accessible crop insurance should be implementable with the available limited data and compensate farmers for catastrophic losses. Communication between government bodies should be improved, maybe by forming a committee with representatives from various institutions.

Existing insurance policies are mostly focused on extreme weather occurrences, such as floods, droughts, and wild elephant attacks. While these disasters offer clear and present hazards to Sri Lankan farmers, it's crucial to remember that they're not the only effects of climate change on the country's agriculture. As a result, all agricultural risks must be reassessed in order to limit potential damages under the new insurance

5. Cost of Cultivation and Sum Insured Amount

Agricultural damage assessments involved in indemnity insurance are costly and time consuming and farmers are not satisfied with the compensation paid. The suggested premium for each crop and the specifics of the cost of cultivation are presented in Table 33. The suggested premium is one-tenth (1/10) of the cultivation cost. As a result, the cost of cultivation is equal to the sum amount of the insurance. However, the current (conventional) insurance scheme’s sum insured amount is less than the cost of cultivation. Therefore, it is recommended that the proposed insurance scheme provide a minimum sum insured amount equal to the cost of cultivation in order to draw in more farmers. For instance, the premium for one acre of paddy is Rs. 4529, and the total amount insured is Rs. 45290. The cost of paddy cultivation per acre is Rs. 45290, which is equivalent to the sum insured. As a result, farmers can be persuaded to sign up for the suggested agricultural insurance program, which is very advantageous for everyone involved. In order to minimize agricultural losses, farmers will be able to receive at least an amount equal to the cost of cultivation. This is one of important mitigation approach to introduce with new insurance scheme for SAPP. The recommended minimum sum insured amount and premium value under the new insurance program has been calculated by the consultant and details are presented in Table 33.

Table 33: Minimum Proposed Sum Insured Value

Crop (1)	Coverage (2)	Cost of Cultivation (Rs.\ac.)	Minimum Value (Rs.\ac.)		Premium Contribution	
			Premium	Sum Insured	Government	Farmer
		2022 (3)	2022 (4)	2022 (5)	60% (6)	40% (7)
Paddy	Season	45290	4529	45290	2717	1812
Maize	Season	92882	9288	92882	5573	3715
Cowpea	Season	45166	4517	45166	2710	1807
Big Onion	Cropping Period	277915	27791	277915	16675	11117
Green Chile	Cropping Period	312719	31272	312719	18763	12509
Red Onion	Cropping Period	323472	32347	323472	19408	12939
Gingerly	Cropping Period	23694	2369	23694	1422	948
Soya bean	Cropping Period	78918	7892	78918	4735	3157
Manioc	Cropping Period	73304	7330	73304	4398	2932
Potato	Cropping Period	441315	44132	441315	26479	17653
Sweet Potato	Cropping Period	138954	13895	138954	8337	5558
Bitter Guard	Cropping Period	290908	29091	290908	17454	11636
Brinjall	Cropping Period	220228	22023	220228	13214	8809
Cabbage	Cropping Period	239614	23961	239614	14377	9585
Carrot	Cropping Period	256243	25624	256243	15375	10250
Tomato	Cropping Period	324928	32493	324928	19496	12997

Source: (1), (2). Crops, period/Season - 2018 Dep.of Agriculture (Volume 75, No. 105, July 2019).
(3). 2022 Cost of Cultivation Estimated by consultant based 2018 cost of cultivation data.
(4). Premium value estimated by consultant
(5). Proposed sum insured value is equal to cost of cultivation. Proposed by consultant to SAPP
(6).(7). Premium contribution proposed by consultant for new scheme under SAPP.

6. Conclusion

The study looked into why farmers in Sri Lanka have a low demand for agriculture insurance. A fundamental hurdle to insurance as an effective risk mitigation strategy was a lack of information and training on crop insurance. Farmers have not made meaningful demand for existing insurance schemes as a risk reduction technique, making it difficult to test the affordability of agriculture insurance on their side. As a result, additional training and awareness campaigns are required, which can be implemented by field-based government employees. (i.e. Agriculture Instructors, Agriculture Research and Production Assistants, and so on.).

Qualitative information gathered through farmer discussions suggests that farmers are willing to consider improved agriculture insurance schemes to help them face with increasing impacts of different risks on agriculture. It is recommended to any new insurance scheme for SAPP need to focused on at least to recover cost of cultivation. Further experimental research is required to ascertain detailed information regarding willingness to purchase such improved agriculture insurance schemes.

In Sri Lanka, correctly constructed index insurance might be seen as a valuable tool for strengthening farmer resilience to climate hazards. Index insurance is technically viable in Sri Lanka, according to the study. In terms of the amount to be compensated, index insurance is more transparent. To assess

agriculture damages in conjunction with the planned new insurance scheme, it is recommended that a standard and accurate damage assessment system, well-trained employees, and historical data bases be maintained.

Indemnity insurance crop loss evaluations are costly and time consuming, and farmers are dissatisfied with the amount received for damage and loses. In contrast, index insurance when coupled with a farmer awareness and education component will have the ability to building up farmers' trust on agriculture insurance. Due to the modest scale of agriculture operations in the dry zone and other parts of the country, this is especially significant.

For a variety of reasons, a properly designed index insurance appears to be a viable choice for Sri Lanka. Farmers will be more willing to embrace insurance as a risk management approach as a result of index insurance. Most of the challenges on the demand side that arise from a lack of understanding and trust can be eliminated with careful implementation of such a program. This will be enhanced through transparency in claim handling.

Farmers become discouraged when they do not receive a benefit in the form of a payout in the absence of a drought or flood, which is a key impediment to the insurance's widespread adoption in Sri Lanka. Two key strategies must be used to overcome this. To begin, farmers should be educated on the true meaning of insurance and the mechanisms by which it might be beneficial to them. Second, insurance for additional risk areas, such as price decreases, fertilizer shortages, repaying the credit they got for agriculture, and so on should be bundled together. During the farmer conversations, it was discovered that insurance would be most advantageous for loan/credit payback in the event of poor weather.

A hybrid technique was used by the private insurance business, which combined an index approach with an indemnity-based approach for verifying claims. This could be the most realistic technique in the early stages of index insurance up scaling in Sri Lanka.

Comprehensive farmer education and knowledge of agriculture insurance principles and possible advantages should be a key component. This will need to be organized successfully within the current institutional framework, which includes farmer organizations, local agricultural committees, and ground-level officers. Partnerships between the government, the business sector, and the community can help to facilitate such initiatives and alleviate the government's personnel and financial resource restrictions.

Chapter 4 of this SAPP consultancy assignment provided detailed recommendations on how to implement the new agricultural insurance scheme, including how to subsidize insurance premiums for farmers, the significance of risk forecasting and government intervention for new initiatives, farmer awareness programs to improve knowledge, the value for money and insurance participation ratio, and the cost of cultivation, premiums, and sums insured.

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Annex-1- Field Data Collection Questionnaire

A. Crop producers

1. What are crops you cultivate as an agribusiness?
    (a). Seasonal crops
    (b). Perennial crops
    (c). both (a) and (b)

2. Seasonal Crops

2.1. Types of seasonal crops
Paddy, maize, cowpea, green gram, black gram, vegetables etc.

2.2. Average extent of each crop cultivated (in hectare/acre)

2.3. Average cost of cultivation (per hectare or acre)/ cost of production of each crop

2.4. Have you experienced of any crop damages?

Cause of damage	Frequency of damage (per particular period)	Average of damage (as a loss of harvest) in kg/Rs.
Drought		
Flood		
Pest attacks		
Diseases		
Wild animal		
Other		

2.5. If not any damage average yield of each crop (kg/mt per hectare/acre)

2.6. Average farm gate price for each crop produce (Rs. per kg)

2.6.1. Are you able to receive a price for each crop, which is above the breakeven price? Yes/No

2.6.2. If no, what would be reason for not receiving a price above breakeven price?

- Not sufficient buyers to have a competitive market price and excess supply
- Quality of produces is not sufficient to have a better price
- Buyers together make the price (Monopsony)

2.6.3. Frequency of not receiving a price above breakeven price for your agricultural produce (for a particular period of years)

Crop	Frequency of not having a price above breakeven price	Farmers' price risk perception

2.7. Type of mitigation measure farmers take for crop losses

Cause of loss	Mitigation measure	
	Insurance scheme	Compensation by the government
Drought		
Flood		
Pest attacks		
Diseases		
Wild animal		
Other		

2.7.1.If insurance is used, name of agricultural insurance scheme

Name of Insurance scheme	Type (code-1)	Premium	Face value	Maturity period	Coverage as a percentage of total loss	Remarks of operation structure
AAIB						
SANASA						
Ceylinco						

Code-1: 1 - Indemnity Based; 2. Index Based

2.7.2. If insurance policy is not bought for mitigating risk of crop losses, what are the reasons?

- Lack of awareness of available insurance policies
- Premium for available insurance policies related to crop losses is a big amount compared to income from agriculture
- Insurance policies related to agricultural losses are very few
- Insurance companies do not like to implement agriculture related insurance schemes

3. Perennial Crops

3.1. Types of perennial crops
Coconut, Tea, Orange, lime, mango, other fruits etc.

3.2. Average extent of each crop cultivated (in hectare/acre)

3.3. Average cost of cultivation (per hectare or acre)/ cost of production of each crop

3.4. Have you experienced of any crop damages?

Cause of damage	Frequency of damage (per particular period)	Average of damage (as a loss of harvest) in kg/Rs.
Drought		
Flood		
Pest attacks		
Diseases		
Wild animal		
Other		

3.5. If not any damage average yield of each crop (kg/mt per hectare/acre)

3.6. Average farm gate price for each crop produce (Rs. per kg)

3.6.1. Are you able to receive a price for each crop, which is above the breakeven price? Yes/No

3.6.2. If no, what would be reason for not receiving a price above breakeven price?

- Not sufficient buyers to have a competitive market price and excess supply
- Quality of produces is not sufficient to have a better price
- Buyers together make the price (Monopsony)

3.6.3. Frequency of not receiving a price above breakeven price for your agricultural produce (for a particular period of years)

Crop	Frequency of not having a price above breakeven price	Farmers' price risk perception

3.7. Type of mitigation measure farmers take for crop losses

Cause of loss	Mitigation measure	
	Insurance scheme	Compensation by the government
Drought		
Flood		
Pest attacks		
Diseases		
Wild animal		
Other		

3.7.1. If insurance is used, name of agricultural insurance scheme

Name of Insurance scheme	Type (code-1)	Premium	Face value	Maturity period	Coverage as a percentage of total loss	Remarks of operation structure
AAIB						
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Code-1: 1 - Indemnity Based; 2. Index Based

3.7.2. If insurance policy is not bought for mitigating risk of crop losses, what are the reasons?

- Lack of awareness of available insurance policies
- Premium for available insurance policies related to crop losses is a big amount compared to income from agriculture
- Insurance policies related to agricultural losses are very few
- Insurance companies do not like to implement agriculture related insurance schemes

B. Livestock

1. What animals you rear as an agribusiness?
   (a). Cattle
   (b). Goat
   (c). Poultry

1.2. Type, purpose and average number of animals per person

Type	Purpose	Average Number per person
Cattle	Milk	
Goat	Milk	
	Meat	
Poultry	Egg	
	Broilers	

1.3. Average production cost (per unit quantity of product)

1.4. Have you experienced of any damage/ loss?

Cause of damage	Frequency of damage (per particular period)	Average of damage (as a loss of animals) in kg/Rs.
Diseases		
Drought		
Floods		

1.5. If not any damage, average animal production (kg/mt per year, number of eggs/herd/year)

1.6. Average farm gate price for each product (Rs. per kg/ egg)

1.6.1. Are you able to receive a price for each product, which is above the breakeven price? Yes/No

1.6.2. If no, what would be reason for not receiving a price above breakeven price?

- Not sufficient buyers to have a competitive market price and excess supply
- Quality of product is not sufficient to have a better price
- Buyers together make the price (Monopsony)

1.6.3. Frequency of not receiving a price above breakeven price for your agricultural produce (for a particular period of years)

Animal Product	Frequency of not having a price above breakeven price	Farmers' price risk perception	
Cow milk			
Beef			
Goat milk			
Mutton			
Egg			
Chicken			

1.7. Type of mitigation measure farmers take for losses/damages to animal husbandry business

Cause of loss	Mitigation measure	
	Insurance scheme	Compensation by the government
Diseases		
Drought		

1.7.1. If insurance is used, name of agricultural insurance scheme

Name of Insurance scheme	Type (code-1)	Premium	Face value	Maturity period	Coverage as a percentage of total loss	Remarks of operation structure
AAIB						
SANASA						
Ceylinco						

Code-1: 1 - Indemnity Based; 2. Index Based

1.7.2. If insurance policy is not bought for mitigating risk of losses to animal husbandry business, what are the reasons?

- Lack of awareness of available insurance policies
- Premium for available insurance policies related to crop losses is a big amount compared to income from agriculture
- Insurance policies related to agricultural losses are very few
- Insurance companies do not like to implement agriculture related insurance schemes

Annex 2- Flood Damage Assessment

1. Flood Damages for Paddy

Paddy fields which are affected due to the intensive rains and floods mostly experienced during the plant establishment time (April–May in *Yala* and Sep-Oct in *Maha* season) and the harvesting period (July-August in *Maha* season and February-March in *Yala* season).

About 20 paddy farmers experiencing floods during last 10 to 15 years were interviewed regarding the impact of floods on crop production. Paddy production depends upon the time and depth of flooding / water logging and prolonged water logging reduces tillering and growth of the rice crop. Furthermore, a flash flood can inundate a standing crop at any stage of growth resulting in heavy crop losses. The Table 1 shows all island average cost of cultivation, five stages of paddy farming and damage cost under each stage. (2018 prices were adjusted for 2020 with CPI)

Table 1: Cost of Cultivation , Cultivation Stages and Damage Cost (Rs./ha.) and (Rs./ac.)

Operation	Labour	Machinery	Material	Total	Stage	Total Damage Cost (Rs./ha.)
General land preparation	2198	0	0	2198		
1st, 2nd & 3rd plough with 4 wt	1738	22315	0	24053		
Plastering bund	16722	0	0	16722		
Leveling and broadcasting	8606		10766	19372	Broad Casting	74065
Fertilizer application	2926		4969	7895		
Weed control with weedicides	2024		6849	8873	Tillering	82938
Pest and disease control	2411		5152	7563	Reproductive	89736
Water management	15300			15300	Maturity	91265
Total damage cost after maturity				101975	Harvesting	263150

Source:
Cost of cultivation of agricultural crops - 2018 yala. Department of Agriculture - Sri Lanka
Agricultural Economic Study No. 105, Volume 75. July 2019. (ISSN 1800-041)

Based on the above Table, total cultivation cost is Rs. 101975 per ha. (Rs. 41270 /ac.) and total damage cost after crop maturity is Rs. 263150 per ha. (Rs. 106495/ac.) Total damage cost is based on the calculation given in Table 2.

Table 2: Yield and Returns (Rs./ha.)

Yield and Returns	Rs. Per ha.
Average yield (kg.)	5263
Price of produce (LKR./Kg.)	50.00
Gross income	263150

Source:
Cost of cultivation of agricultural crops - 2018 yala. Department of Agriculture - Sri Lanka
Agricultural Economic Study No. 105, Volume 75. July 2019. (ISSN 1800-041)
Paddy Marketing Board Circular No. 40 of 31-01-2020 (PMB/OP/Circular -40)

Based on previous studies and discussions with farmers, flood damage curves were developed using 80-90 cm. as the critical flood depths which will result in complete damage during the early, reproductive and maturity growth stages. During the focus group discussions (FGDs), the high probability of flood damages during the crop establishment phase was discussed and it was concluded that, if broadcasted paddy was submergence for more than 4 days, the crop would have to be re-established. However, the most vulnerable period is the harvesting stage and floods during this period may result in losses of up to 100%. Table 3 shows the damage cost in each stage from broadcasting to harvesting.

Table 3: Flood Damage Cost in Different Depths in Five Stages

Depth (cm.)	Broadcasting		Tillering		Flowering		Maturity		Harvesting	
	Index	Cost (Rs./ha.)	Index	Cost (Rs./ha.)	Index	Cost (Rs../ha.)	Index	Cost (Rs./ha.)	Index	Cost (Rs./ha.)
10	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
30	0.2	14813	0	0	0	0	0	0	0.2	52630
40	0.4	29626	0.4	33175	0.2	17947	0.2	18253	0.2	52630
50	0.6	44439	0.8	66350	0.4	35894	0.4	36506	0.4	105260
60	0.8	59252	0.9	74644	0.6	53841	0.8	73012	0.8	210520
80	1	74065	1	82938	0.8	71788	1	91265	1	263150
100	1	74065	1	82938	1	89736	1	91265	1	263150
120	1	74065	1	82938	1	89736	1	91265	1	263150
	Cost (Rs./ac.)	29975	Cost (Rs./ac)	33565	Cost (Rs./ac.)	36315	Cost (Rs./ac.)	36935	Cost (Rs./ac.)	106495
Average damage cost (Rs./ac.)			**48657**							

Source:
Cost of cultivation of agricultural crops - 2018 yala. Department of Agriculture - Sri Lanka
Agricultural Economic Study No. 105, Volume 75. July 2019. (ISSN 1800-041)
Paddy Marketing Board Circular No. 40 of 31-01-2020 (PMB/OP/Circular -40)
Study findings of Metro Colombo Urban Development Project -2017

Based on above Table 3, overall maximum direct damage cost is Rs. 48657 per ac.. Above Table shows maximum depth damage of each stage and following damage function (Table 4) is represents overall average damage cost per square meter in all stages.

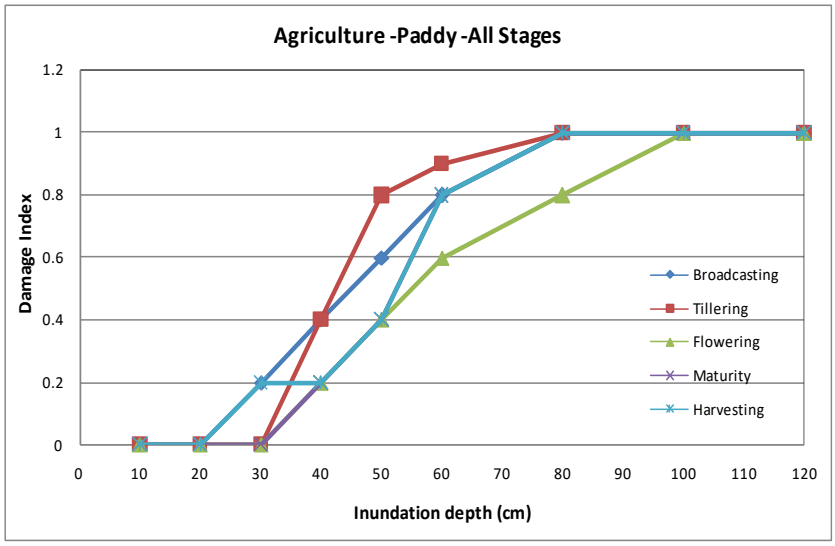
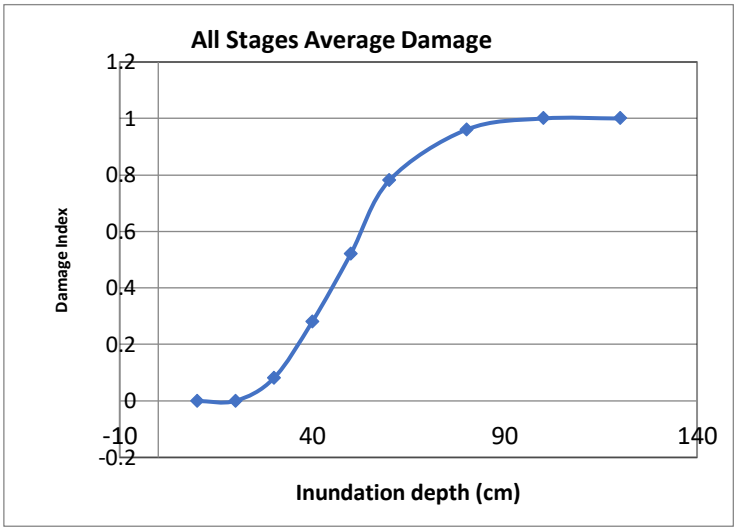


Table 4: Depth Damage Function for Paddy

Cost (Rs./m^3)	Depth (cm)	Index
0	10	0
0	20	0
1.35	30	0.1
3.03	40	0.3
5.77	50	0.5
9.43	60	0.8
11.66	80	1.0
12.02	100	1.0
12.02	120	1.0



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