SCBF
SWISS CAPACITY BUILDING FACILITY
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Feasibility Study with Dry Runs for Agricultural Insurance in Bangladesh

SCBF FS-14 conducted by:
Syngenta Foundation for Sustainable Agricutlure (SFSA)

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Main Activities	**Feasibility Study, Dry Run**

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List of Abbreviations

ADB	Asian Development Bank
AWS	Automated Weather Station
BDT	Bangladeshi Taka
BMD	Bangladesh Meteorological Department
BMMDP	Bangladesh Microinsurance Market Development Program
BRRI	Bangladesh Rice Research Institute
BWDB	Bangladesh Water Development Board
CIMMYT	International Centre for the Improvement of Maize and Wheat
DAE	Department of Agricultural Extension
EPB	Export Promotion Bureau
GARI	Global Agro Resources Incorporation
GBK	Gram Bikash Kendra
GDIC	Green Delta Insurance Company
IDRA	Insurance Development and Regulatory Authority
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
MPCI	Multi-Peril Crop Insurance
PKSF	Palli Karma-Sahayak Foundation
SBC	Sadharan Bima Corporation
SCBF	Swiss Capacity Building Facility
SDC	Swiss Agency for Development and Cooperation
SFB	Syngenta Foundation Bangladesh
SFSA	Syngenta Foundation for Sustainable Agriculture
UCSB	University of California Santa Barbara
WIBCI	Weather Index-Based Crop Insurance
WII	Weather Index Insurance

1 Objective of Feasibility Study

Agricultural production – largely dominated by smallholder farmers – and food security have made impressive progress in South and South-East Asia over recent decades. The improvements have played a key role in fueling 'pro poor' economic growth. However, erratic weather threatens farmers' livelihoods, as do pest and disease. Poor harvests can prevent farmers from repaying their loans. They are then naturally unwilling to access credit or use modern inputs in the next season. Yields and income therefore typically fall again. Agricultural insurance cuts through this vicious cycle. It relieves smallholders of some of their weather related risks, and by providing a safety net, encourages them to invest in future harvests.

The Syngenta Foundation for Sustainable Agriculture (SFSA) has been working on agricultural index insurance since 2009 with the mission to develop, implement and spread smallholder insurance across Africa, Asia and Latin America. Its goal is to make agricultural index insurance widely available for smallholders so that they see it as a vital input for better harvests.

SFSA launched the Kilimo Salama (Safe Agriculture in Kiswahili) project in Kenya in 2009 to develop and market agricultural risk mitigation products. These insurance products protect smallholders' investment in quality inputs so they can pay off agricultural loans and start afresh at the next season, even if there is a drought. Through indexes created from automated weather station (AWS) and satellite data, objective and low-cost monitoring enables an affordable risk mitigation solution for previously uninsurable farmers. To distribute the insurance, the model leverages agricultural value chains and mobile networks – bridging all of the links and supporting access to credit, inputs, and markets.

Whereas SFSA has institutionalized its operations in Eastern Africa into ACRE Africa, a social enterprise with shareholding impact investors and licensed and regulated as insurance agent, SFSA does not pursue this social business approach for its new operations in Asia. It is operating as an inclusive agricultural index insurance business facilitator to build the capacity of all insurance value chain actors, notably the one of the primary insurers and distributors and data service providers, to offer effective and affordable agricultural insurance solutions for farmers.

Its initial insurance business facilitation services offered by SFB[1] are 100% grant financed by SFSA and various development funders, like SCBF, Swiss Agency for Development and Cooperation (SDC) and others. This is because there is no demand for agricultural insurance services currently in Bangladesh where the insurers and the potential distributors are aware about affordable index-based insurance solutions for smallholder farmers. In fact, only Green Delta has been piloting agricultural index insurance which substantial free-of-charge Technical Assistance from IFC. SFSA and SDC agreed to a public-private development partnership of co-funding the operations of SFB in building awareness and capacity among insurers, potential insurance distributors, aggregators of smallholder farmers and various service providers so to design, pilot and up-scale affordable agricultural insurance solutions for farmers. Once an initial

[1] A specific local legal entity is required in order to transact with local market actors and to be eligible for donor grant funding. SF NGO has been set up for this purpose.

agricultural insurance track record has been created, it is expected that the market players in the crop insurance value chain pay for a portion of costs that cover research, infrastructure and market development. The market players in the value chain co-invest in areas where they have business and growth potential. At that stage, SFB will start to generate income from its services and gradually increase its full grant dependence from SFSA and other funders like SDC.

The SCBF co-funded this feasibility study for SFSA to analyze the potential for SFB/SFSA to support market players in developing and distributing affordable crop insurance products in Bangladesh that effective transfer key weather risks faced by smallholder farmers. The centerpiece of the study were dry runs of rice, maize, and potato weather index insurance (WII) prototype products over several seasons to test the product pricing and understand the local characteristics of farming and the varieties grown. This study extended over two years from October 2015 to September 2017 and was complemented by another SFSA and SDC co-funded study on WII prototype product development from July 2016 to March 2017. This report presents the main findings and conclusions of this feasibility study and broadly outlines the action plan on how to facilitate crop insurance pilots under the framework of SDC's forthcoming Bangladesh Microinsurance Market Development Program (BMMDP).

2 Methodology of Feasibility Study

The goal of the feasibility study was to estimate the potential for developing commercially viable crop insurance in Bangladesh and to identify implementing partners. Recognizing the diversity of the agricultural sector, the team conducting the study investigated the viability of three value chains of, rice, maize, and potato establishing for each whether it would be beneficial for the farmers and stakeholders to insure the crop against the most important weather-related risks. These crops are selected based on their acreage and importance to the rural economy. Rice is a major food crop and maize and potato are major commercial field crops. The study was conducted in four phases:

- **Phase 1: Data collection**

For developing WII, SFB needs historical weather data and crop data at least 10 years, and data for 20-30 years are best for index development. This will help us to understand historical in-situ weather risks and their frequency. Data was collected from Bangladesh's government ministries, its agencies, and its development partners. In the private sector, the team met with banks, agribusinesses, processors, and input companies. Additional information was gathered from agronomists and interviews with agricultural institutions.

- **Phase 2: Field visits**

In the second phase the collected data was verified by field visits and discussions with farmers, agribusinesses, rural lenders, farmer groups, and other stakeholders. Field and stakeholder interviews generally provide a good sounding board for testing market research data, especially when assessing the risks and input use.

- **Phase 3: Weather and yield data collection**

Through meetings with the meteorological department, Ministry of Agriculture, and field level discussions, sources of reliable daily weather data (from rain gauges and/or AWS) with adequate historical time series, as well as crop yield data taken on a seasonal basis at a small administrative unit, were identified.

- **Phase 4: Identification of commercially viable products and pilots**

After considering the data collected in the first three phases, value chains and specific aggregators were identified where crop insurance could be introduced.

3 Overview of Crop Sector

The nation of Bangladesh currently finds itself in a unique position: as one of the most densely populated nations in the world, with 169 million people occupying 57 thousand square miles, food security is a key priority. In a 2009 World Bank published study of the nations which will be worst affected by climate change, Bangladesh ranks high – floods, storms, and sea level rise are all predicted to impact the country. In context, Bangladesh contributes only 0.4 metric tons per capita of carbon emissions (whereas the US contributes 17 and the UK 7.1), but the impact is far more serious than most developed nations. Within three decades, the country's average temperature is expected to be at least 2°C warmer. This has major implications for the nation's agricultural productivity and food security.

Except for the hilly regions in the southeast and northeast, and patches of highlands in the central and northwest regions, Bangladesh consists of low, flat, fertile land. There are about 230 rivers and tributaries, which flow across the country down to the Bay of Bengal. Much of the country has alluvial soil which is continuously enriched by heavy silt deposited by the rivers through frequent flooding during the rainy season. These factors create ideal conditions for agricultural production and are reflected in the high productivity across the country.

Bangladesh has a subtropical monsoon climate. Of six distinct seasons, there are three which are most prominent: Summer (April to June), monsoon (June to October), and winter (November to February). The monsoon accounts for 80 percent of the total annual rainfall, which varies from 1,200 to 2,500 mm. Bangladesh also receives about 400 mm of rain during the pre-monsoon months of March to May, which enables farmers to grow short-duration drought-resistant crops during this period. Maximum rainfall is recorded in the coastal areas and in the northern Sylhet and Mymensingh districts, adjacent to Assam and Meghalaya, India. Whereas, minimum rainfall is observed in the western parts of the country in the districts of Rajshahi, Jessore, and Kushtia.

Dominant crops in Bangladesh are Rice, Jute, Maize, Potato and Vegetable based on acreage and farmer involvement. There are 15.18 million farmers in Bangladesh in which 12.81 are smallholders. SFB has selected three crops rice, maize and potato as they have significant crop acreage, farmer involvement, high potential market value, farmer investment, contribution to national food security and export trade.

- **Rice**

Rice is on the top of the ranking covering 75 percent of crop lands in Bangladesh. The total acreage of rice is 25,626,000 acres of which the small farmer's acreage is 12,700,000 acres what means that a high number of farmers is involved in rice production. Rice dominates the cropping pattern throughout Bangladesh. There are three classes of rice which are being cultivated: Aman (rain-fed rice, transplanted and broadcast varieties), Boro (irrigated) rice, and Aus according to the season in which they are harvested. Among the three types of rice, Aus covers 9.16 percent of land, Aman covers 48.44 percent and Boro covers 42.40 percent of land. Given the increasing population of Bangladesh in the last few decades, the nation has made great strides in rice productivity to remain food secure. Bangladesh stands fourth in per capita rice consumption in the world, according to data by the Food and Agriculture Organization (FAO).

- **Maize**

Maize is growing rapidly in Bangladesh. Around 2 percent of lands are under maize cultivation where 390,000 acres out of 804,000 acres of land are cultivated by small farmers. The country's annual (2016) maize output reached a new high of 2.75 million tons; over 90 percent of the maize is for the growing poultry and fish feed industry. According to the agricultural statistics yearbook of Bangladesh (2014-15), the average maize yield is about 2.83 tons per acre. Though the demand for maize rose with the poultry and fish feed industry, the government is now trying to promote maize not just as a feed crop, but also as food crop.

- **Potato**

Potato has good demand not only in Bangladesh but also has export potentiality. According to the Export Promotion Bureau (EPB), Bangladesh exported potatoes worth about BDT 2.33 billion in the 2014-15 fiscal year. Around 3 percent of the total lands are covered by potato production. Total acreage of potato production is 1,164,000 acres of which 570,000 acres belong to small farmers. Potato is generally grown between November and February, taking 90 days to mature from planting to harvest. The soil and climate conditions of the northern districts of Bangladesh is ideal for potato production. Potato is a high investment and high return crop. Average yield according to the agricultural statistics in Bangladesh (2014-15) was 7.95 tons per acre.

4 Data Availability for Weather Index Insurance Product Design and Monitoring

Traditional crop insurance based on farm visits and assessments has not been viable in most developing countries and faces difficulties with moral hazard and adverse selection. Index insurance, either through area yield or weather indices, provides an alternative. Since it employs an objective third party data source, index insurance does not have the same drawbacks as traditional insurance. Index-based products cover specific risks and therefore need to "fit" the crop insured. For instance, if the crop does not suffer from drought risk, drought index insurance is not a relevant product and farmers will not be interested in paying for the cover.

For the historical weather data, daily rainfall and temperature satellite data is available from several sources including the University of California Santa Barbara (UCSB), the United States' National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), and several European and Asian sources, among others. The UCSB has historical precipitation dataset for more than 30 years at the resolution of 5x5 km grid. Data is published every five days on the UCSB website. The satellite data will be ground-proofed by measurements from weather stations and rain gauges, as well as by field verification. Field verification will be done in two phases: first, during a dry run[2] with a farmer aggregator partner, and second, during the pilot and commercial stages through ongoing contract monitoring. This aids the team verifying the accuracy of the satellite readings, and in accurately correlating the readings to the losses in yield from drought and other weather risks at each stage of the growing season. This is especially key for crops for which the SFB is building new indexes, and with which it has limited experience.

The Bangladesh Meteorological Department (BMD) currently runs a network of 44 AWS which collect minute by minute rainfall, temperature, relative humidity, wind speed, and radiation data (Figure 1). In the next two years, potential 200 AWS are to be installed with World Bank funding; the north of the country being the highest priority. In addition, there are another 35 conventional weather stations. The target is to have one AWS per *upazila* administrative sub-district (there are total of 489 *upazilas*). The same Asian Development Bank (ADB) program is also investing in the installation of 5,000 semi-automatic rain gauges which will transmit data via Bluetooth, in addition to large investments into data servers. BMD, unlike many other meteorological departments around the world, has an open data policy – users can directly access weather data in real time via the online BMD portal. Once an MOU is in place, users can also access historical data. Locations of the BMD AWS network can be found at the BMD website (http://115.127.34.155:8080/DataLogger/#mapview1).

[2] The dry run is a mock index insurance program where preparing an index reflects the crop cycle and observes it over the entire cropping season.

Additionally, the Bangladesh Water Development Board (BWDB) offers river gauge data for 106 locations across the country, although historical time series are somewhat limited. The river gauge network can be found at the BWDB's Flood Forecasting & Warning Centre site (http://www.ffwc.gov.bd/).

Yield statistics are collected by a combination of crop cutting and statistical sampling. The Ministry of Agriculture's Department of Agricultural Extension (DAE) collects data on 27 crops each week. For key food security crops and especially rice, several informants mentioned there are likely issues with the validity of published government production statistics due to a process called "harmonization between government departments." It is likely that in order to develop a yield index, another independent data source will need to be identified. For rice, Bangladesh Rice Research Institute (BRRI) data is a potential source in certain locations.

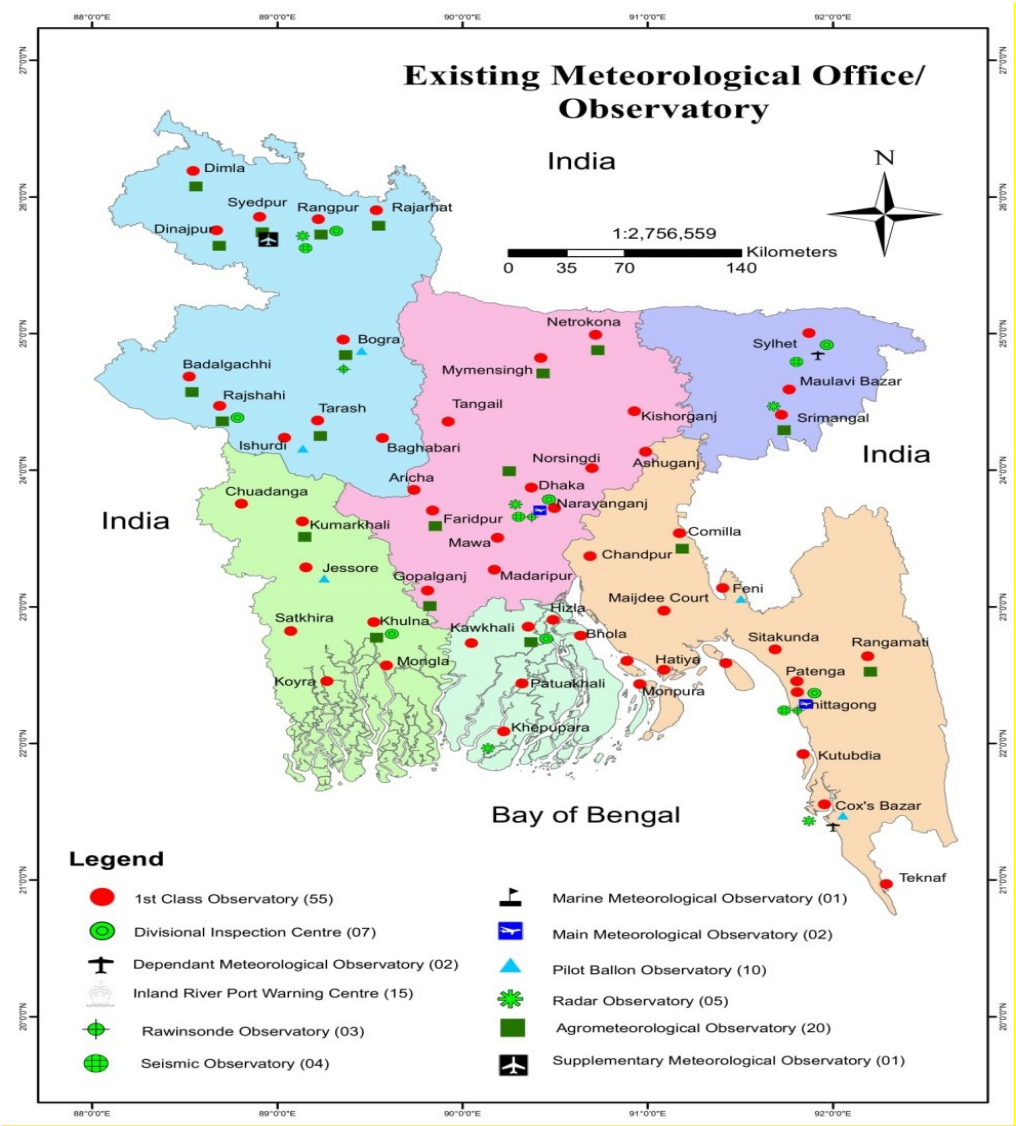

Figure 1: *Existing Meteorological Office/Observatory*

Historical weather data on rainfall, humidity, tempararature, soil moisture are required for WII product development. However, above discustion shows that required weather stations are not avalibale in Bangladesh. Though SFB/SFSA focuses to work mostry in north bengal; there has 16 districts where only 6 conventional weather stations are available. This conventional stations provide historical data. Besides, most of the AWS are not well functioning due to lack of proper maintanence. BMD initiates to keep under maintenance of esisting 20 AWS funded by ADB project. As data is very essential for idex development, pricing, claim settlement, SFB/SFSA shall install AWS in areas where data is unavaibale. As of now, SFB/SFSA has installed 5 AWS funded by SDC in four districts of north bengal. Settlelite data has the potentiality to get weather data from several sources which stated in the chapter earlier.

5 Crop Insurance Initiatives in Bangladesh

Bangladesh introduced crop insurance through the government-owned insurance company Sadharan Bima Corporation (SBC), the public-sector non-life insurer and reinsurer company, in 1977 which had been in existence until 1995. The key issues which led to the failure of the SBC Multi-Peril Crop Insurance (MPCI) program center on:

(i) Low demand for the voluntary program and problems of adverse section and moral hazard.
(ii) Technical drawbacks of the policy design including the setting of insured yield coverage levels too high and the capping of premium rates at well below the actually required levels.
(iii) Operational issues including poor control over loss assessment and loss assessment procedures and high administrative costs.
(iv) Lack of financial and other support to the program from the Government.

SBC also piloted a livestock (cattle) insurance scheme called Individual Grower MPCI Loss of Yield Policy. For 19 years (1977-1995) on a voluntary basis, during which time the uptake rates were consistently low and the program incurred major underwriting losses. The sum insured was set at 80 percent of the preceding three-year average yield of the particular farm in question and valued at the government-declared procurement price of the crop. The sum insured was therefore determined on an individual farm basis. At that time there were no reinsurance companies and no subsidy provided. A summary of the results for these 19 years (i.e., 1977-1995) is discussed in the following section (source: Sadahran Bima Corporation, 2009).

In May 2013, the International Finance Corporation (IFC) held a workshop to launch an index insurance program in partnership with private insurer Green Delta. From inception, both the ADB and IFC projects aimed for close collaboration to avoid duplication and share findings. The IFC project specifically targets private sector insurance partners, whereas the ADB program is being introduced via the government and has broader aims, which include the strengthening of the regulatory framework and the weather data infrastructure. Aside from the ADB and IFC funded programs, there have been several other index-based crop insurance schemes that have been piloted or are currently being piloted in Bangladesh. A summary of all of the current schemes are given in table 1.

Table 1: *Current Index-based crop insurance schemes in Bangladesh*

Funding Organization	Implementing Partners	Risk(s)	Crop(s)	Location(s)	Notes
ADB	SBC, Bangladesh Met	Drought, excess rain	Rice, Potato	Rajshahi, Sirajganj, Noakhali	Introducing through NGOs, MFIs, farmer co-ops or agricultural lenders
IFC	Green Delta	Yield (through BRRI), temperature, rainfall	Rice, maize, cassava	Multiple	Introducing through contract growers. Also considering tea, potato, some fruits, and jute
International Center for the Improvement of Maize and Wheat (CIMMYT)	Grameen Jano Unnayan Sangstha (GJUS)	Various, considering wind and flood	Maize	Bhola district (greater Barisal area)- coastal	Introduced with a savings component, current status unknown.
International Food Policy Research Institute (IFPRI)	Palli Karma-Sahayak Foundation (PKSF)	Drought	Aman rice	Bogra	Piloted for three months until October 2013, current status unknown.

- **IFC and Green Delta**

Green Delta Insurance Company (GDIC) received an equity investment plus substantial free-of-charge Technical Assistance from the IFC since 2015 to develop insurance products for individual farmers, agribusinesses, and lending institutions protect farmers from weather-related risks such as drought, excess rain, and cyclones. Green Delta also develops insurance products that minimize the impact of crop losses due to natural disasters and provides advisory support for distributing and administering these products, increasing lending and business to farmers and improving their risk profile with product pricing support from IFC. Additionally, IFC has capacitated GDIC staff members in developing WII products listed in table 2 below.

Table 2: *GDIC insurance projects*

Crops	Risk Cover	Areas	Work with	Insured farmers	Claim
Tomato, Cucumber, Bitter Gourd	Low temperature, Unseasonal Rainfall	Chitalmari, Bagerhat	Renessa	Over 1'000	1'000 tomato farmers
Hybrid Rice	Low temperature, Unseasonal Rainfall	Muktagasa, Mymensingh	M/s. Supreme Seed Company Limited (A Concern of Surovi Group)	250	Not yet claimed
Cassava	Damages during the cold days, excessive rainfall	Modhupur, Tangail	Sylvan Agriculture Limited (Sister Concern of PRAN-RFL GROUP)	10	Not yet claimed

- **ADB, SBC and BMD**

In 2015, the ADB and the Government of Bangladesh launched a multi-pronged program which includes an index insurance feasibility assessment; product development and testing; regulatory board advisory services; weather data infrastructure investments, and the development of the insurance distribution model. The two main implementing institutions are the state-owned insurer and reinsurer SBC and the BMD. The objectives of the project are:

i. Accomplishing pilot testing of viable Weather Index-Based Crop Insurance (WIBCI) products.
ii. Improving and strengthening policy and regulatory frameworks.
iii. Capacity development, awareness-raising and weather infrastructure upgrading.

Aman rice, Boro rice and potato are the crops involved in this project and the three districts Rajshahi (Drought Prone Area), Sirajganj (Flood Prone Area), Noakhali (Cyclone Prone Area) have been selected for the project. The project has installed 20 AWSs in their projects areas, developed draft regulatory framework, through focus group discussion and training 10,007 farmers have already been sensitized and 400 official from different stakeholders were trained on weather index-based crop insurance issues.

Table 3: *WIBCI project*

Crops	Risk Cover	Areas	Work with	Insured farmers	Claim
Boro and Aman rice	Excess and Low Rainfall	Rajshahi, Sirajganj, Noakhali	National Development Program (NDP), Sagorica	7'000 (Approx.)	6'800 (Approx.)
Potato	Excess rainfall, Humidity	Rajshahi	Enafi	167	167

- **International Center for the Improvement of Maize and Wheat (CIMMYT)**

Between 2013 and 2016, CIMMYT had conducted a study that analyzed the potential social safety net benefits that WII could bring to female farmers as well as the data collected from 433 male and female farmers living on a climate change vulnerable coastal island in Bangladesh where an increasing number of farmers are adopting maize as a potentially remunerative but high-risk cash crop. CIMMYT implemented a choice experiment designed to investigate farmers' valuations for, and trade-offs among, the key attributes of a hypothetical maize crop weather-index insurance program that offered different options for bundling insurance with financial saving mechanisms. The results reveal significant insurance aversion among female farmers, irrespective of the attributes of the insurance scheme. Heterogeneity in insurance choices could however not be explained by differences in men's and women's risk and time preferences. Rather, gender differences in farmers' level of trust in insurance institutions and financial literacy were the key factors driving the heterogeneous preferences observed between men and women. Efforts to fulfill gender equity mandates in climate-smart agricultural development programs that rely on WII as a risk-abatement tool are therefore likely to require a strengthening of institutional credibility, while coupling such interventions with financial literacy programs for female farmers.

(Source: The influence of gender and product design of farmer preference for weather-index crop insurance, CIMMYT).

- **International Food Policy Research Institute (IFPRI)**

IFPRI conducted an experimental study in Bogra, offering index-based insurance against drought for the Aman rice crop collaborating with PKSF to implement the pilot. In Bogra, most farmers have access to irrigation in order to counter the impacts of drought, but many are still willing to purchase insurance coverage as the premium paid out for drought will cover irrigation costs. Prior to implementing the pilot, IFPRI first conducted an experimental demand-elicitation exercise with more than 300 farmers in Bogra and Manikganj to find out about smallholder farmers' interest in formal insurance products. The study found that because farmers are subject to a variety of risks, they do not focus on only one type of insurance. Instead, they evenly split their endowment between life and disability insurance and agricultural insurance. Under this project PKSF's partner Gram Unnayan Karma (GUK) had piloted in Aman season 2013 on drought (deficit rainfall). The premium was BDT 100 where two windows considered, one for 14 consecutive dry days and other for 12 consecutive dry days. Around 2000 farmers were insured, there total payout was BDT 1.6 million. Aman season in 2014, there around 1000 farmers insured where total payout was BDT 1 million though there consecutive dry day in the policy was 7 days.

In conclusion, ADB with SBC and BMD initiative are limited to few pilots only. The capacity of the stakeholders is limited. They have not yet a concrete scale up plan. Expertise on product development are yet dependent on other sources. Initially they entered this market without any aggregator, though after learning they worked with aggregator. GDIC and IFC are equity partner. IFC emphasize more on the capacity building of GDIC, but they have not invested more in support market and regulatory areas.

SFB/SFSA will pilot a 'distributor-led' model for crop where they would not insure farmers directly but develop products through conducting dry run and identifying proper indices, bringing together relevant

value-chain partners, such as aggregators, MFIs, local insurance companies and re-insurers. Basically, SFB/SFSA will be creating products for local insurance companies, connecting aggregators and mobile network operators for premium collection and payout processing. SFB/SFSA would also conduct awareness campaigns to make farmers familiar with WI insurance and provide a linkage between Re-insurance companies and local insurance companies to create sensible and affordably priced insurance products for Bangladeshi farmers.

6 Regulation

A draft regulatory framework for Weather Index-based crop insurance (WIBCI) was developed in December 2016 by the SBC under the project of WIBCI funded jointly by the ADB and the Bangladesh Government. This policy framework covers the provision of index-based insurance necessary to reduce the risks for the insurer entering the market and for the policy-holders who want to purchase the product. The framework does not set out any regulatory provisions. However, it does give recommendations on the features of an index-based insurance product that the Insurance Act and Regulations should enable in order to achieve the objectives set out above. It serves as a guiding document for the proposed regulatory mechanism.

In addition, SBC under the WIBCI project has also developed a draft framework for AWS maintenance and data checking. The primary benefit of weather index insurance viz. expeditious claim settlement can be derived only if there is a robust weather measurement network. This can be set up through the installation of AWSs. These AWSs measure and transmit weather data almost on real-time basis, which allows underwriters to calculate and settle claims expeditiously. The framework suggests guidelines for the AWS equipment, data-receiving network and location in an area, which ensures high quality data.

This framework is now in the process of approving by the Insurance Development Regulatory Authority (IDRA) and the Bank and Financial Institutions Division (BFID) with expected approval in June 2018. IDRA has already obtained opinions from insurance companies and plans to organize a workshop to get opinions from further stakeholders.

Nevertheless, an insurance company can pilot weather index-based insurance products under microinsurance modality prior to the approval from IDRA as part of a regulatory sandbox approach. According to the draft regulatory framework (clause 4.1), *the insurer should only be allowed to sell as index-based insurance product after submitting a product approval application to and receiving permission from the authority*. This application includes the product design and the actuarial report that specifies the product design, indices, details on sales process and the marketing materials used. SFB/SFSA will assist its insurance partners in the product application and negotiation process with IDRA upon the successful completion of its facilitated insurance pilots.

A non-life product pilot takes one year. After this one-year pilot and with the central rating committee's approval, IDRA is in the position to allow the opening of the pilot product for commercialization according to the draft regulatory framework clause 4.2, *insurer providing index-based insurance products should be able to underwrite policies in the manner they consider most appropriate. There should be no prescribed or minimum premium basis or limits on what is seen as an acceptable return on the index-based insurance policies*.

As a whole, the regulatory framework for index based insurance will enable the protection of policy holders and the appropriate supervision of industry participants by the regulatory. Further to this, by having a prudent policy in place it will enable the industry players to share and learn from each other to up-scale the solutions in a considerable way.

7 Potential Distribution Channel

At present, there are significant untapped opportunities in very nascent crop insurance market driven by the four current initiatives described in the fifth chapter. Linking the existing agricultural value chains with an underwriter and identifying professional and committed insurance distributors that aggregate large numbers of smallholder farmers is the key to success. Such potential insurance distributors are categorized into crop lending institutions, crop input suppliers, and crop output organizations, like processors and traders. An analysis of the main market players in crop lending, crop inputs and outputs – with focus on rice, maize and potato – has revealed the following list of potential insurance distribution channels for SFB/SFSA to develop for crop lending institutions. BRAC MFI[3] has been identified as preferable insurance distribution partner because of the following:

- Overall outreach to 6.83 million active members with 720 USD average loan size.
- Borgachashi Unnoyon Prakalpa (BCUP), North West Crop Diversification Programme (NCDP), Second Crop Diversification Programme (SCDP) are the three projects running under BRAC MFI where they provide agricultural loan to 0.5 million farmers approximately.
- Outreach to 5.5 million plus low-income women borrowers organised in its 284,400 plus village organisations which group 15 to 25 women together.
- Outreach to approximately 660,000 farmers over the past 12 years with loan disbursements of over USD 280 million.
- Overall loan repayment rate of 98%.
- 2,300+ branch office operations for national coverage with 19,000+ field staffs.
- 1.7 billon USD loan outstanding and 0.5 billion USD savings outstanding.
- 95% of all borrowers are covered by a group credit life plus underwritten by Gradian Life Insurance. In 2017, they have collected premium BDT 9,600 million and pay-outs was BDT 7,200 million.

The following has been agreed so far with BRAC MFI:

1) An agreement will be signed with SFB/SFSA to be a distribution partner.
2) Pilot Aman rice for deficit rainfall product in north Bengal with 500 farmers outreach.

SFB/SFSA has not yet approached other potential insurance distributors like PRAN. The crop input suppliers BRAC Seed and Agro Enterprise have been identified as preferable insurance distribution partners because of the following:

- 22 seed production centres and about 7,000 contract farmers around the country as largest producer of hybrid maize seed and second largest producer of potato seed.

[3] BRAC MFI is a social enterprise of BRAC being the world's largest non-governmental development organization, measured by the number of employees and the number of people it has helped since its 44 of operation. Apart from microfinance services, BRAC offered assets about 580 K USD to ultra-poor women, education worth of USD 3.9 million, built 12K community institutions, supported 368K adolescent club members, served 41 million people served with hygiene latrines, and so forth.

- 5 seed processing centres with a processing capacity of 12,000 metric tons per year, along with 11 modern storage systems with the capacity of 4,400 metric tons.
- In the seed business, BRAC Seed and Agro Enterprise have 19% market share in hybrid rice, 23% in hybrid maize, 36% in potatoes (of organised seed supplied) and 8% in vegetables.
- BRAC has developed 5 hybrid rice varieties, 4 hybrid maize varieties, 10 hybrid vegetable varieties and 3 open-pollinated vegetable varieties.
- It has registered 12 hybrid rice exotic varieties through government authorities.
- BRAC's Seed and Agro Enterprise has built the value chain system of production and distribution through a wide network of 450 dealers and more than 4,500 sub-dealers around the country. The following has been agreed so far with BRAC Seed and Agro Enterprise.

BRAC Seed has shown their interest to work with WI insurance for contract farmers. SFB/SFSA has not yet approached other potential insurance distributors like Supreme seed, Syngenta, and ACI. SEBA has been identified as preferable insurance distribution partner because the following:

- SEBA Limited is a market development consulting firm with a wide range of expertise and experience in developing sustainable supply chain for different private and public agri-businesses.
- Currently the company is working with a number of processors and fabricated food manufacturer in the potato sector.
- SEBA has been assigned to manage the contract farming program for its international buyer, Kellogg's to source quality processing potatoes and supply through a potato processing company in the country.
- SEBA has over 10,000 trained growers in all major region of the Bangladesh. They maintain a nationwide network through its local extension service providers. They offer training and advising on different agro business development issues for different target groups- starting from farmers to food processors within the agriculture sector.

Another Trader Agency / Processing Organization is Global Agro Resources Incorporation (GARI) which has been identified as preferable insurance distribution partner because of the following:

- GARI is one of the leading agro-based companies in Bangladesh dealing various agriculture products including Fresh Potatoes, Seed Potatoes, Sesame Seeds, Sesame Oil, Peanut Kernel, Yellow Corn, Green Mung Bean, Fresh Vegetables and other agriculture products as well.
- GARI produce process and export products about 23 countries around the World.
- They have contract farming program for producing potatoes for export. Their contract farming zones are mainly in Bogra, Rangpur, Dinajpur, Thakurgaon, Rajshahi, Munshigonj, and Comilla districts of Bangladesh.
- In 2011, GARI exported 10,000 MTs of fresh potatoes in 13 countries and in 2012, they exported 2,000 MTs of fresh potatoes in six countries of the world.
- GARI establish and develop France Potato Varieties in Bangladesh and to be export to Chain Stores in Singapore and Malaysia quite large quantities.

8 Crop Dry Run Findings and Conclusions

Dry run is an index to reflect the crop cycle and observe the entire cropping season. The dry runs targeted rice, maize and potato over different crop seasons, as these crops fulfilled the following requirements:

- Significant crop acreage at the national level
- High potential market value and farmer investment
- Indexable risk profile
- Existing, vertically-integrated value chains for distribution
- Contribution to national food security and export trade

The dry runs covered different areas of the Dinajpur, Nilphamari, Bogra, and Pabna districts. Overall cropping patterns of these districts are given in Table 4. Information was collected to better understand local farming practices, crop cycles and seasons, growth stages of crops during the seasons, the prevalence of risks to production, and farmer investment in production. The dry run was conducted in the Rabi/Boro season (irrigated) in 2015-2016, the Aman/Kharif season (rainfed) 2016 and Rabi/Boro (irrigated) 2016-2017. Crops cycles included Aman and Boro rice, Rabi and Kharif maize, and potato.

Table 4: *Total acreage and number of farmers of selected crops in dry run study areas*

District	Upazila	Crops	Acreage ('000 Ha)	No. of Farmers ('000)
Dinajpur	Birganj	Aman rice	30	68
		Boro rice	14	38
		Winter maize	9	27
		Summer maize	2	5
		Potato	11	25
	Parbartipur	Aman rice	28	67
		Boro rice	25	59
		Winter maize	5	11
		Summer maize	0.60	1
		Potato	5	12
Bogra	Sherpur	Aman rice	22	50
		Boro rice	21	47
		Winter maize	3	11
		Summer maize	0.40	1
		Potato	3	9
Nilphamari	Jaldhaka	Aman rice	22	59
		Boro rice	14	54
		Winter maize	-	-
		Summer maize	2	21
		Potato	4	39
Pabna	Ishwardi	Aman	4	19
		Boro rice	3	13
		Winter maize	-	-
		Summer maize	0.03	0.20
		Potato	0.10	0.50

8.1 Rice Dry Runs

Rice dominates the cropping patterns throughout Bangladesh:

- Covering 75% of crop lands (Yearbook of Agricultural Statistics 2015).
- Total 25,626,000 acres of which smallholder farmers cultivate 12,700,000 acres.
- Three classes of rice are cultivated: (1) Aman (rain-fed rice, transplanted and broadcast varieties), (2) Boro (irrigated) rice and (3) Aus according to the season in which they are harvested. Among the three types of rice, Aus covers 9.16 percent of land, Aman covers 48.44 percent and Boro covers 42.40 percent of land.

A broad categorized rice crop calendar is given in Table 5.

Table 5: *Cropping calendar of major rice cropping seasons in Bangladesh*

Rice calendar	Season	Water source	Months
Aus	Pre-monsoon / summer	Rainfed	Apr - Jul
Aman (transplant)	Monsoon	Rainfed	Jul/ Aug - Dec
Aman (direct sow)	Monsoon	Rainfed	Apr - Nov
Boro	Dry season / winter	Irrigated	Dec - Apr

- **Boro Hybrid Rice**

The first dry run was conducted in Ishwardi and Sherpur upazilas in the Pabna and Bogra districts. The study observed 30 contract farmers of BRAC Seed & Agro Enterprise for Boro hybrid seed production.

Season. The total planting window in dry run areas of Boro hybrid rice for seed production was 33 days, which has started on 17th November 2015 and ended on 20th December 2015. A contingency of two days can be added to the earliest date and latest date what results in a period of 37 days for the sowing window. Three sub-windows as given below are proposed on the basis of total length, with each 12-day length.

- **Early Window:** Begins on 15 November 2015 up to 27 November 2015.
- **Normal Window:** Begins on 28 November 2015 up to 10 December 2015.
- **Late Window:** Begins on 11 December 2015 up to 22 December 2015.

Crop Phases. Average crop period is 151 days. The longest crop period lasted 154 days while the minimal harvesting period was 141 days. The period involved the following phases: Germination, transplantation, vegetative, reproductive and ripening stage. It was found that stages required 46 days, 63 days, 26 days and 17 days for germination, vegetative, reproductive and ripening respectively.

Cost of Production. The production cost for Boro hybrid rice seed is considerably higher than the production of rice as a crop with average cost of hybrid rice seed production of BDT 65,000. Reasons include increased seed cost, labour and inputs (such as hormones to initiate generative stages for better crossing). More information is given in Table 6.

Table 6: *Allocation of costs of production for hybrid rice seed per category*

Category	Cost (BDT per acre)
Seed	20'000
Fertilizer	7'000
Input costs	9'500
Irrigation	6'500
Labor	22'000
Total	**65'000**

Agronomy & Risks. Most of dry run farmers faced risks in Boro season of low temperatures at transplanting, high temperatures during the booting and grain filling stage and unseasonal rainfall/early monsoon at the harvesting. Besides, farmers also faced localized wind storms, insect and disease risks like brown plant hoppers, sheath blight and false smut (Table 7).

Table 7: *Major risks for hybrid rice seed production in the Boro season*

Risk	Stage	Problem	Solution
Low Temperature	Transplanting in December / January	Both hybrid and local varieties lead to seedlings dried off.	Address through temperature index. Consecutive day count and temperature level threshold
High Temperature	Reproductive	Poor pollination and grain filling lead to drop in yields.	Address through temperature index. Temperature level threshold
Unseasonal Rainfall	Harvesting	Less harvest such as rotting and sprouting of the seed, washed out of the polygon of rice	Address through a rainfall index
Storms	Reproductive	Physical crop damage	Address through area yield index (potentially).
Pests	Crop life	Physical crop damage and yield reduction	Address through pesticide spray program. Option to develop an area yield product if the problem is catastrophic.
Drought (Lower ground water level)	Before Harvest	Occurred high production cost as farmers have to spend more money for irrigation.	Index via water catchment areas and river water level gauges

Data requirements. Given the risks highlighted above and the appropriate solutions, different datasets are required. Unseasonal rainfall/early monsoon would utilize the CHIRPS dataset and the network of manual rain gauges/AWS in the country. These datasets contain a long-term history. The temperature indices utilize AWS data which is currently limited in distribution and history. Potential area yield index would rely on government yield statistics which are often not reliable and take too long to be published. Finally, the river water level rely on automatic river gauges which are scarce across the river courses.

➢ Aman Rice

A total of 74 farmers were covered under the dry run study. The duration of Aman rice season in dry run area was from July to October. Two methods were applied in cultivation; broadcasting and transplanting.

Season. In Dinajpur district, earliest farmers planted Aman rice in last week of May, and the latest farmers planted in the end of June. Total planting window length was 32 days. Within this window three sub windows have been proposed in 11 days' difference. In Bogra district, the earliest farmers planted on 14 Jun 2016 and the latest farmers planted on 28 Jun 2016. Total period for sowing was 15 days which considered in two sub windows in seven days' difference. Plating windows are given below:

Dinajpur

- **Early Window:** Started on 28 May 2016 through to 7 June 2016.
- **Normal Window:** Started on 8 Jun 2016 through to 18 Jun 2016.
- **Late Window:** Started on 19 Jun 2016 through to 29 Jun 2016.

Bogra

- **Early Window:** Started on 14 Jun 2016 through to 20 Jun 2016.
- **Late Window:** Started on 21 Jun 2016 through to 28 Jun 2016.

Crop phases. In general, crop phenophase duration varies in different locations due to variety, farmers practice and so on. We have collected data from Dinajpur and Bogra district and the crop period is almost same (Table 8).

***Table 8**: Crop period for Aman rice at different location*

Location	Crop Period				
	Seedlings (days)	Vegetative (days)	Reproductive (days)	Ripening (days)	Total period (days)
Bogra	42	58	25	20	145
Dinajpur	49	58	25	25	156

Cost of Production. In Aman season, farmers are using two types of seeds, hybrid and HYV seed. SFB/SFSA has collected the data only for HYV. The average production cost was BDT 20,000 per acre (Table 9).

***Table 9:** Allocation of costs of production for Aman rice per category*

Category	Cost (BDT per acre)
Seed	1'200
Fertilizer	1'300
Input costs	4'500
Irrigation	3'000
Labour	10'000
Total	**20'000**

Agronomy & Risks. The most eminent risks in the Aman season included heavy rainfall at the germination stage and drought at transplanting and vegetative stage as well as flooding at reproductive stage. Besides, farmers also faced insect and disease infestations like brown plant hoppers, sheath blight and false smut.

Table 10: *Major risks for rice production in the Aman season*

Risks	Stage	Problem	Potential Solution
Heavy Rainfall	Nursery / Seedling	Germination and seedbed spoiled. Farmers had to sow again or brought seedling from market.	Transplanting guarantee (rainfall index)
Lack of rainfall	Transplanting Stage	Farmers transplant but there is a lack of follow up rainfall that leads to poor establishment.	Transplanting guarantee (rainfall index)
Lack of rainfall	Vegetative / Reproductive	In vegetative stage, crop requires enough water for growing up. However, rainfed season farmers rely on rainfall. It was observed that there was deficit rainfall, so plant couldn't grow properly that in turn hampered the yield.	Rainfall Index
Flood	Reproductive stage	Crop under water for many days resulting in huge crop damage	Flood Index (River Water Level)
Pest	Crop Life	Crop physically damaged, high production cost and reduced yield by stem borer and BPH	Pesticide spray program. Option to develop an area yield product if the problem is catastrophic.
Disease	Reproductive / ripening stage	Reduced yield.	Address by area yield Index

Data Requirements. Like in the Boro rice, the risks require rainfall datasets, river water level data and government yield statistics.

Main conclusions. Based on the risk patterns and other observations like farmer practice, production cost, weather patterns and data availability we can focus on the index/product which should be ready for initial pilots or real operation as summarized in table 11 below.

Table 11: *Main conclusions for Rice*

Boro Season	Aman Season
A rainfall index for unseasonal rainfall/early monsoon would be easiest to start with and scale. It would be based on satellite data and ground-proofed by the manual and AWS network run by the meteorological department and a few installed by SFB/SFSA.	SFB/SFSA would start with the rainfall based indices using satellite precipitation estimates ground proofed by weather station. It is for both excess rainfall and deficient rainfall.
For temperature risks, in partnership with Columbia University, SFB/SFSA is exploring potential satellite data source that can be ground proofed for accuracy to facilitate index development and potential scale. The same applies to river water level gauges where SFB/SFSA is exploring satellites that estimate soil moisture. This index can also be supported by investment into automatic river gauges.	Temperature risk for Aman requires more research and testing.
There are the storm events that would be difficult to measure on a large scale. For the moment, this product would not be an easy go to market insurance solution. More research into vegetative indices and how to better improve the quality of data collected by the government need to be addressed.	Flood Index is one of the most potential index for Aman season. It would be based on satellite data and river water level data collected from the BWDB.

Way forward:

1) By developing a rainfall index SFB/SFSA will cover the losses which occurred by excess rainfall or lack of rainfall and the pricing would be based on the amount of rainfall.
2) The temperature index and river water level index also capture risks like pollination due to high temperature/drought as it is one of the major risk for commercial hybrid seed production which is under contract farming.
3) Flood index for Aman will cover the agri loss due to flood and here the pricing would be done based on the river water level above the danger level or the number of days water logged in the field.

8.2 Maize Dry Runs

Maize cultivation is growing rapidly:

- Around 2% of the total arable land are under maize cultivation, half of it by smallholder farmers.
- Annual maize production reached a new peak of 2.75 million tons in 2016. Over 90% of the maize is used by the growing poultry and fish feed industry. The government is now promoting maize as food crop to reduce the use of irrigation water.
- Average maize yield is about 2.83 tons per acre (agricultural statistics yearbook of Bangladesh 2014-15).

There are two seasons for maize in Bangladesh, *Rabi* and *Kharif.* Table 12, shows maize crop calendar.

Table 12: *Cropping calendar of major maize cropping seasons in Bangladesh*

Maize calendar	Water source	Planting window	Days of maturity
Rabi	Irrigated	Oct - Mar	140 days
Kharif	Rainfed	Feb - Jun	100 days

A total of 20 maize farmers were involved in the dry run process. The average land size of dry run farmers was 0.34 acre and 0.73 acre in Bogra and Dinajpur, respectively.

Season. In Bogra, maize was planted earliest on 15 November 2016 and latest on 29 November 2016. Total window length was 14 days; two sub windows were proposed 8 days' difference. In Dinajpur, the earliest farmers planted on 25 November 2016 and latest farmers planted on 20 January 2017; three sub windows were proposed in 19 days' interval.

Dinajpur

- **Early Window:** Begins on 25 November 2016 through to 12 December 2016.
- **Normal Window:** Begins on 13 December 2016 through to 1 January 2017.
- **Late Window:** Begins on 2 January 2017 through to 20 January 2017.

Bogra

- **Early Window:** Begins on 15 November 2016 through to 22 November 2016.
- **Late Window:** Begins on 23 November 2016 through to 30 November 2016.

Crop Phases. Average germination length was 8 days and seeds are sprouting until the plant sizes 4-5 inches. Vegetative stage begins immediately after sprouting and ends when the first signs of flowering are seen. During this stage, maize is increasing in its size with more leaves. The average period of this stage was 57 days. Flowering stage starts before the cob initiation stage and lasts until the full blooming of flowers. The average length of this stage was 18 days. Yield formation and ripening stage starts, when cob develops to fill with grain and it continues until ripening of cobb. The average duration was 50 days.

Cost of production. Per acre cost of production of maize was BDT 30,000 (Table 13).

Table 13: *Allocation of costs of production for maize per category*

Category	Cost (BDT per acre)
Seed	3'500
Fertilizer	9'500
Input costs	2'000
Irrigation	5'000
Labor	10'000
Total	**30'000**

Agronomy & Risks. During the dry run, it was found that farmers faced different types of risks as outlined in the Table 14.

Table 14: *Major risks for maize production*

Risk	Stage	Problem	Solution
High Temperature	Germination and Emergence	Seeds couldn't germinate properly due to high temperature at day time.	Replanting guarantee
Low Temperature	Germination and Emergence	Seeds couldn't germinate properly due to low temperature for late planting farmers at Dinajpur.	Replanting guarantee
Lack of water/Rainfall (Drought)	Vegetative	Plants could not grow properly as they need enough water which affects yield.	Water level index or rainfall index for drought coverage
Storm and Rainfall	Ripening	Plants affected by storm and rainfall. As a result plants broke down and hampered yield.	Rainfall index and area yield index (potentially)
Blast	Ripening	Decreased the yield and lower market price.	Hybrid product

Data Requirements. The proposed solutions would rely on temperature data, rainfall data, river water level data and government yield statistics.

Main conclusions. In view of the limitations highlighted in rice, the rainfall indices to cover drought and excess/untimely rainfall is the solution to proceed with in 2018 as more research goes into the other datasets.

Way forward:

1) For maize SFB/SFSA will explore more simple indices like rainfall as the production cost is higher that have an impact on pricing.
2) For summer maize index will be finalized once the dry run is completed.

8.3 Potato Dry Runs

Potato has good demand not only in Bangladesh but also has export potentiality. According to the EPB, Bangladesh exported potatoes worth about BDT 2.33 billion in the 2014-15 fiscal year. Around 3 percent of the total lands are covered by potato production. Total acreage of potato production is 1,164,000 acres of which 570,000 acres belong to small farmers. Potato is generally grown between November and February, with a total crop duration of 90 days between planting and harvest (Table 15). The soil and climate conditions of the northern districts of Bangladesh is ideal for potato production. Potato is a high investment and high return crop. Average yield according to the agricultural statistics in Bangladesh (2014-15) was 7.95 tons per acre.

Table 15: *Cropping calendar of potato in Bangladesh*

Potato calendar	Water source	Planting window
Rabi	Irrigated	Nov – Feb

The activities of 50 potato farmers were observed in Dinajpur and Nilphamari districts. It was found from dry run that late blight was the main risk for potato. In Bangladesh, annual potato yield losses due to late blight have been estimated around 25-57 percent. Moreover, farmers spend a high amount of input cost on potato production. In the potato dry run, data has been analyzed on crop production practice, cost of production, yield and risks. Furthermore, real time data has been analyzed which was sourced from local weather station in Dimla and Nilphamari.

Season. Earlier, potato farmers used to sow potato seed in mid-October but nowadays it starts 15 days later as temperature in that time is not favorable for potato cultivation. Late blight affects those farmers more who are used to plant later. In both districts, farmers follow almost the same planting dates. Two windows were considered in 15 days' difference. The windows were:

- **Early Window:** Begins on 10 November 2016 through to 24 November 2016.
- **Late Window:** Begins on 25 November 2016 to 5 December 2016.

Crop Phases. Potato dry run farmers in Nilphamari were involved through contract farming. The farmers all used the variety named Lady Rosetta. However, Dinajpur farmers used different types of potato seeds, including Granola, Diamond, Chips Shona, Cardinal. The phases for different location described Table 16.

Table 16*: Crop period for Aman rice at different location*

Location	Crop Period				
	Germination	Growth Stage	Tuberization	Maturity	Total Length
Nilphamari	10	24	41	11	88
Dinajpur	15	17	50	13	95

Cost of Production. Potato production requires high investment. Dry run found that the cost of potato production was BDT 55,000-65,000 per acre. Table 17, shows the relative contribution of several cost categories to overall average production costs observed for Nilphamari.

Table 17: *Allocation of costs of production for potato per category*

Category	Cost (BDT per acre)
Seed	20'000
Fertilizer	18'000
Input costs	6'000
Irrigation	2'000
Labor	15'000
Total	**61'000**

Agronomy & Risks. During the dry run, it was found that farmers faced different types of risks. They are outlined in Table 18.

Table 18: *Major risks for potato production*

Risks	Stage	Problem	Solution
High Temperature	Germination	Seed could not germinate properly.	Replanting guarantee (Temperature Index)
Low Temperature	Tuberization	Plants were affected by late blight and tuber was damaged.	Temperature Index
High humidity	Tuberization	Plants were affected by late blight and tuber was damaged.	Humidity Index
Low temperature and high humidity	Tuberization	Plants were affected by late blight and tuber was damaged.	Temperature Index, Humidity Index
Disease and pests	Maturity	Yield decreased	Area yield index (potentially).

Data Requirements. Dry run analyzed temperature and humidity data from local weather station as satellite data SFB/SFSA uses only provides rainfall data. Government yield statistics would also be required for the potential area yield solution.

Main conclusions. Similar to rice, exploration of alternative datasets for temperature and humidity to provide the solutions is needed. As there is no ready-made solution for this, potato insurance will be on hold for this year as SFB/SFSA continues with the research.

Way forward:

1) By collecting the relative humidity from the manual weather station and AWS SFB/SFSA will prepare the implementation of the product for late blight coverage after 2018.
2) With the same process temperature index (especially low temperature) and rainfall index would also be introduced with the demand of the farmers after 2018.

8.4 Main conclusions of dry runs and next steps

In this chapter, SFB/SFSA discussed the several risks that were found in Dry Run study. Understanding risks, crop season farmers' acceptance on weather index products will be piloted in 2018. Products that are proposed to be taken forward in 2018 are listed in table 19.

Table 19: *Proposed products to be taken forward for product development in 2018*

Season	Crop	Risk	Index	Products*
Monsoon	Aman Rice	Heavy/Excess Rainfall	Rainfall Index	Flexible Season Cover Transplanting Guarantee
Monsoon	Aman Rice	Deficit Rainfall	Rainfall Index	Flexible Season Cover Transplanting Guarantee
Winter (2018-19)	Potato	Late blight	Temperature and Humidity Index	Flexible Season Cover
Winter (2018-19)	Boro Rice	Unseasonal Rainfall	Rainfall Index	Flexible Season Cover
Winter (2018-19)	Winter Maize	Drought, Unseasonal Rainfall	Rainfall Index	Flexible Season Cover

* Flexible season cover is the weather index insurance that is offered for several phases of the crop. The client has the option to pick the crop phases that they are interested in. The transplanting guarantee only addresses one phase of the rice crop that is occasioned by heavy rainfall or deficit rainfall at the transplanting stage.

Main Conclusions. Data Collection faced a few challenges. To begin with, the grant begun midway through the 2015/2016 Boro rice and SFB/SFSA compensated for missing data by observing the start of the 2016/2017 Boro season. The weekly reports from the fields ideally would have been same day of the week for the entire season. However, due to logistical challenges, the one-week time difference wasn't consistent and the analysis team had to make adjustments in their models to cater for this. Further, access to historical data relevant to SFB/SFSA's areas of operations was a challenge as well. Considering all those factors SFB/SFSA is now conducting the dry run in new locations by keeping in mind the previous experience. For weather data SFB/SFSA established 5 AWS already and for historical data exploring more data source like satellite data.

Several risks that the farmers face but have not been implemented for starting in 2018 due to data unavailability and for a simple start. Because simple product is easy to understand for all the stakeholders. SFB/SFSB will implement hybrid and complex product with time and farmer's need.

Way forward:

1) Due to lack of sufficient historical data like temperature, river water level etc. SFSA has engaged in a three-year research partnership with Columbia University (IRI) and IRI have analysed weather data and will also assist to develop the index for each season.
2) With the products developed in context of Bangladesh, SFB/SFSA will pass on the technical know-how of the products to the local insurance companies like Pragati. Once SFB/SFSA shares the data and the

products developed, SFB/SFSA shall engage in the premium pricing exercise with the insurer. With the upcoming monsoon season in mind, where rainfall index is under development (Deficit and Excess Rainfall) these activities should be concluded by April 2018 with index term sheets developed for testing the products commercially. So, within April-May the other relevant tasks for product piloting (policy paper, product promotion, capacity building) could be done simultaneously and contract would be ready before the season starts.

9 Summary of Results from Product Development Study

Parallel to the feasibility study, SFSA and SDC co-funded product development study under the inception period of BMMDP to assess from which prototype products from SFSA's portfolio could be developed in Bangladesh. They broadly fall under the following categories:

1) **Flexi Season Cover:** This represents the standard model that is build phase wise dependent on the crop. Each phase has its own risks and index is prepared to assess the risk. Some approaches of flexi season cover are explained in the Table 20.

***Table 20**: Approach for Flexi Season Cover*

Technique	Risk assessed
Absolute Total Rainfall	Checks the total amount of rainfall received over a period against the recommended.
Consecutive Day Count	Checks for spells of certain events such as dry days, rain days, cold days, hot days, river water level above, river water level below. With these we are able to tell if and when the crop was affected. It helps check for distribution of the parameter in consideration.
Overlapping Block of Days	Under this we check for both the distribution and total amount of the parameter in consideration (e.g., rainfall) over a given number of days.

2) **Replanting/Transplanting guarantee:** This is a short-term type of cover that looks to cover losses in the early part of the season that would necessitate replanting for maize/potato and transplanting again for rice. This will enable farmers salvage the season.

3) **Indemnity Product:** This is the traditional multi-peril crop insurance that covers physical loss of or damage to a crop from a named peril. The defined events include:
   - **Hail Damage:** Manifestation of damage resulting in a loss of production indirectly caused as a result of a hail strike.
   - **Windstorm:** An event where mechanical damage is evident to such an extent that the plant is permanently damaged or the harvest severely lodged.
   - **Uncontrollable Pests and Diseases:** Manifestation of damage resulting in a loss of production directly caused by widespread infestation of disease or pest that is practically impossible to control under current recommended Crop Husbandry Practice.

4) **Area Yield Index:** This product is based on government statistics on an administrative level. The loss is measured by comparing the current year government published production against the preceding five-year average to check if there was a shortfall in production. This index looks to cover catastrophic events that would happen over an entire administrative level that would not be captured by an index.

SFB/SFSA has product portfolio focused on these types of index. Most of them are developed and some are developing stage.

***Table 21**: SFB/SFSA product portfolio (both in development and previously developed)*

Product	Type of Farmer	Risks Covered	Value Chains	Data Necessary	Status
Precipitation index	Small to Large	Drought, excess rain	Rice, Maize, Pulses, Oilseeds	Rainfall data (min 15 years) from both satellite and AWS	Developed
Transplanting index	Small to Large	Low temperature	Rice	Temperature data (15 years min) both satellite and AWS	Developed
Flood index	Small to Large	River flooding	Rice, Maize	River gauge data (5 to 10 years min), spatial analysis of farm proximity to river	Under development
Disease index	Small to Large	Late blight	Potato	Humidity data (min 15 years)	Under development
Index-indemnity hybrid	Mid to Large	Weather, disease, and pests	Rice, Maize, Potato	Weather data (min 15 years) from both satellite and AWS, sampling from independent crop assessor	On hold
Area yield	Small and Large	All risks that cause a shortfall in yield that would reflect in at the sub-district level	Rice, Maize, Potato, Pulses, Oilseeds	Yield data (7 to 10 years min) from independent source	On hold

From the dry run aspect, it is found that index-based products are best suited for pilots. For risk assessment the whole cropping cycle has observed from the field along with the crop characteristics at different specific phase. SFB/SFSA has picked the major risks observed in the field and trying to hit simple and needed weather based index like deficit rainfall, late blight so on. The product is structured so that premiums and payouts are calculated by comparing actual data to an index based on historical data. The structure of the insurance contracts is region-specific payouts depend on the past weather parameter in specific region and on current conditions on the ground. By considering all those factor index development and pricing would be done at when the product is ready for implementation.

10 Strategic Challenges and Coping Strategies

The feasibility study identified several challenges that have to be coped with when SFB/SFSA starts facilitating the introduction and up-scaling of crop insurance services tailored to the needs of smallholder farmers. The four major challenges faced and the coping strategies of SFB/SFSA in its role as insurance business facilitator are outlined below.

1. **Agri Insurance Awareness and Capacity**
   - Insurance awareness of even the larger crop market actors is quite limited.
   - Experience of implementing crop insurance by the insurance companies is lacking. Only few have the experiences (SBC, GDIC).
   - Smallholder farmer's knowledge of insurance and other financial services is limited. Financial literacy training is needed, but its delivery to large number of farmers is cost-intensive.
2. **Affordability**
   - Smallholder farmers do not have the monetary resources to pay insurance premiums upfront. They may even lack the resources to buy quality inputs.
   - The crop insurance products need to be adjusted to each area and crop while being affordable.
3. **Data availability and investment**
   - Quality time-series of crop production and yield data as well as meteorological weather data are required in order to design products. As of now, SFB/SFSA collected 15 years historical data from BMD on temperature, rainfall, humidity, wind speed, soil moisture which is being analysed for WII product development.
   - In addition, SFB/SFSA collected 32 years CHIRPS data form satellite source. Real time data is required for claim settlement. For which, SFB/SFSA established 5 AWSs in four districts and intends to invest in further stations when entering new areas. Real time data availability for claim settlement will be a challenge when scale up, if not installing AWSs further.
   - SFB/SFSA has a plan to establish AWSs in their scale up areas where real time data is unavailable. Furthermore, World Bank has launched a project namely 'Agro Meteorological Information System Development Project' partnering with BMD, BWDB and DAE. This project shall install AWSs in 64 districts in Bangladesh though the number of AWS and its locations are not yet finalized which might be another source of real time data if it located at SFS/SFSA project areas.
4. **Not enabling crop insurance policy and regulatory framework**

   This will raise legal and regulatory risks surroundings index based insurance. It also unprotect the interest of customers by setting principle based rules for index based insurance contract, no transparency with respect to product offering.

The coping strategies of the above-mentioned challenges are outlined in table 22.

Table 22: *Strategic Challenges and Coping Strategy*

	Strategic Challenges	Coping Strategy
Insurance Core Market	1. Farmer Level 1.1 Farmer Insurance Literacy, Awareness 1.2 Insurance premium 1.3 Develop affordable products 2. Service Provider/Institutional/distribution level: Capacity on product development, product promotion, data collection. Business plan development, networking	1.1 SFB/SFSA will dedicate significant attention to the education and training of the farmers. To do this as efficient as possible, SFB/SFSA will make use of different tools: WII/agro fairs, folk songs, leaflets, advertisements in local papers, documentaries, etc. In addition, SFB/SFSA will conduct trainings on the aggregators' core and field staff. These trained staffs' responsibilities in turn will include the education of the farmers. 1.2 Aggregator will pay the insurance premium bundled with agricultural loan or input as an extended service 1.3 Discussing with insurer affordable product to be development. Probable option is insurer willing to reduce cost on operation, loading cost. 2. The capacity building of SFB/SFSA's partners will be crucial in order to achieve the desired outcomes. This includes the following: - Technical assistance in developing insurance products - Assistance in using risk-assessment methodologies - Designing business plans for insurers and aggregators - Educate on WII and its implementation mechanisms - Training in data collection
Support Level	1. Data Availability 2. Coordination: stakeholders in public and private sector	1. SFB/SFSA installed 5 AWS in four districts during the feasibility study and unlocked essential data sources for meteorological data. For additional data, SFB/SFSA will on the one hand intensify its relation with the BMD, the IRI and other research and governmental institutions and on the other hand direct further investments to the installation of more AWS in new areas. 2. Regular meeting, result share, exposure visit in project areas, workshop.
Policy Level	1. Crop Insurance policy and Regulatory Framework	1. SFB/SFSA will invite IDRA staff to its capacity building workshops for its market partners so that IDRA staff is learning from the insurance pilots. This may enable them to further develop the regulatory framework for WII crop insurance.

11 Going Forward/Action Plan

SFB/SFSA have completed the two-year preparatory phase with the findings and conclusions outlined in the previous chapters and are now prepared to launch the following table 23 Insurance pilots that cover the next monsoon season (from May to November 2018) and the next winter season (from November 2018 until March 2019):

Table 23: *Action plan*

No	Crop	Season	Insurance cover	Market partners	Locations	No. of farmers insured	By when
1	Rice	Aman	Deficit Rainfall	BRAC MFI, Pragati Insurance	Dinajpur, Bogra	500	June 2018
2	Rice	Boro	Unseasonal Rainfall	BRAC Seed, Pragati Insurance	Dinajpur, Bogra	500	November 2018
3	Potato	Winter	Late Blight	SEBA, BRAC MFI, Pragati Insurance	Nilphamari, Dinajpur	500	November 2018
4	Maize	Winter	Unseasonal Rainfall	BRAC MFI, Pragati Insurance	Dinajpur, Bogra	500	November 2018

In sum, SFB/SFSA will pilot the first insurance product in June 2018 for excess rainfall for Aman rice, late blight for potato in November 2018 and flexi season cover for Boro rice and winter maize in November 2018. All these products will be developed on the basis of the findings of dry run data analysis that was completed in four sub-districts in the Dinajpur, Nilphamari and Bogra districts. SFB/SFSA will conduct similar dry runs before entering new areas. Recently, SFB/SFSA has started potato dry runs in Sibganj and Bogra as well as Boro HYV in Ishwardi-Pabna. Furthermore, SFB/SFSA plans to start Aman rice, summer maize and Boro rice dry runs in Pabna, Dinajpur and Nilphamari districts.

The key insurance partners are already listed in the above table on the planned insurance pilots:

1) Insurance companies: The first two insurers selected are Pragati Insurance Ltd and the public SBC. Both have the human and financial resources and some relevant experience in index insurance.

2) Reinsurers: The legal conditions require SBC as only public Bangladeshi reinsurance company to re-insure at least 50%[4]. To secure the sustainability of the market, SFB/SFSA will facilitate the involvement of Swiss Re and other international reinsurers.

3) Aggregators: Aggregators like MFIs (BRAC, Gram Bikash Kendra (GBK)), off-takers (SEBA, Himadri, GARI) and input companies (BRAC seed, Supreme seed) will increase the range of developed insurance products

[4] This is a questionable regulatory provision, which may be revised once the exposure limits of SBC are reached.

significantly with their network of farmers and their field experience, the range of the developed insurance products will be increased significantly. The discussions are the most advanced with BRAC. In addition to the above-mentioned aggregators, SFB/SFSA might enter negotiations with mobile banking operators (BKash, Rocket) to facilitate and accelerate the payment process.

Table 24: *Potential Partners and Status of Partnership*

Market actors	Potential Partner	Status of partnership
Reinsurer	• SBC • Swiss Re-International	Relationship established with SBC and need further discussion for reinsurance service based on weather index insurance products. SFSA has a good relationship with Swiss Re and they are providing reinsurance service in Kenya.
Insurer	• SBC • Pragati Insurance Ltd.	Pragati Insurance Limited agreed to be an insurance partner. Need for further discussions with SBC.
Aggregator	• Lending: BRAC, GBK, etc. • Input Company: BRAC Seed and Agro Enterprise, Syngenta, Supreme • Output Market: Ejab Group, SEBA, GARI, etc.	BRAC MFI agreed to be a distribution partners. Further discussion with potential partners BRAC Seed and SEBA are needed.
Data Provider	• BMD • Satellite Station • DAE, BRRI, Bangladesh Agricultural Research Institute (BARI) • UCSB	Collaboration with BMD for historical weather data and UCSB for satellite data.
Research	• IRI	Currently in a partnership with IRI for weather index research and development.

Annex I – Rational for Crop WII

The success of agricultural production does not only depend on a farmer's agricultural expertise and investment, but also on the climatic and environmental conditions, which are generally beyond the grower's control. Innovations that encourage and protect farmer investment, especially in the context of climate change, are timely.

Traditional risk management mechanism like is micro credit loans, donations, savings, crop insurance are less effective to coverage the farmer's losses. Traditional crop insurance required higher pricing due to frequent loss assessment which is subject to administrative difficulties. In case of multiple peril loss assessment for each peril is difficult. And underwriters need exact and accurate information to reduce adverse selection and moral hazard problem along with monitoring and administrative cost. All those factors affect the premium rate and it is hardship for the farmers to bear in a developing country like Bangladesh. Weather index-based crop insurance is the one that can overcome the limitations if it applies by considering country context, weather conditions and other infrastructures are necessary to implement it. WII contract is a contingent claim contract for which payment is based on specific objective weather parameter that is closely correlated with farmer's yield loss. The underlying index is easily and objectively measurable, transparent and based on random variables. Index-based crop insurance is a viable risk mitigation tool that creates a safety net for farmers to enable and encourage them to invest in their farms and raise productivity and reduce the risks financial institutions face when lending in agriculture.

In India, over the last 10 years, index insurance has grown to enable access to agricultural credit for over 22 million farmers, unlocking a value of 3.1 billion USD in agricultural investment. Based on developing countries experience and considering the issues specific to Bangladesh SFSA also have taken the initiatives by focusing some important issue: proper preparation for index measurement and premium determination, flexible product design using less number of perils and multi-peril options and different risk layering, wider stakeholder partnership, insurance and reinsurance support from national and international level.

WII has greater potential to help reduce weather risks in an agricultural system where financing, production, processing and marketing are well functioning and integrated. Insurance can be a suitable risk management option but it cannot solve problems related to agricultural production inefficiencies. To represent the best value proposition, insurance should therefore be grafted onto a system where other vital economic parts are already functioning but where the insurance improves efficiency or further unlocks the economic potential in agricultural production.

Ideally, index insurance should be integrated into coordinated supply chain relationships with linkages between input provision, commodity sales, and additional flows of resources, extension services, technical advices and production oversight. Such relationships for instance exist in markets for rice, exported crops (such as potatoes) and certified seed production. SFSA would thus recommend to focus on such systems for scale-up strategies. A key linkage that should be particularly emphasized is with agricultural finance. Without bundling insurance with credit, many farmers will lack both the capital to pay the insurance

premium and sufficient incentive to use scarce resources to buy risk coverage. Placing insurance products within complementary systems with broader linkages can also facilitate simpler contract design, as other mechanisms can deal more efficiently with the aspects of risk and crop losses that cannot be indexed.

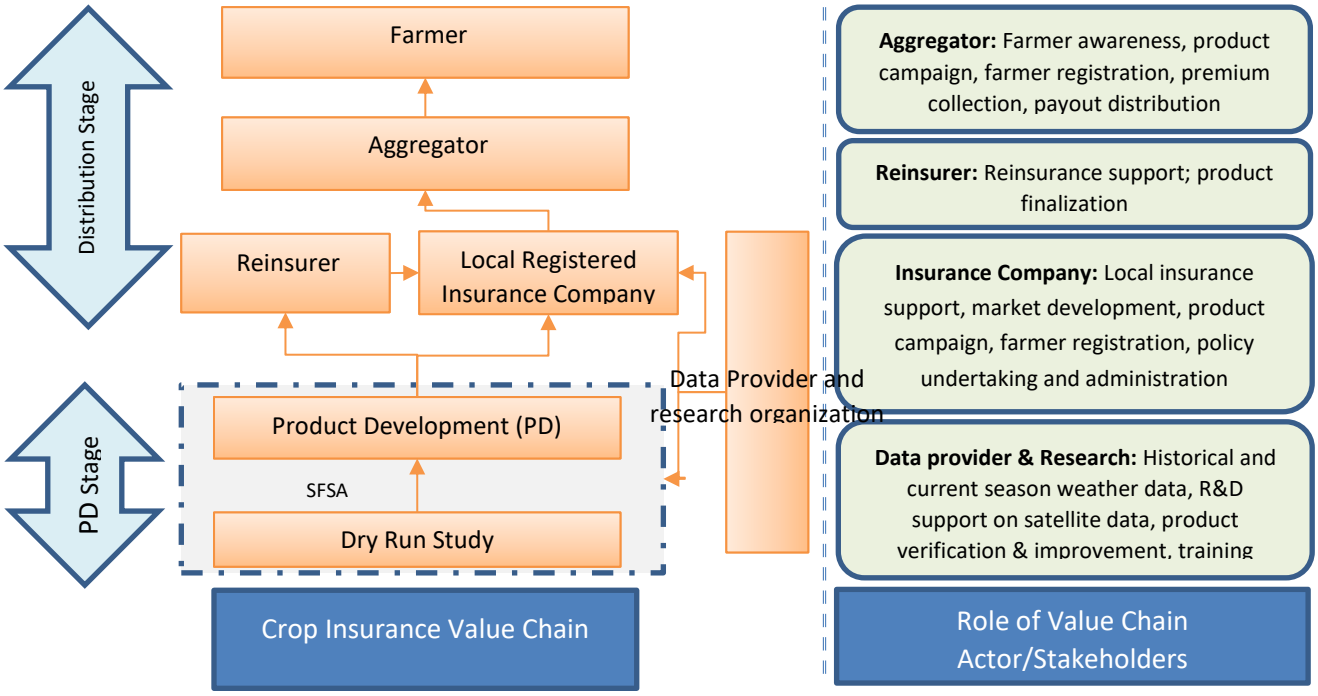

Figure 2: *Insurance Value Chain and Stakeholders*

Annex II – Workshop Minutes

Weather Index Insurance Initiatives and Development of Smallholders in Bangladesh

Background

Bangladesh faces disasters and weather-related risks almost every year. This affects crop production and ultimately reduces the income of farmers. In addition, as Bangladesh is a densely populated country, it needs to ensure food security. Government as well as donor agencies as well as the public and the private sector are working on food security. Climatic hazards create barriers to ensure food security in Bangladesh. Crop insurance can play a role in mitigating climatic risks reducing financial risks of farmers what makes them confident to invest further. Aiming to know the risks associated to crop production as well as the landscape of crop insurance in Bangladesh, a feasibility study and a dry run for agricultural insurance in Bangladesh was conducted by Syngenta Foundation Bangladesh (SFSA) under Agricultural Insurance Solutions (AIS) project co-funded by Swiss Capacity Building Facility (SCBF) and Syngenta Foundation for Sustainable Agriculture (SFSA). The aim of the feasibility study was to understand the insurance landscape and to determine the potential and distribute agricultural insurance products throughout Bangladesh. The goal of the dry run study was to understand the local characteristics of farming and varieties grown as well as the impact of risks on the crops to be insured.

The Workshop

The workshop has been held on 5th November, 2017 at Azimur Rahman Conference Hall in the Daily Star Centre, Dhaka, Bangladesh. The aim of the workshop was to disseminate the initiatives and development of agricultural crop insurance in light of feasibility and dry run study. The invitee list was quite conclusive including personnel from different insurance companies, aggregators (MFIs, offtakers, processing companies, seed companies), banks and governmental organizations (BMD, SDC). Here follow the contents of the workshop:

- SFSA and SCBF Global Perspective
- Introduction to Weather Index Insurance
- Feasibility Study Introduction
- Dry Run Study Introduction
- Stakeholders Experiences, Learning and Discussion

The workshop was designed in two parts. In the first part, the concept of weather index insurance was introduced as well as the feasibility study and the dry run study. Before entering the main sessions, a welcome remark has been given by the Mr. Md. Farhad Zamil, Country Director of SFSA. Thereafter, a session on Syngenta foundation and SCBF global perspective was run by Mr. Perez Rouven, Insurance Program Coordinator at SFSA. Subsequently, Mr. Srinivasa Rao Gattineni, ASIA Coordinator at SFSA described weather index insurance, its necessity, crop production challenges, insurance products, stakeholders' involvement, processes, etc. Mr. Md. Aminul Moven, Project Manager at SFSA, has shared

the findings of the feasibility study including agricultural insurance landscape, agricultural values chains, distribution, challenges/constraints and way forward. Ms. Tagdira Naznin Smriti, Actuarial Associate at SFSA has shared dry run findings on crops like rice, maize and potato, its importance, processes, associated risks on crop productions, etc.

The second session was an open discussion on specific stakeholders' experiences, learnings and findings. The output of this discussion is summarized in the following.

Discussion

- Mr. Shameem Hassan Bhuiyan, meteorologist at agromet Division, BMD shared that Bangladesh has experiences on most of the national calamities/disasters except volcano eruption and bush/forest fire. Besides, it has high population density. For ensuring food security, crop insurance can be a way to overcome these issues. It needs awareness not only on the farmer level but also on the stakeholders' and policy level. Good thing is that crop insurance theme was added with high priority to the draft National Adaptation Plan (NAP) in Bangladesh. Government can come here with subsidies as they have experiences to provide subsidy to agriculture on inputs, etc. In addition to that MFIs can play a vital role to pay the premiums on behalf of farmers as a bundled service which is to be included in their loan program. He suggested that in future, agromet advisory services like weather forecast can be introduced along with insurance services for the famers. This could be a way of risk mitigation on weather.
- Mr. Mamunul Hassan, vice president of Pragati Insurance Limited said that they have experiences in flood index insurance. Though it took more time to understand flood insurance before entering there. Now they are very much aware of index insurance. He suggested the following:
  - Benefits of insurers and farmers should be considered while designing insurance products.
  - Area or topography wise premium price can be varied on the basis of significant stress/risks.
  - Governments should exclude 15% Value Added Tax (VAT) on premium price.
  - Farmer awareness campaigns on crop insurance benefits and its modalities should be considered as a high priority in the project.
  - Aggregators like MFIs can play an effective role in crop insurance education, promotion, premium pay, awareness, etc.
- Mr. Tanvir Rahman Dhaly, head of business development unit microfinance, BRAC urged that BRAC is involved in developing National Financial Inclusion Strategy of Bangladesh where Syngenta Foundation can play an effective role in developing this by providing information. He also told that crop insurance needs public (IDRA, MRA, Bangladesh Bank, BMD) and private sector collaboration. With this collaboration, stakeholders shall act together which ensures to formulate the right paths as well as infrastructure on crop, micro, health insurance etc. He added that in 1970-80, there was no favourable system to promote crop insurance in Bangladesh; now, few stakeholders exist like aggregators, insurance companies, data providers, MNOs, etc. which makes confidence to promote crop insurance at present.
- Mr. Moazzem Hossain, chief executive, GBK stated that the government's regulatory board can play a vital role in promoting WII in Bangladesh. As example he said that once there was no agricultural loan by the Bank except few specialized banks; but now banks are disbursing agricultural loans as

government formulated regulation on to disburse agricultural loan by the banks. The insurance regulator could follow the same approach to foster WII to the target level. He also said that in Bangladesh, there is some adverse outlook on insurance on the rural level. This should explain farmers through awareness campaign.

- A.H.M Humayun Kabir, managing director of Supreme Seed Company, shared that the Bangladesh Seed Grower Association had raised the necessity of crop insurance initiatives in 1998-99 which now comes to be functional. He suggested that the project needs to confine the definition of smallholders' before stepping in the insurance market.
- Ms. Zinia Rashid, programme officer at SDC, shared that the upcoming project will not only implement crop and livestock insurance but also synchronize work among different agencies, public and private sector by providing them a platform. In addition, capacity building activities will be there for public and private stakeholders aiming to understand and educate them on crop insurance and assist in order to ensure their role in promoting index insurance. She stated same view like other participants that the project needs to categorize farmers and land ownership.
- Ms. Nilufar Yesmin, deputy general manager at SBC, urged that distribution networks need to be ensured and a mechanism regarding premium payment needs to be considered by the project. Besides, she expressed that farmer awareness campaigns are very important to promote crop insurance.
- Mr. Eshtiaque Ahmed, managing director at ejab group, urged that they have been working on potato seed and processing varieties production via contract farming since 2008-09. They are providing loans as well as seeds to the farmers targeting good yield for their next year business. However, due to weather risks they did not always achieved the expected production/yield from the contract farmers. He expressed that WII can be a way of mitigating financial risks but also that there should be a considerable premium price.
- Mr. Mosiur Rahman, head of corporate (disbursement) at Rocket, a mobile banking service organization, said that related public and private bodies should come in the insurance market, and work together, then WII will be a case in the context of Bangladesh.

In summing up the discussion, it was derived that crop insurance has prospects. This requires education on insurance on the farmer level, private and public sector coordination with proper distribution channels and an enabling environment as well as considerable premium prices for the farmers. The workshop was concluded by giving thanks for participation and the invitation to have lunch together.

The workshop participants

No	Name	Designation	Organization
1	Nilufar Yesmin	Deputy General Manager	Sadharan Bima Corporation
2	Md. Mamunul Hassan	Vice President	Pragati Insurance Limited
3	Tanvir Rahman Dhaly	Head of business development unit Microfinance	BRAC-MFI
4	Moazzem Hossain	Chief Executive	Gram Bikash Kendra-MFI
5	Eshtiaque Ahmed	Managing Director	Ejab Group
6	Muhammad Mosiur Rahman	Head of Corporate (Disbursement)	Rocket
7	Shameem Hassan Bhuiyan	Deputy Director	BMD
8	Syeda Zinia Rashid	Programme Officer	SDC
9	Md. Mostafizur Rahman	Manager	GARI
10	A.H.M Humayun Kabir	Managing Director	Supreme Seed Company Ltd
11	Borun Chakraborty	Assistant Manager	PRAN
12	Srinivasa Rao	ASIA Coordinator	SFSA
13	Perez Rouven	Insurance Program Manager	SFSA
14	Md. Farhad Zamil	Country Director	SFB
15	Krishno Gopal	Manager: Finance and Administration	SFB
16	Md. Aminul Moven	Project Manager	SFB
17	Tagdira Naznin Smriti	Actuarial Associate	SFB
18	Shakila Sultana	Intern	SFB

Annex III – Snapshot of financial inclusion status as of end of 2017

Financial inclusion is on the rise in Bangladesh, driven in large part by growth in mobile money use and registration. A growing 43 percent of Bangladeshi adults are now financially included, meaning they have accounts at financial institutions offering at least one of the following services: savings, insurance, investments or money transfers. This is up from 2014 (37 percent), mostly due to the growth in mobile money accounts. There are 58 banks, both private and state-owned, another 37 non-bank lending institutions, and over 698 MFIs are currently licensed by authority, however, the BIG 4 are dominating the microcredit scenario, BRAC, ASA, Grameen Bank, Buro Bangladesh.

Potential players from lending institution are BRAC-MFI, ASA-MFI, GBK. In microfinance program of ASA has been globally considered as the most efficient model of micro lending for its elegance of innovation, scale, sustainability. Currently, Eight Million People of Bangladesh are attached with this program finding it immensely beneficial in improving their quality of life. The organization has been extending managerial assistance and consultancies for developing microfinance operation to many NGOs/MFIs around the world.

Annex IV – Snapshot of crop input markets status as of end of 2017

There are over 100 seed companies, including the state-run Bangladesh Agricultural Development Corporation (BADC) and corporate giants like ACI. Both the private and public sectors are involved, supplying 20 percent of the demand for seeds and offering mainly varieties of hybrid rice, maize, vegetables, and spices, through 18,000 registered dealers nationwide. There are also a large number of processors and contract growers, including 14 major rice millers.

Seed multipliers and contract growers are ideal distributing partners for the insurance program. These schemes often extend inputs on credit to growers, with insurance fitting well into the bundle of services offered to raise farmers' productivity and quality. Premium can be aggregated by the contract grower and potentially deducted together with the input loan from the amount paid to the farmer for the harvest. There is also potential to introduce a replanting guarantee scheme with a seed company.

Annex V – Snapshot of crop output markets status as of end of 2017

There are several agro processors such as PRAN, Akij, Square, Ahmed, ACI, BD Foods and Bombay Sweets in Bangladesh with Pran being the largest. According to Bangladesh Agro Processors Association (BAPA), there are around 250 processors however the list in not exhaustive as there are other processors who are not members of the association. These processors produce a range of items and sell their products both nationally and internationally. There are also contract farming organizations SEBA, GARI, Ejab group (Himadri) that are ensuring their production for national and international market through contract farming system.