Understanding Agricultural Index Insurance:
Field Visit and Training.
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Section 1: Introduction

Agriculture provides the main source of livelihood for 75% of the poor in developing and Least Developed Countries (LDCs). Most of the world’s poor are based in rural areas, and even when they are not engaged directly in agricultural activities; they rely on non-farm employment and income (livestock management, farm labourers), which is indirectly linked to agriculture. In these countries, irrigation infrastructure is limited and cultivated land is dependent on rainfall and the vagaries of weather.

The situation in India, a developing country is no different. Approximately 61% of rural households are dependent on agriculture for their livelihoods. Indian agriculture is over-reliant on the vagaries of the monsoon¹ with three-fourth of the annual rainfall received during this season. There are significant temporal and spatial variations in rainfall patterns across the country. For example, while Rajasthan, a western state receives less than 10 cm of rain, north-eastern parts of the country get over 1000 cm of rainfall. Moreover, there is substantial rainfall variability across the crop cycle, which further affects yield, as crops require appropriate rainfall during critical crop phases (Sinha 2007: 8). This variability in weather is further exacerbated by the fact that a substantial number of farmers have marginal or small landholdings², with inadequate irrigation.

Hence, the need to protect farmers from agricultural yield variability has been an overriding concern for Indian policy makers. Risks in agriculture can be categorised as production (yield) and price risks. Price risks, influenced by demand and supply factors are partly addressed by government interventions such as Minimum Support Price (MSP) operations, Public Distribution System (PDS) releases and changes in export-import policies. In the case of production risks, rainfall variability is the major risk factor and agricultural insurance can play a role in hedging against such risks.

In India, crop insurance, which indemnifies the farmer against shortfall in crop production, is mostly bundled with crop loans and subsidised by Central and State governments. It is managed by the Agriculture Insurance Corporation of India Ltd. (AIC) and delivered through various channels such as rural financial institutions (with Regional Rural Banks (RRBs) playing a prominent role), NGOs, SHGs and farmers’ cooperatives³. In 1999, the Insurance Regulatory and Development Authority (IRDA), the newly formed regulator, opened up the insurance industry to private insurers and foreign investment. Consistent with public insurers, the IRDA required all private insurers to reserve a certain portion of their portfolios in the rural and social

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¹ India receives rain from both the South West Monsoon (May-September) and the North East Monsoon (October-December). The former covers most of India, while parts of Andhra Pradesh and entire Tamil Nadu receive rainfall from the latter.
² Less than 1 hectare and between 1 and 2 hectares respectively
³ In 2002, the government established AIC, the only standalone agriculture insurance company with capital participation of four public sector general insurance companies (National Insurance Company Ltd., The New India Assurance Company Ltd., The Oriental Insurance Company Ltd., United India Insurance Company Ltd) and the National Bank for Agriculture and Rural Development (NABARD). AIC has taken over as the implementing agency from the GIC which undertook agriculture insurance business in previous years.
In recent times, some private insurers and AIC have executed pilot projects that sell Weather Based Crop Insurance Schemes (WBCIS) as a substitute or complement to crop insurance provided by the government. Under WBCIS, payout structures are developed to compensate insured farmers when there is crop loss resulting from adverse weather conditions (excess or shortfall from a predetermined threshold level of rainfall, temperature, humidity etc).

The Indian insurance industry has experienced significant growth since it was opened up to private companies, with the microinsurance portfolio growing faster than the insurers’ traditional lines. Not counting the Government’s mass health insurance schemes in 2009-10, an estimated 163 million low-income persons had some form of insurance (Ruchismita & Churchill: 430). Aside from regulatory targets, this unrivalled outreach has also be propelled by subsidies offered by the Government to promote access to a variety of products, across the health, agriculture, livestock and accident/death risk areas.

At the week-long training workshop on “Understanding Agricultural Index Insurance” at CIRM Advisory Services, IIT-M Research Park, Chennai, from August 27-31, 2012, theoretical explanations on several dimensions of insurance was supported by class-room exercises. Participants were also taken on a two-day field visit, where they interacted with farmers, members of farmers’ federations and employees of a district cooperative bank to understand the grassroots modalities of insurance.

Although the participants of the workshop represented different organizations and countries (refer to annexure 1) they were guided by a common objective of drawing insights from the Indian experience and replicating various index based agricultural insurance projects in their countries. Their main objective was to develop insights on:

- Product design and innovation to improve product acceptability and outreach
- Financial literacy of products among clients and capacity building among various stakeholders
- Development of weather index insurance and the role of regulators in this process
- Research for impact evaluation and product and delivery process modification

This report aims at summarising the key points discussed during the workshop and provides related insights from various secondary resources. Section 2 presents the salient features of weather index insurance. Section 3 outlines the history of weather index insurance in India, while section 4 discusses the key role of data and approaches to cope with absence of historical weather data. Section 5 focuses on innovation in product design and delivery channels. Section 6 provides insights on creating an enabling environment for weather based index insurance growth in developing countries.

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4 The IRDA issued the “Rural and Social Sector Obligations” notifications for all insurers in 2002. The obligations require life insurers to originate 7% of the total lives insured from the rural sector, increasing annually to 16% by the fifth year. For general insurers, rural obligations start from a target of 2% of their insured premium in the first year, rising to 7% in the tenth year. The idea behind this is to encourage insurers to discover profitable business models to serve the rural market; and in subsequent years there will a voluntary increase in their investments and outreach to low-income households.
Section 2: Salient Features of Index Based Agricultural Insurance

2.1 An area based approach (not at an individual farm level approach) is used for risk assessment.
The approach is based on average risk and average loss characteristics for the entire area. The assumption is that if the area is small enough and agro-climatically homogenous, crop output for the majority of farmers is highly correlated. In reality, this is not the case, as several factors bring variations in output. This approach, hence, gives rise to basis risk (See Box 1). Despite this, the method is preferred, as the individual farm level approach requires ex-ante and ex-post assessments, which are cumbersome and suffer from moral hazard issues.

Box 1

**Basis Risk**
As Mr. Shekar of CIRM explained, one of the main thrusts of insurance is to reduce the basis risk. What is basis risk? Suppose ‘X’ is the total loss suffered by the farmer, and ‘Y’ is the total claim paid by the insurer. If X is an amount different from Y, this gives rise to a basis risk (‘Z’). This leads either to (a) under insurance when claims paid out is less than actual loss or (b) unsustainability when claims paid are higher than actual loss.

Reasons for basis risk may differ depending on the type of insurance product.

- In case of yield insurance, basis risk arises because the trigger value is the average yield calculated for a larger area, which may not represent the actual yield of a smaller unit.
- In case of weather index insurance, basis risk arises on account of distance of the village from the weather station, as data generated may not represent that of the villages which are far away from the station.
- The design of the product itself as it may not take into account the seasonality in agriculture and rainfall, type of crop and the crop cycle.

2.2 Weather based index insurance covers a systemic or covariant risk.
Covariant risk implies that adverse weather conditions affect all farmers, unlike individual risks which randomly affect individuals. This means that the principle, “many pay the premium, only a few claim indemnities”, does not strictly apply in the case of weather insurance.

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5 “The area approach treats all farmers in a defined area as identical in terms of risk and loss, paying identical premium and receiving identical claim amount” (Sinha: 13).
2.3 Weather insurance is not designed to indemnify\(^6\). It assuages loss (inputs, time and effort) of borrower.

As the principles of conventional insurance is not followed in this case, it can raise the question “should weather insurance be termed as insurance?”. This was voiced by a few participants during the second day of the workshop.

There is a difference between a weather financial contract and a traditional insurance contract. In the latter, indemnities are paid only after actual damages are quantified by proper loss adjustments and not simply upon the occurrence of a specific state of nature. In the former, a payout can be made prior to the loss being experienced. Hence it may be considered a weather derivative / weather insurance contract. While the difference between the two might be important from regulatory and legal viewpoints, from an economic perspective, both instruments share the common feature of being triggered by an underlying weather index\(^7\).

2.4 For both the area-yield insurance and WII, client participation is compulsory, as insurance is bundled with the loan taken by the farmer.

Low insurance literacy and paucity of monetary resources among farmers, makes participation in the scheme limited and premium collection difficult\(^8\). Hence participation has been made compulsory.

2.5 Role of legislations and regulators in ensuring that banks cater to the rural clientele is crucial.

More than 80% of Indian farmers hold marginal or small landholdings. With improper documents to show as collateral, financial institutions are wary to lend to this segment. In India, the two main regulations, to ensure that this is not the case are (a) the government directive stating that agriculture is a priority sector for financing by banks, and (b) Rural & Social Obligations laid out by the regulator IRDA.

\(^6\) To indemnify mean to reinstate to the position that a person was in to the extent possible prior to the happening of the peril.

\(^7\) Stoppa and Hess (2003)

\(^8\) Out of a 100 persons, about 8-10 persons have insurance coverage in India today (Mr. Shekar, CIRM). Also individuals are more interested in purchasing life and health insurance and not really weather insurance, stated Mr. Mishra of ICICI Lombard.
Section 3: The Journey so far: Evolution of Agricultural Insurance

Key milestones in the history of agricultural insurance development in India are as follows:

- 1965: Government of India (GoI) draws up Crop Insurance Bill and a model scheme for crop insurance
- 1985-98: Introduction of Comprehensive Crop Insurance Scheme (CCIS)
- Rabi season of 1999-2000: Area Yield Index based National Agricultural Insurance Scheme (NAIS)
  - Underwritten by the AIC, it is usually distributed through rural banks (commercial banks, regional rural banks and cooperative banks) as a compulsory product tied to subsidised crop loan. AIC in turn receives premium and claims subsidies from the government to keep the product affordable to the farmer
- 2003-04: Weather Index Based Crop Insurance Scheme (WBCIS) or Weather Index Insurance (WII)
- 2010-11: Modified National Agricultural Insurance Scheme (MNAIS)

3.1 Area yield index insurance

Succinctly put, the process involved is:

- The insurer creates an index based on a guaranteed yield (determined through historical yield data for the region) for the insured unit.
- The contract pays out to all farmers in the region, based on loss assessments made through Crop Cutting Experiments (CCE), if the actual yield is lower than the guaranteed yield.

Mr. Kolli Rao of AIC, in his session on “Index Insurance as Risk Mitigation tool in Agriculture” explained in detail the methodology in estimating indemnity under the NAIS.

- Three levels of indemnity – 90%, 80% and 60% are identified corresponding to low, medium and high risk areas for all crops, based on the coefficient of variation in yield of the past ten years of data.
- A moving average of previous seven years yield data, (collected and verified by the State government,) is taken as the guaranteed yield and is compared with the current year’s actual yield.
- The shortfall is calculated as a percentage of the threshold. The amount of indemnity is the shortfall percentage times the sum insured.

\[ \text{Indemnity} = \max \left( 0, \frac{\text{Threshold Yield} - \text{Actual Yield}}{\text{Threshold Yield}} \right) \times \text{Sum Insured} \]

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9 Pioneered by J.S. Chakravarthi (secretary and president of the Mysore State Insurance Commission), who studied crop insurance among farmers in Chitradurga district in Karnataka in 1920.
The NAIS is an improvement over the CCIS in two ways:

a. As farmers plant multiple-crops to diversify their risks, NAIS’s multi-crop product insures farmers’ total agriculture income, and hence scores over CCIS’s single crop cover (Ruchismita & Churchill: 435).
b. Insurance is made available to non-loan linked farmers as well

By 2009, NAIS had covered 19 million farmers and 26 million hectares, covering about 16% of cultivated land in India. The scheme was effective in reaching smallholders - the average premium per farmer insured slightly exceeded INR 400 (USD 8 approx.). The average area insured per farmer came down from 1.6 hectare in 2000-01 to 1.4 hectare in 2008-09, suggesting the scheme was covering more small and marginal farmers (Ruchismita & Churchill: 436).

While NAIS continues to be the largest agricultural insurance programme, it suffers from a few limitations:

- As explained in Section 1, a scheme that uses an index, rather than farmer’s actual losses, is subject to basis risk.
- Albeit more effective than making use of an individual approach as the basis of settlement, Crop Cutting Experiments (CCE), involves high manpower cost. This is because there is non-availability of historical, farm level data (yields, ownership and tenancy records); and landholdings are numerous, fragmented and found in remote regions.
- Measurement is done by government agencies, which reduces the cost for the insurer, but the latter has no control over the process of loss assessment.
- The involvement of the additional party (the government loss assessment process) also contributes to substantial delays in claim payout (Sinha 2007). Often, farmers have to wait for six to nine months post harvest, causing financial constraints to them.

### 3.2 Weather Index Insurance (WII)

The WII is an insurance product which covers losses on crop due to various unfavourable weather conditions including rainfall, temperature, humidity, wind velocity and sunshine hours. The insurance policy makes a payout to the insured when values of any of the parameters (covered under the insurance product) exceeds or is lower than the trigger values that are set out in the insurance contract. This eliminates the problem of yield measurement. Also, once investment in meteorological gathering infrastructure has been made available, it is possible to ensure reliability and integrity of the system (Sinha: 6).

Mr. Mishra of HDFC ERGO outlined the process involved in designing a WII:

1. Crops and the locations to be covered by the product are decided.
2. An agronomical study is undertaken, where the crop cycle is analysed (using primary and secondary data). The risks involved and the time period to be covered is identified for each crop stage - germination, development, reproductive and maturity.
3. Various perils to be covered in each stage are decided. For e.g. during germination it can be deficit and/or excess rainfall. These perils are identified through discussions with agriculture specialists, meteorological officers and other experts and stakeholders.

4. Historical weather data (daily) for these locations is procured.

5. The index is designed for each time period. For e.g., during 1st June-15th July, if rainfall is less than 100 mm in location A, then a payout is made (trigger identification).

6. Mapping of key areas in the district for allocation of Automated Weather Stations (AWS), procuring the data from the weather stations and finally making the payment to the farmer.

The private sector’s involvement in the provision of agricultural insurance started in 1999 when the IRDA opened up the insurance industry to private insurers and foreign investment and set out the Rural and Social Sector Obligations (“forced familiarity”). The role has subsequently distended, when in 2005, with the Micro-Insurance Regulations, companies were allowed special leniencies while designing and distributing products registered with IRDA as microinsurance. One of the most important factors has been the government allowing private insurers to provide products offered through the national agriculture credit programme which is compulsory and has a high premium subsidy.

The first WII pilot was undertaken in 2003, by ICICI Lombard (IL) and its distribution partner BASIX with the support of World Bank. Mr. Navin Sharma of ICICI Lombard, explained that studies based on historical data (1972-73 to 2002-03) show a strong correlation between fall in Kharif (summer) food grain production and monsoon rainfall. For example in the year 2003, a 49% dip in July rainfall led to a 19% drop in Kharif output. Moreover, a causal analysis conducted by General Insurance Corporation (GIC) Re’s crop insurance cell showed low rainfall/drought and excess rainfall/flood accounting for 35% and 30% of crop losses respectively. This helped IL identify the key parameters with greatest correlation with crop losses, and design a product covering a farmer against these perils. (See Box. 2). The positive response of farmers post IL’s intervention, exhorted the Government to encourage AIC to offer weather based subsidised contracts. From merely 230 farmers in 2003, the WBCIS coverage grew to nine million farmers in 2010-11.
Weather-based index insurance, Mehboobnagar district, Andhra Pradesh (AP)

ICICI Lombard’s pilot project was launched in June 2003, for the Kharif season (2003-04) in Mehboobnagar district of AP through the Krishna Bhima Samruddhi (KBS) local area bank, which was promoted by BASIX (a rural livelihood promotion institution). KBS sold policies only to farmers who had availed loans. The product insured against rainfall variations.

The product is designed to make payouts if there is a deviation in cumulative rainfall over a particular season from the historical average (threshold level). Notional payments for every stage in the crop cycle are different. Mr. Sharma explained this with the help of an example.

- The crop cycle is divided into various stages, such as pre-sowing, seedling, vegetative, reproductive and maturity. Time period (weeks) of each stage is noted, along with the rainfall requirement per stage. For example, during the vegetative stage of soybean, which lasts for six weeks (16th July – 26th August), the rainfall requirement is 150 – 170 mm. The lower limit is set at 170 mm.
- The actual rainfall for the period is noted. Say for example, for the above-mentioned period, the actual rainfall for current year is 140 mm. The payment per mm of deviation (deficit or excess) from the lower limit for each hectare is determined. Take for example INR 10 in this case: Payout = Deficit (170-140 = 30mm) \* INR 10 = INR 300 per hectare.

Mr. Sharma stated that GPRS technology has made it possible for the insurance companies to receive the weather data within a week from its generation at the weather station in some locations. Thus reducing the payout time considerably.

3.3 Hybrid Product: The Modified National Agricultural Insurance Scheme (MNAIS)

MNAIS, is a hybrid of the yield and weather-index schemes, i.e. AIC’s NAIS and WII. It is being tested by the government, as of the Rabi Season (2010-11) across 34 districts in 12 States. It was introduced with the purpose of providing a more accurate basis for calculating threshold yield for triggering payouts. If the pilot test is found to work on the ground, it can replace the NAIS to provide small and marginal farmers with better risk cover.
Some of the features of the MNAIS are as follows:

- Area yield for major crops is measured at the Phirka level\textsuperscript{10}, reducing spatial basis risk substantially.
- The contract is designed to make claim payments during the cropping season, thus providing immediate respite and allowing the farmer to invest in alternative coping strategies.
- It covers “prevented sowing” for 25% of the total sum insured if monsoon arrives late and farmers decide to postpone sowing. It also covers post-harvest losses for up to two weeks after harvest.
- Unlike NAIS, where the financial risk lies with the state, in MNAIS premiums are paid for insuring the crop and hence the claim liability (and therefore the financial risk) lies with the insurer rather than the State. This can lead to price transparency with premiums reflecting the true value of risk.

During the field visit of the participants to Cuddalore and Nagapattinam districts, farmers explicitly stated that they preferred this type of insurance, since (a) the insurance unit is much smaller and promotes greater accuracy, (b) settlement basis is Cost Cutting Experiments (CCE) which is more reliable than weather data generated from far-off stations; and (c) claims are settled quickly after each crop stage.

**Section 4: Data for WII: Quality, Availability & Limitations**

The quality of real-time data and density of data stations is vital in assessing accurately risk and hence reducing basis risk. According to Dr. Skees, President, GlobalAgRisk, Inc. “a lack of metrological infrastructure will limit the number of clients for which an index can be used reliably to underwrite risk.”\textsuperscript{11} In India, access to historical data on weather is managed exclusively by the Indian Meteorological Department (IMD). The need for meteorological infrastructure was discussed at length by Mr. Kolli Rao and Mr. Prakash (Karnataka State Natural Disaster Monitoring Centre (KSNDMC) during their sessions at the workshop.

Two issues drew much deliberation:

- **Number of weather stations across the country.**

  Dr. Rao, pointed out, “for weather based insurance to be an effective alternative to yield based insurance in India, there needs to be 8,000 weather stations and 32,000 rain gauges across the country to cater to village-level data”. Currently, the country does not

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\textsuperscript{10} During the field visit, farmers indicated that unit measurement is *phirka* (a group of 8-10 villages). This was considered as an improvement over the NAIS and WBCIS which were based on larger insured units.

\textsuperscript{11} Key note speech in the Research Conference on Micro-insurance – April 2012, hosted by Institute for Innovation and Governance Studies.
even have a quarter of that. Increasing the number of stations is also problematic, as annual installation and maintenance costs are high.

- **Type of weather station in use.**

The majority of stations in use are rain gauges and efforts are underway to expand the network of Automated Weather Stations (AWS). Mr. Prakash from KSNDMC, outlined the advantages of telemeter rain gauges over manually operated ones – *“in the case of the latter, obtaining reliable data is contingent upon a person visiting the site every morning in order to change the graph. Often times this schedule is not followed, leading to non-reliable data”.*

**New Developments**

The investment in AWS is made by various government departments (meteorological, space research and educational institutes) and now is attracting investment from private agencies with incentives to access more accurate data. Acknowledging the importance of the role of private players in the arena, Mr. Rao cautioned that the integrity of the data collected is questionable, as data are not collected according to standards and specifications prescribed by the government. To overcome this, a pilot project on validating the data collected through an *open source platform*, where daily weather data (temperature, minimum and maximum rainfall and solar radiation) for the last 15 years (1995 data) can be obtained for thirty five thousand villages has been embarked upon. If this data can be validated, this source can replace a weather station and weather points at a village level can be obtained. This will minimise the basis risk.

Mr. Prakash, focused on how Information and Communications Technology (ICT) tools could be utilised in enhancing the spatial resolution of weather parameters at the micro level (*taluk*, *hobli* and village), by providing examples from Karnataka¹². Through maps, pictures and videos he outlined the various tools developed, designed and implemented to capture weather data, their process of operation, dissemination of information and challenges faced. For example, telemeter rain gauges, solar-powered and equipped with a GPRS, transmit data every 15 minutes. This data is projected on a map, thus showing differential rain levels at villages that are even 2.5 kms away from each other. This is made possible by using a geo-statistical technique to interpolate the value of the rainfall at an unobserved location from observations at nearby locations (*kriging*). The basic cost of this solar powered telemeter is INR 17500 each (less than 400 US$),

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¹² A *taluk* is an administrative unit of the local Indian government system. It can be viewed as a sub-division of a district. A *hobli* is defined as a cluster of adjoining villages in the state of Karnataka. This clustering was formed mainly to streamline collection of taxes and maintenance of land records by the *revenue* department of the state. Each *hobli* consists of several villages and several hoblis together form a *taluk*.
and combined with five years on-site maintenance it is about INR 47,500 (less than 1000 US$) per station (Also see Box 3).

Box 3

**Satellite imagery for scaling up weather index insurance: reducing basis risk & data costs**

Satellite data represents a promising low-cost alternative to weather-station data for index insurance. Satellite rainfall estimates originated in 1980 and have become increasingly more accurate over time (Dinku et al., 2007). Insurers and reinsurers tend to require 30 years of historic data for pricing insurance products, and this level of historic data is now emerging. Also, merging satellite data with weather station data may be possible for long term historic records.

Satellite data has several benefits beyond lower costs than weather station data. First, unlike weather stations in some areas, satellite data is real-time data that can track weather trends as they occur. Second, satellite data is more inclusive than weather station data and has the potential to lower basis risk. Weather stations provide data at particular points. The conditions close to the weather station are extrapolated from these measurements. Satellite data is spatially continuous and can provide actual measurements for these points between weather stations.

Using satellite imagery to underwrite index insurance is still considered experimental; however, this data is used consistently in other outlets and has been proposed for use in upcoming pilot projects. Research and piloting regarding using satellite data is still needed. Synthetic Aperture Radar (SAR) is demonstrating some significant potential as this technology penetrates cloud cover and, with the proper models, can provide localized estimates of soil moisture as well as a clear image for identifying water inundation from flooding.

*Source: Jerry Skees, Anne Murphy and Benjamin Collier, GlobalAgRisk, Inc. Michael J. McCord and Jim Roth, Microinsurance Centre, LLC*

Section 5: Innovation

5.1 Innovations in Product Design

There have been several deliberations vis-a-vis the trade-off between accurate and complex contracts that are more responsive to farmers’ risks, and those that are simple and easily understood but less customised to farmer’s needs.

Before 2008, simpler products were dominant, i.e. they rarely involved crop-stage specific covers. This was because sales were voluntary and hence farmers’ understanding was crucial. Over time, more complex framework has emerged, as there are better data correlations between crop yield and various weather conditions. In theory, this lowers basis risk for the farmer, but the complexity places a burden on sales and distribution channels. Take for example, the
experience of Weather Risk Management Services (WRMS) in West Bengal, where a multi-peril weather index insurance product developed for rice was subsequently replaced with a single peril cover\footnote{Project undertaken by CIRM, titled, “Providing Weather Insurance Bundled with Weather Forecasting SMS Service to Small & Marginal Farmers in North-East India” along with WRMS, ICICI Lombard General Insurance Company, embarked in September 2009.}. As several of the speakers at the workshop commented, it is a difficult choice, as farmers’ understand simple contracts, but if they are not able to make claims during bad years, then they will lose trust in the product and will be unlikely to renew. In recent years, there has been many new products covering the priority risks of low-income households. The following examples highlight innovations emerging in a sector extremely crucial for farmers’ livelihoods – livestock (See Box 4 and Box 5).

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**Box 4**

**Helping vulnerable livestock keepers manage their risk: The case of Mongolia**

Mongolia was the first to pilot an index-based insurance product for livestock that covered substantial losses due to extreme winters.

The goal of index-based livestock insurance (IBLI) is to provide cover for catastrophic livestock mortality events within a region, recognizing that smaller, individual livestock mortality risks are better addressed through appropriate household-level risk management strategies. The product combined self-insurance, market insurance and social insurance. The farmers were provided with two products namely Base Insurance Product (BIP) and Disaster Response Product (DRP). BIP was a commercial risk product sold and serviced by the private insurance companies, while DRP was a social safety net product financed and provided by Government.

Herders pay a premium based on the value of their animals reported and the relative risk in the *soum* (*soum* is equivalent to a county) that they select. The *soum* is selected based on herder knowledge, of where his animals are most exposed during the first six months of the year. Herders are able to insure between 25 to 100 percent of the estimated value of their animals. Payments begin once the predetermined threshold of mortality for the *soum* and species is exceeded. The payment rate is capped once the mortality rate exceeds the exhaustion point (cap). BIP payments are the product of the payment rate times the value insured. DRP payments use the full value of animals. The DRP pay for losses beyond the exhaustion point.

**Source:** *Piloting Index-Based Livestock Insurance in Mongolia*. Olivier Mahul and Jerry Skees (2006), Access Finance, Issue 10, World Bank.
Insuring Livestock against drought-related mortality: The case of Kenya and Ethiopia

In January 2010, the second index-based livestock insurance product was launched in the Marsabit district of northern Kenya and was aimed at providing insurance cover for livestock mortality due to a prolonged lack of forage.

The index in IBLI is predicted livestock mortality. It is calculated by using a measure of pasture availability that is recorded by satellites, called the Normalized Differenced Vegetation Index (NDVI). This vegetation measure is fed into a response function that relates pasture availability with drought related livestock mortality. The index threshold above which payouts must be made is called the strike level. The strike level for IBLI is 15%, i.e. compensation will be made if predicted livestock mortality is above 15%.

The Larger Marsabit District was covered by two separate contracts – the Upper Marsabit contract consisting of Maikona and North Horr divisions, and the Lower Marsabit contract consisting of Central, Gadamoji, Laisamis, and Loiyangalani divisions. The standard livestock for a pastoral herd (camels, cattle, sheep, goats) were covered. To arrive at a value for the insured herd, the four livestock types were transformed into a standard livestock unit known as a Tropical Livestock Unit (TLU). The TLU is calculated as follows: 1 Cattle = 1 TLU. 1 Camel = 1.4 TLU. 1 goat/sheep = 0.1 TLU. So, if an individual would like to insure 3 cattle and 20 goats/sheep, TLU insured is 3×1 + 20×0.1 = 5 TLU.

Once the total TLU is calculated, it is used to determine the value of the total herd. Using average prices, for livestock across Marsabit, one arrives at a set price per TLU insured, Say Ksh 15,000. Hence the total value of the herd for the above-mentioned example is: 5 TLU x 15,000 = Ksh 75,000. The premiums are then applied to this to arrive at the amount an individual would pay for IBLI coverage for the year.

According to International Livestock Research Institute, the primary challenges encountered during the implementation were:

1. Pastoralists’ geographic dispersion and seasonal mobility
2. Illiteracy and innumeracy
3. Unfamiliarity with and mistrust of insurance
4. Lack of banking infrastructure
5. Poor transportation and communication infrastructure
6. Infrequent payouts that undermines interest in the product

Source:

Mude et al., 2010.
5.2 Distribution Channels

The distribution of insurance to low-income households poses several problems – from accessing remote areas, to encouraging individuals with liquidity constraints and little financial literacy in taking up complex financial products. Broadly speaking there are four conduits through which insurance has been distributed in rural India.

- Initially, before the term microinsurance came into use, the Government of India’s extensive rural banking network was the primary channel and continues to enjoy prominence. Take for example the NAIS, underwritten by AIC, wherein the distribution channels lean heavily in favour of Rural Financial Institutions (RFIs) such as commercial banks, regional rural banks and cooperatives.

- In the early 1990s and 2000s, NGOs built upon their social capital in the community to sensitise households and offer customised products. These are Community Based Organisations (CBOs) that are involved in diverse activities (livelihood creation, disaster relief and infrastructure development). For example, DHAN has recently piloted a community based weather insurance pilot. They are slowly entering the field of provision of crop insurance as local pooling does not seem to be ideally suited for systemic risk like weather.

- Later, MFIs that entered the market and provided a solution to the affordability problem by financing premiums. “...offered strong data and cash management systems, and helped facilitate the evolution of the sector from a development initiative to having a more commercial orientation” (Ruchismita & Churchill). Unlike NGOs and mutuals that offer microcredit, MFIs are focused primarily on providing financial services. Their close links with clientele reduces transaction costs, adverse selection and fraud. According to Sa-Dhan, MFIs served more than 26 million customers in 2009-10, an 18% growth in clients and a 56% growth in the loan portfolio from 2008-09 (Ruchismita & Churchill). The first pilot of weather insurance was actually undertaken in collaboration with BASIX, an MFI.

- Recently, through new distribution channels, insurers have expanded their distribution strategy to include rural supply chains (and technology-enabled direct sales channels (Internet kiosks, mobile phones, point of sale devices and biometric cards). (See Box 6, 7, and 8)
**Box 6**

**Tapping into the supply chain: Pioneer Hi-Bred International Inc.**

In 2008, Pioneer Seeds used its marketing channels to provide weather (rainfall) insurance (underwritten by a leading insurance company) to its consumers in two districts of Jharkhand, India.

The insurance cover was in the nature of a blanket cover purchased by Pioneer from the insurer and the risk covered was deficit rainfall in the sowing phase. Insurance was provided on the purchase of seed packets by farmers such that, the premium was entirely paid by Pioneer, and the costs were not passed on to the intermediaries or farmers. The insurance contract was based on the cumulative rainfall during a pre-specified period of time. Thus it was a single index based contract where the insured farmer received cover against low rainfall at a strike value of 150 mm. In the event of rainfall that measured between 100mm and 150mm, the insured would receive Rs. 100, and if the rainfall was below 100mm, the insured would receive Rs.175, which was the indicative price of one kg of Pioneer seeds in the local market.

The claim settlement process was fairly simple. In the case of a payout situation, block wise announcements were made. A list of beneficiaries was collected from the delivery channels using the weather insurance sales receipt. Farmers of a particular block were invited to a specific area on a particular day to receive the settlement through demand draft, drawn in the name of the farmer. This exercise was conducted in the presence of Pioneer field staff and retailers.

Tapping into existing supply chains to offer insurance bundled with input products ensures automatic take-up in large volumes and reduction of transaction costs.

Despite consistent efforts from Pioneer like premium subsidy, the intended impact and the long term goals of the activity were not achieved. Important reason for the poor response being favourable weather situation during the season leading to no pay-outs, thus farmers did not see any tangible value in the product. Another factor cited by the retailer for poor sales was the lack of financial/non-financial incentives to retailers to promote sales of Pioneer products.

**Source:** “Innovative Microinsurance distribution: The case of Pioneer seeds”. Janani Akhilandeshwari and Mangesh Patankar (2010), CIRM.
**Box 7**

*Bundling with other products: IFFCO-TOKIOs’ fertiliser bags*

Mr. Gopinath of IFFCO-TOKIO spoke of the importance of bundling insurance with other products. Take for example the company’s *Sankat Haran Bima Yojana*, which was launched in October 2011. The product was designed to bundle a Personal Accident (PA) insurance plan with IFFCO or IPL brand fertiliser bags. Any individual who purchases this brand of fertiliser gets a free PA insurance of INR 4000 per 50 kg bag subject to a maximum of INR 1,00,000. What makes this particularly attractive is that there are no formalities or paper work to be completed, a receipt issued by the cooperative society of purchase of the fertiliser is the insurance document to be shown at the time of claims. For the company, it has created a brand image, such that when the company goes to sell the weather product, most people are already aware of the company.

**Box 8**

*Rural Internet Kiosks: Common Service Centres (CSCs)*

Internet outreach in rural India is expanding rapidly, particularly after the government’s ambitious e-governance plan to set up Internet kiosks in rural areas. The Common Service Centres (CSCs), located in every sixth village, are manned by a village entrepreneur, and have access to the internet and are delivery points for public, private and social sector services. AIC has started tying up with these CSCs to sell agriculture insurance.

In 2011, there were 96,000 such functional CSCs managed by 15 private State Designed Agencies (SDAs). Some SDAs offer insurance, for instance, SARK systems offers life and general insurance products of Birla Sun Life and HDFC Ergo.
Section 6: Conclusion: The way forward

This section summarizes the issues discussed during the workshop and outlines the critical factors for a sustainable sector.

**Key take-away points**

Weather index insurance is not designed to indemnify, and in this respect does not follow the principles of conventional insurance.

a. Weather index insurance products may be considered a derivative.

b. The decision to keep WII as a form of insurance or treat it as a derivative is ultimately the prerogative of the national financial regulatory authorities under consideration.

2. In developing countries, the area-yield insurance can be chosen over weather index insurance if historical crop yield data is available at the micro level.

3. Vis-a-vis area-yield insurance:
   a. Crop cutting experiments as a basis of settlement involves high manpower cost.
   b. Implies substantial delays in claim payout.

4. Vis-a-vis weather index insurance:
   a. Less than perfect correlation between rainfall (any other weather parameter) and yield as data collected from limited number of locations within geographical data implies poor risk cover.
   b. Data available at district level (usually), with stations located near urban or semi-urban areas will be a key factor in ensuring availability of customised weather insurance.
   c. Lack of trust among farmers as data viewed as divorced from ground realities are the key challenges in selling voluntary weather index insurance.

5. Improvements plausible through the hybrid Modified National Agricultural Insurance Scheme (MNAIS):
   a. A new approach combining features of area-yield insurance and weather index insurance (pilot tested 2010-11) implies lower basis risk.
   b. Insurance unit is a group of villages for all major crops, reducing spatial basis risk, and increasing accuracy.
   c. Settlement basis is crop cutting experiments, reducing reliance on weather data which is an input, whereas yield is the final output.
   d. Speedy claim settlement after each crop stage.

6. Data quality and collection improvements require:
a. Increase in number of weather stations across the country to cater to village-level data
b. Change in type of weather station in use, for instance, an Automated Weather Stations (AWS)
c. Use of geo-spatial techniques (kriging) to enhance spatial resolution of weather parameters
d. Standardisation of weather data collected by private agencies

7. Insurance products must be simple, clear, easy to understand contracts and must also ensure greater accuracy that lowers basis risk. A customised approach to contracts can induce greater take up. (See Box 9)

Box 9

**Crop-Stage weather Tickets: HDFC Ergo & IFPRI**

Crop-weather tickets developed by HDFC Ergo, in collaboration with the International Food Policy Research Institute and CIRM, enable farmers to choose the severity of the coverage of the event and also the specific phase of the cropping season. This builds in transparency and better understanding of how the insurance product works. Salient features include:

a. Weather insurance contracts sold in the form of tickets specific crop risk phases that clearly state the amount of payout.
b. Incorporating a building block approach that lets the farmer choose the amount of cover as well as the crop stage to be covered, thus providing flexibility and choice.
c. Contracts are for shorter risk phases, so premiums lower and more affordable.
d. For a cropping season, two types of tickets are available for each of the four-month periods.
e. Both tickets have similar benefits but differing probability of payouts. Tickets with a higher payout probability costs about USD8, while the one with the lower probability payout about USD6.
f. First ticket pays in the event of moderate rainfall, whereas the other pays when there is excessive rainfall.
g. Both tickets allow a payout of either US$22 per acre when the index reaches the ‘strike’ amount of high rainfall or US$88 per acre when the index hits the ‘exit’.

About 93% of the contracts sold were high value options. This indicates farmers’ preference for moderate risk covers, which have a higher probability of payouts, even when they have a higher up-front cost.
8. While the main distribution channels are government’s extensive rural banking networks, the others include:
   a. Community based organisations (NGOs, SHGs)
   b. Microfinance institutions
   c. Rural supply chains (e.g. bundling insurance with other agricultural inputs)
   d. Technology-enabled direct sales channels (Internet kiosks, mobile phones, point of sale devices and biometric cards).

Creating an enabling environment: starting and scaling up weather index insurance

India is a global leader in microinsurance innovation. The colossal number of rural households act as a potential market and provide insurers with the potential of achieving economies of scale. More importantly, this is because the Indian context has witnessed an intertwining of the roles performed by various sector players

- **Public sector**
  - with a clear mandate to assist the poor, and dominating a significant chunk of the insurance landscape
  - massive investment in safety nets
  - provision of subsidies to support productive activities by low income households
  - exhorting regulations (IRDA’s quota-driven innovations and Microinsurance regulations)

- **Private sector**
  - technological solutions
  - innovations in product design and distribution channels

- **Active aggregators (NGOs, SHGs, MFIs)**
  - bring about organisation in the unorganised sector
  - positively disposed to insurance
  - some even carry the risk themselves outside the purview of the insurance supervisor

- **Public-private partnerships**

For developing countries, in order to set-up and/or scale-up weather index insurance there are a few mandatory conditions. These have been adapted from Hazell et al\(^\text{14}\), and include:

- An enabling environment, including the effective legal and regulatory system to enforce contracts and supervise insurance, and in which subsidized risk-management options do not crowd out market-driven products.

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• Adequate infrastructure (e.g. weather stations) to provide unbiased weather data and minimize basis risk.
• Credible, cost-effective and commercially viable national insurers, whose payments are guaranteed by a credible authority, and intermediaries that market and package insurance with relevant inputs, technology, agronomic and weather information, and/or financial services.
• Coverage of the ‘right’ risks (i.e. infrequent, but high-impact events that threaten livelihoods or cause traditional coping mechanisms to fail), using an index that captures that risk well, thus minimizing basis risk.
• Availability of cost-effective products, for which clients find that the benefits of transferring risk are greater than the costs.

Conditions for sustained scaling up include:

• Payouts that are based on objective, transparent, verifiable and understandable criteria, and which reach clients soon after the insured event.
• Trusted, credible intermediaries and insurers.
• Tangible coverage. People need to be able to relate to the expected benefits (payouts in certain cases) of the contractual relationship.
• Transparency and understanding. Farmers have a good understanding of their risk exposure, and the function and benefits of a risk transfer instrument.
• Adequate and sustained demand for risk transfer products.
• Affordable, high-value products, and new ones over time as conditions evolve and farmers develop their businesses.
• Smart subsidies for disaster-relief insurance products, minimizing costs by adjusting the targeting to match changing circumstances (i.e. the number and types of people who remain vulnerable as the local economy develops). Any subsidies used to launch development index insurance products should be phased out over time.
• Access to adequate reinsurance arrangements to prevent insurers from defaulting on large payouts.
Annexure 1 Stakeholders of the event
The training was organized by CIRM Advisory Services (CAS) in partnership with GCAMF (Grameen Credit Agricole Microfinance Foundation).

CAS (Chennai, India) is an organization involved in product design and action research to facilitate provision of formal risk management solutions for low income and vulnerable households to protect them from economic shocks; improve their resilience to stimulate graduation of households from subsistence to business economies. CAS has adopted the approach of impact evaluation, knowledge synthesis, capacity building and policy advocacy to meet its objectives (visit http://www.cirm.in/ for further details). Ms. Rupalee Ruchismita, the director of CAS, introduced the participants to the organization, its objectives, its journey in the field of microinsurance with special emphasis on agricultural insurance and purpose of the training.

GCAMF (Luxembourg) encourages the development of local microfinance institutions and of social businesses enterprises in developing countries by offering suitable financing. The Foundation is also active in the development of social performance indicators in the microinsurance sector and is pursuing smaller-scale research projects with its sister organization FARM (visit http://www.grameen-credit-agricole.org/ for further details). The participants were introduced to GCAMF by their M.D., Mr. Jean-Luc Perron.

The participants of the programme represented different organisations such as insurers, funders, research institutions and NGOs from 13 countries:

1. Thérèse Sandmark - Agricultural Microinsurance Officer, GCAMF, Luxembourg.
2. Constance Collin – Student, University of Rennes.
6. Patrick Warin - Advisor to the chairman of the Micro Insurance International Institute for Research (MIIRI), France.
7. Georges A. Abbey - Lecturer, University of Lome, Togo.
8. Fatona Ayoola Paul - member of the project team, Nigerian Agricultural Insurance Corporation, Nigeria.
10. Jean-Luc Perron – Managing Director, GCAMF, Luxembourg.
11. Hellen Olima - Insurance officer, Department of Insurance within the Ministry of Finance, Kenya.
13. Solveig Wanicke – Project Advisor, Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany.
15. Sessimè Martine Dahoun - Head of Regulation and Licensing Department of the Insurance Department, Ministry of Finance, Benin.
16. Adébayo Pacôme Bonou – Head of Production Services, Agricultural Mutual Insurance of Benin (AMAB), Benin.
17. Tiburce Kouton - Director General, Agricultural Mutual Insurance of Benin (AMAB), Benin.
18. Chris Cherry – Lecturer, University of the Witwatersrand, South Africa.
22. Alhaj Kaddunabbi Ibrahim Lubega - Chief Executive Officer, Insurance Regulatory Authority of Uganda and Chairman, East African Insurance Supervisors Association (EAISA), Uganda.
23. Mouhamadou M. Fall - Deputy Director, Senegalese National Agricultural Insurance Company (CNAAS), Senegal.