International Research Institute for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY

Workshop on Fundamentals of Index Insurance

March 18th, March 25th, and April 8th, 2021

Workshop Report

Adapting Agriculture to Climate Today, for Tomorrow (ACToday)

Led by International Research Institute for Climate and Society,

Columbia University

Acknowledgments

Adapting Agriculture to Climate Today, for Tomorrow (ACToday) is the first Columbia World Project, led by the International Research Institute for Climate and Society (IRI). ACToday Vietnam is partnering closely with the National Institute of Agricultural Planning and Projection (NIAPP) and the Director of International Cooperation who requested that ACToday train government officials at the National Center for Hydrological and Meteorological Forecasting (NCHMF) and Ministry of Agriculture and Rural Development (MARD) on agricultural index insurance.

Clear communication across two languages and two time zones during the workshop was well facilitated by the interpreter Dan Pham despite an unstable internet connection.

Contents

Acronyms

A4NH	Agriculture for Nutrition and Health
ACToday	Adapting Agriculture to Climate Today, for Tomorrow
DCRD	Department of Cooperatives and Rural Development
FIST	The Financial Instruments Sector Team
IMHEN	Institute for Meteorology, Hydrology, and Environment
IPSARD	Institute for Policy and Strategy for Agriculture and Rural Development
IRI	International Research Institute for Climate and Society
MARD	Ministry of Agriculture and Rural Development
NCHMF	National Center for Hydrological and Meteorological Forecasting
NIAPP	National Institute of Agricultural Planning and Projection
VAAS	Vietnam Academy of Agricultural Sciences
VFU	Vietnam's Farmer Union
VHMA	Vietnam Hydrological and Meteorological Administration

Introduction

In 2017, President Lee Bollinger of Columbia University announced a new initiative aimed at improving the links between academic research and real-world problem-solving. Through this initiative, called Columbia World Projects, President Bollinger challenged the Columbia community to identify big global problems and apply Columbia-based research to solving them. The first Columbia World project aims to help countries achieve Sustainable Development Goal

2 (SDG2): “End hunger, achieve food security and improved nutrition and promote sustainable agriculture,” by developing nation’s climate services. The project is called “Adapting Agriculture to Climate Today, for Tomorrow,” or “ACToday,” and is led by the International Research Institute for Climate and Society (IRI), part of the Earth Institute at Columbia University. Another unit at IRI, The Financial Instruments Sector Team (FIST) has been a key partner scaling many index insurance projects around the world. The Financial Instrument Sector Team has developed a suite of weather index insurance educational materials born out of years of experience and expertise that incorporates a participative philosophy through interactive exercises which have been instrumental in the design and the scaling of index insurance products.

To ensure that ACToday’s efforts align with national interests, we work with national partners from agencies responsible for rural development, agriculture, disaster response, and meteorology. In Vietnam, ACToday has worked with the National Center for Hydrological and Meteorological Forecasting (NCHMF) and the Ministry of Agriculture and Rural Development (MARD) to strengthen the forecasting capabilities of NCHMF and to translate these forecasts for use by MARD in their work. This partnership led to the request for training from ACToday on the principles of index insurance. This effort aligns with a directive of the Vietnamese Government to develop agricultural insurance, enabling farmers to better manage risk, facilitate higher productivity, and ultimately working towards achieving SDG2 in Vietnam.

The COVID 19 pandemic has caused significant loss and disruption worldwide, and while Vietnam has had one of the most effective responses to the virus, COVID 19 has posed a significant hindrance to the implementation of the work of ACToday Vietnam. Due to the effects of the pandemic, in-person travel and instruction in Vietnam by ACToday staff are no longer possible and due to a recent increase in COVID-19 cases, the Vietnamese government has placed restrictions on in-person meetings and non-essential business. In response to these constraints, the work of ACToday Vietnam has shifted to being entirely online, posing novel challenges to the instructional approach of ACToday and the logistics of organizing trainings.

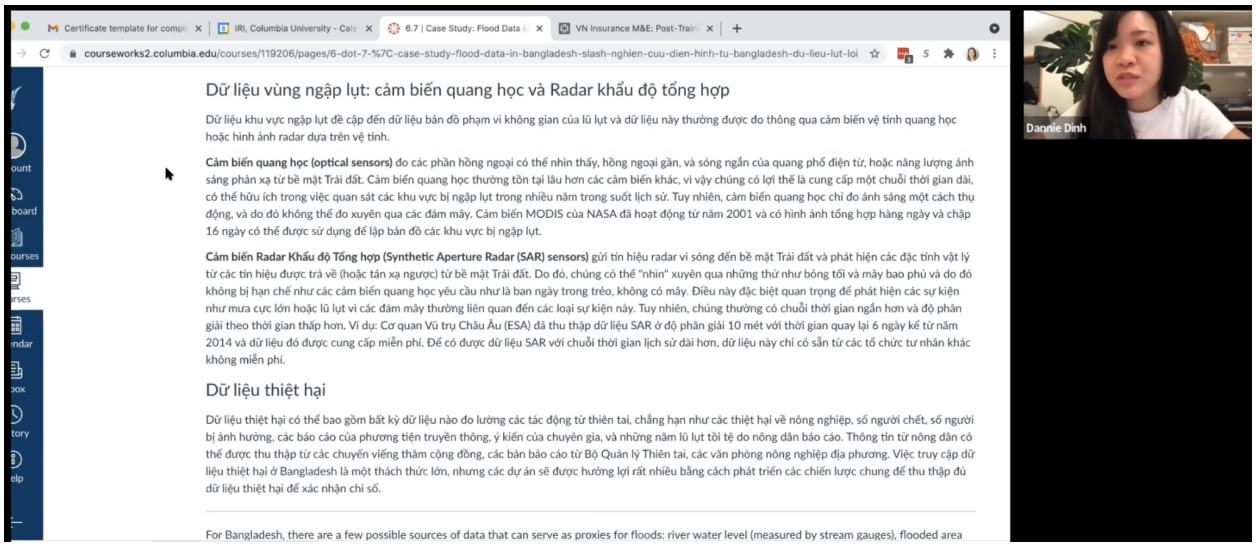
Workshop Objectives

The ACToday Vietnam team, working with FIST, facilitated an online workshop on the fundamentals of agricultural index insurance in Vietnam on March 18th, March 25th, and April 8th, 2021.

The objective of the workshop was to enable stakeholders to best address the needs of farmers through an understanding of index insurance, its advantages and disadvantages, and the role of climate data to make informed decisions regarding future index insurance projects. After an initial government-run agricultural insurance pilot run from 2011 to 2013, the Vietnamese government through Decree 58 issued in 2018, and Decision 22 issued in 2019, implemented a plan of government support for insurance for five agricultural products: rice, cattle, water buffalo, black tiger shrimp, and whiteleg shrimp. MARD has the responsibility for evaluating insurance products and advising farmers on the best options.

Over 25 participants from a variety of backgrounds —including educators, government officials, and private sector consultants working at the intersection of agriculture, climate, and insurance in Vietnam—participated in the 3 live discussion sessions and 14 participants ultimately completed the online course via Columbia's Courseworks platform. Workshop participants represented a variety of ministries and organizations within the Vietnamese government and private sector including the Ministry of Agriculture and Rural Development (MARD), Institute for Meteorology, Hydrology, and Environment (IMHEN), National Center for Hydrological and Meteorological Forecasting (NCHMF), National Institute of Agricultural Planning and Projection (NIAPP), and Vietnam Farmers' Union (VFU).

Through discussions with workshop participants and survey responses, we will identify gaps in the capacity of participants to work with index insurance and to identify what unmet needs still exist. This information, along with the strengths and opportunities for collaboration identified, will be used to tailor future trainings to these needs and to engage in partnerships to proceed with the development of index insurance programs within the agricultural sector



Dannie Dinh of ACToday Vietnam wraps up the conclusion of the workshop

Program & Proceedings

Through the use of Columbia University's CourseWorks learning management system and Zoom software, the workshop was conducted entirely online. The asynchronous portion of the workshop was conducted in CourseWorks and was broken up into seven instructional modules consisting of explanations of fundamental theory and practical considerations of index insurance. These models were available in both English and Vietnamese and included text-based lessons, short multiple-choice review questions, and a discussion forum for posting comments or questions. This self-directed, asynchronous instruction was integrated with three complementary synchronous Zoom trainings conducted with an interpreter for clarity and comprehension.

Asynchronous Training

The asynchronous portion of the training began with a pre-training survey asking the participants their desired outcomes from the training, how they plan to apply what they learn in the course, and how IRI can help them achieve their goals. The first four modules were made available on CourseWorks after the completion of the first synchronous session on March 18th. The final three modules were unlocked after the second synchronous session on March 25th followed by the final live session on April 8th. Though a discussion forum was provided after each module on CourseWorks, no participants utilized this function to share their thoughts or questions. A post-training survey covering participants' thoughts on course material and their plans for applying this knowledge was administered after the final live session.

CourseWorks Modules

1) Why Index Insurance?

- Advantages of index insurance over insurances with certification of loss: cheaper, lower moral hazard
- 3 types of index: Weather, Area Yield, Livestock
- 3 Scales of insurance: Micro, Meso, Macro
- Basis risk: 2 types of mistakes

2) Types of Index Insurance

- Weather - based on weather station and satellite records of precipitation and temperature
- Area Yield - based on the percentage of yield sampled compared to aggregate historical yield
- Livestock - based on remote sensing of vegetation or sampling of livestock mortality

3) What is an index?

- Explanation of contracts window, triggers, exit thresholds, and caps

4) Affordability of Insurance and Pricing Considerations

- Price determined by fees set by insurers, coverage percentage, and uncertainty which can be mitigated by forecasts
- Insurance works best for low-frequency high magnitude events, with trade-offs between coverage, frequency of payouts, and length of coverage

5) Good Practices for Responsible Index Insurance

- “Best Practices” of index design "checklist"
- Insurance is “about” the good year, unlocking its potential
- Insurance has to match the risk, is it better than alternative strategies like using savings or borrowing from friends?
- Indices for index insurance are vetted by historical backtesting

6) Data in Index Insurance

- Elements of a Data Source: latency, temporal resolution, spatial resolution, the historical record of the data set, its cost

7) Building an Index Insurance Program: The Role of Key Stakeholders

- Power imbalances between insurers and farmers
- Index development as a participatory project
- Advantages and disadvantages of subsidies and the role of government

Synchronous Training - Day 1: Thursday, March 18

Presentation

The workshop began on Zoom on Thursday, March 18th in the United States, the morning of the 19th in Vietnam. Bristol Powell from FIST and Dannie Dinh from ACToday Vietnam welcomed the participants to the workshop and introduced themselves. This was followed by a poll asking the participants about their familiarity with insurance. A variety of backgrounds and degrees of familiarity with agricultural insurance were found to be present in the group. There was an explanation of IRI, the ACToday Vietnam project, the FIST group, and the structure of the workshop on both Zoom and CourseWorks. Participants were advised to work on one module a day and ask any questions that arose in the discussion forum in CourseWorks or on Day 2 of the workshop the next week.

Outside of the insurance game, there were fairly few comments and questions by the participants in this session. There was a preliminary question by a participant working in the private sector on what level of actor: farmer, business, or government, this workshop was geared towards, which was answered in an explanation of the three scales of insurance.

Insurance Game Exercise

An insurance game was played to allow participants to view an investment and insurance decision as a farmer might. In the initial setup, the participants had the choice of going into debt to buy a higher price, higher payout rice seed, or choosing a free lower productivity seed for a growing season where the possibility of a severe flood i.e. total loss of investment is 1 out of 5. To invest in the high yield rice, the player needed to take out a loan of 160,000₫ with a successful season resulting in a payout of 1,200,000₫. If the player chose the traditional low-yield rice, no loan was required and the payout was 400,000₫ if there was no flood. There were a nearly even number of participants who chose each variety with slightly more choosing the improved, expensive seed.

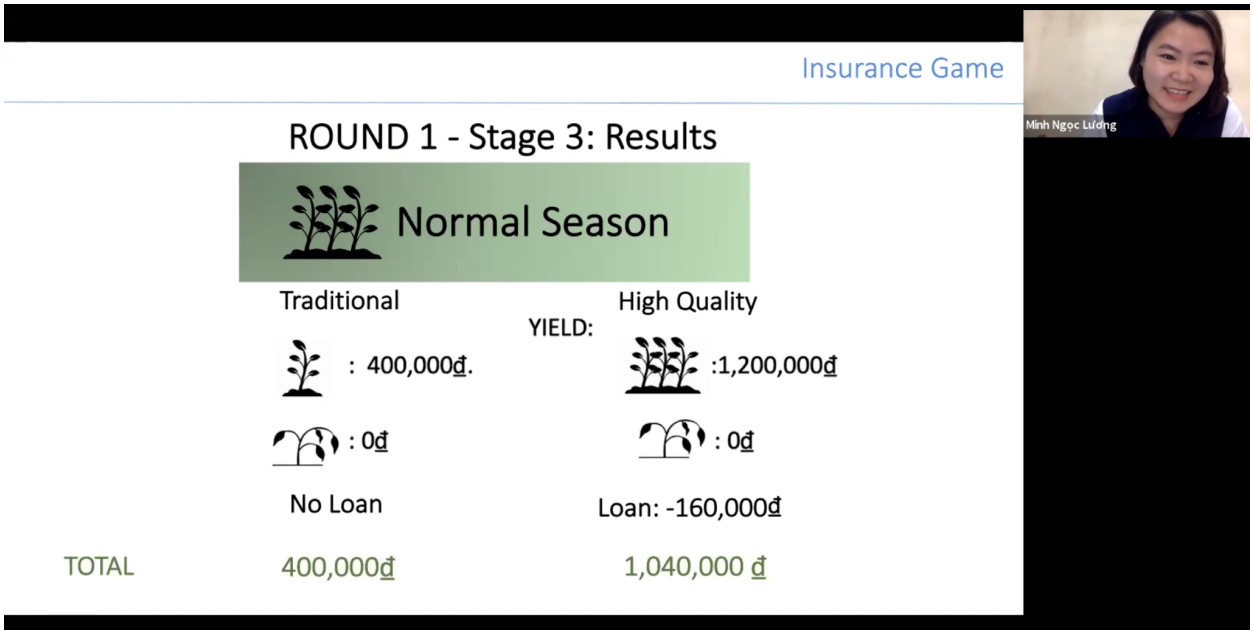
The risk of flooding was simulated by a drawing of pieces of paper representing the two possible outcomes of a bag. In the first round of the game, a non-flood year was drawn and participants earned their full payouts. Before the second round, participants were given the same choice again between the two varieties, and somewhat surprisingly, despite the previous year having been a good one, more people chose the less risky seed than before.

When asked by Bristol if those that had chosen the less risky seed were jealous of those who had chosen the more risky seed and earned more, one participant explained her attitude with a Vietnamese saying translated to “if you want to measure someone's success, wait for the future.”

Another participant explained his choice to buy the more expensive and higher reward seed by noting that even though there is a risk of failure and debt in the first few seasons, the payoff of the improved seed was high enough such that after a few rounds, one will have enough money to have a pool of savings and self insure.

The second drawing of the game also led to a good year.

A new insurance dynamic was added after these first two rounds. An insurance product with a premium of 300,000₫ was added with a payout of 600,000₫ in case of a bad year. This led the participants to have four possible combinations of seed and insurance to choose from. In this scenario, all participants chose to purchase the more expensive and productive seed, with most participants choosing to buy insurance, but not all.



Minh Ngọc Lương of Peapros explains her decision in the insurance game

One participant who chose to not purchase insurance explained his choice with a calculation factoring in the price of insurance and the risk of failure, with the result being that self-insurance is more profitable. This strategy of using savings to manage future risk was commented upon by this same participant who stated that many farmers do not manage their savings very well, and any insurance project should incorporate the promotion of savings within the design of the program to mitigate this behavior. This same participant noted that this game is analogous to the decision by many farmers to either farm rice or farm shrimp by noting that the failure of a rice crop often does not lead to major hardship for a farmer but a failure of shrimp aquaculture, which requires a much larger investment, leads to major debt.

Synchronous Training - Day 2: Friday, March 25

Presentation

Workshop day two began with a round of introductions. Each participant shared their name, their organization, and why they are participating in the training. Ten different people introduced themselves with some participants sharing their computers with multiple people watching the training alongside them. Participants came from a range of government agencies along with one private sector consulting firm and all had some interest in the development of index insurance or the application of climate forecasts. Several participants were currently involved in the piloting of an index insurance project in An Giang Province.

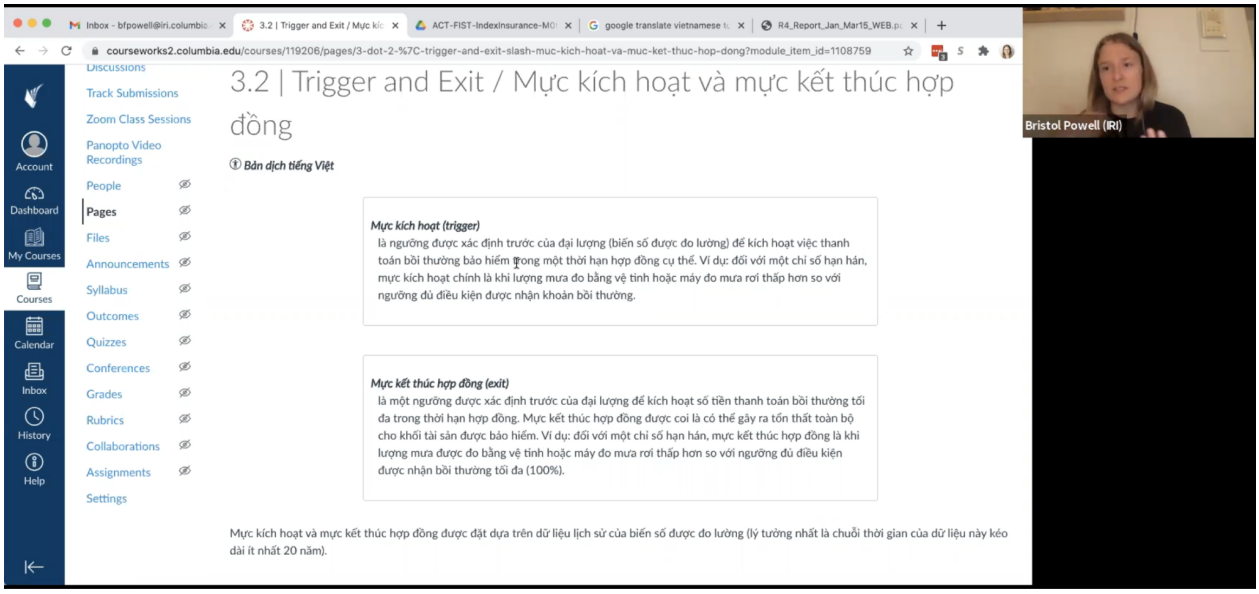
Bristol Powel reviewed modules 1 through 4 covering the fundamentals of what an index is, the basics of how an index is constructed, and how payouts are calculated. Following the recap of the first four modules, there was an open discussion with time for questions.

Q&A Session

Several participants asked questions to clarify or expand upon topics in the modules or the previous live session. Topics addressed included: how moral hazard is reduced by index insurance in practice, the advantages and disadvantages of weather-based, area yield, and livestock insurances, and how a lack of available data is addressed.

Experiences with previously conducted pilot index insurance projects were shared by several participants.

An example of an area yield insurance project was shared by an official working for MARD in An Giang Province. In this case, crop failure was not caused by a sudden flood but instead a slow rise in water leading to several dykes giving way. This led to flooding and crop failure but only for those who farmed just downstream of the dykes. The overall yield in the sample area used by the index was unaffected by the dykes giving way, resulting in no payouts for affected farmers.



Briston Powell from FIST reviews index triggers and exits

One other participant from MARD shared a story of a weather-based index pilot project based on temperature. In this case, several small villages met the temperature threshold of the index and there was a crop failure, but since the unit area of the index was too large to capture these localized spikes in temperature, the temperature captured by the index was only 80% of the threshold, no payouts were made. This greatly reduced faith in these villages in the index insurance project and many people no longer participated.

Both of these examples brought up the importance of the size of the unit area of an index as well as the importance of having the right variable selected and measured as the proxy for crop loss. These stories of past failures also brought up the question of how to get farmers to trust index insurance and come to agreement on its triggers. This prompted discussion of the

importance of an open participatory method for index construction and applications of this approach in Ethiopia, Malawi, and Zambia.

Synchronous Training - Day 3: Thursday, April 8

Presentation

The third day of the workshop began with Bristol and Dannie reminding participants that the modules on CourseWorks would be available for completion until Monday, April 12th. A review of modules 5 and 6 followed; module 7 was not reviewed due to a lack of time at the end of the course.

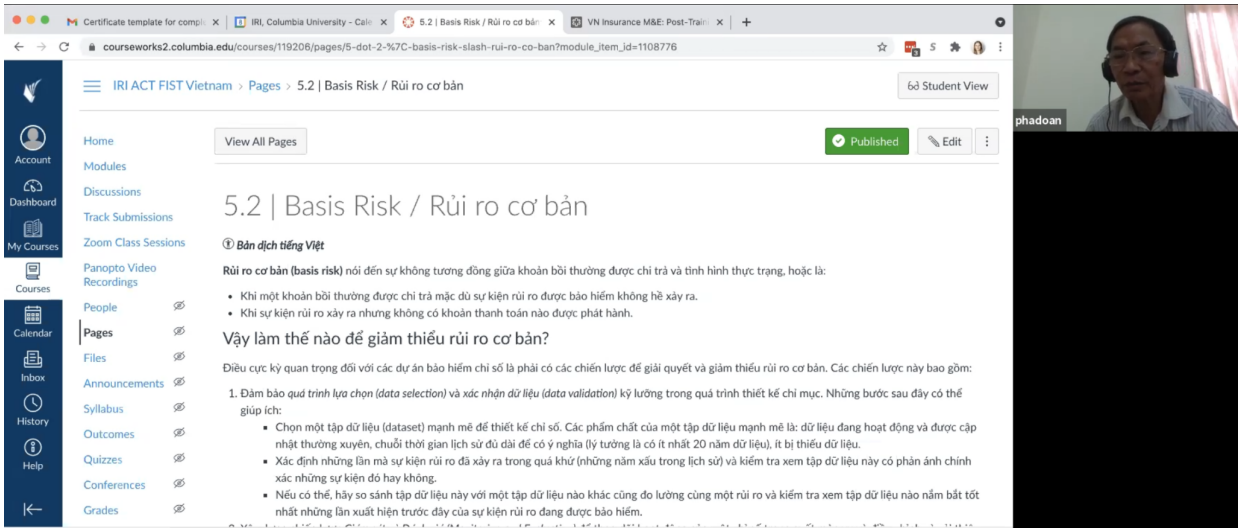
The review began with the presentation of the “checklist” for index creation from module 5, with each of these nine best practices explained, with an extended elaboration of the characteristics of basis risk followed by questions on this topic.

The various kinds of data used in index design, their limitations, and how to mitigate some of these limitations were the topic of module 6, which also prompted a series of questions.

The session ended with a reminder to the participants that they would receive a certificate of completion if they complete all of the modules on CourseWorks, and this was followed by goodbyes, thank-yous, and the end of the workshop.

Q&A Session

The topic of basis risk prompted the official working for MARD in An Giang Province to share more of his experience piloting an area yield insurance from 2011 to 2013 in that province. Despite the dykes breaking and the subsequent flooding of 500 hectares, no payouts were made. The only way that he could manage the risk of dykes breaking at that moment was to try to reinforce the dykes and build them higher. He suggested going forwards that using satellite data may be a more accurate way to measure loss to prevent this basis risk than an area yield system.



Ngọc Phả Đoàn of the MARD recalls his experience with a pilot index insurance

Best practices to reduce the risk of basis risk were shared: using complementary datasets e.g. satellite and meteorological stations, finding robust data sets, with long histories, and no gaps, as well as using a validation process on the index by using historical data and historically known bad years to cross-validate the accuracy of the index. A basis risk fund, an alternative safety net in case of a basis risk event, was also discussed as a way to mitigate the effects of basis risk.

One participant asked whether satellites can be used to measure crop yields for use in area yield insurance. This prompted discussion on the applicability of vegetation health sensing data such as NDVI and how they can be used to cross-validate data but not accurately be used just by themselves.

A researcher from the Center for Agricultural Policy (CAP) shared her opinion about how important improving access to agricultural insurance is and shared a story of how an insurer sold crop insurance policies all across Long An Province but when a large flood inundated the area, the insurer chose to flee the area instead of honoring the payouts the farmers were entitled to. This left the farmers without any access to insurance and distrustful of insurance projects.

The researcher suggested that in light of the need caused by Vietnam's vulnerability to natural disasters and weather events and the current lack of insurance availability, it is important to move ahead and she requested a supplemental course on how data can be used to produce index insurance.

This led to a discussion on how vulnerability to extreme weather and the current lack of agricultural insurance availability has led WFP and other major NGOs to target Vietnam as the next country to develop agricultural insurance solutions and IRI will work to make sure these insurance systems are responsibly implemented

Synthesis of Comments from Surveys

Pre-Workshop Survey Responses

Before the beginning of the workshop, participants indicated in a survey that they were interested in having a general understanding of index insurance and its applicability to the Vietnamese context. The MARD is constructing a framework for the development of index insurance in Vietnam and several participants from the MARD noted that knowledge from this workshop would be used in constructing and analyzing that framework. Several participants working with the MARD Sustainable Agriculture Transformation (VnSAT) to implement a pilot index insurance project in An Giang Province also anticipated that the workshop would improve their work in the pilot project. Other participants noted their desire to use information from the course in topics outside of agriculture, such as disaster management and healthcare. Participants were interested in taking advantage of IRI's experience, having helped implement index insurance in other countries, to improve the calculation of and choice of an appropriate index adapted to agricultural production in Vietnam.

Post-Workshop Survey Responses

After having completed the workshop, participants responded in surveys that the most important aspect covered by the training was the differences between the different types of index insurance and the best practices for what considerations need to be taken into account when creating an index.

Participants saw opportunities for cooperation between farmers, the Vietnamese government, weather forecasters, and foreign institutions to work together to produce agricultural insurance that works for Vietnam. This included representatives from IPSARD, CAP, Peapros, MARD, and NCHMF who all saw opportunities for new partnerships in establishing agricultural index insurance.

After having completed the training, participants indicated that they felt more comfortable assessing potential index insurance projects in Vietnam. They also noted they would be more informed in their discussions with farmers and more capable to advise them on what kind of risk management strategy would work best for them. Members of the NCHMF indicated that they felt more comfortable projecting potential risks for farmers based on their weather predictions.

While some participants responded that they may not be utilizing this training in their work going forwards, other participants noted they will be using this information in their work on constructing indexes for pilot projects and when they advise farmers.

A representative from MARD indicated that information from the workshop will be integrated into training materials that they are developing on agricultural insurance services. A forecaster at NCHMF stated that with this information and technology, they will produce a forecast bulletin better tailored to the needs of each province.

Workshop Effectiveness

Twelve participants rated the increase of their comprehension in five aspects of index insurance after the training on a scale from 1-5, with 1 being no increase in knowledge and 5 being a significant increase in knowledge.

On the question of how much their comprehension increased on the topic of weather-based index insurance, participants rated themselves as having learned a large amount with the average rating being 4.25 and only one participant rating themselves at level 3, a moderate increase in knowledge.

For the second question asking how much their comprehension increased on the topic of weather-based index insurance triggers payouts, participants rated themselves as having learned a large amount with the same high the average rating of 4.25, although with different people ratings themselves at 4s and 5s and with only one participant rating themselves at the level 3

On the third question, how much comprehension increased on the topic of how insurance can unlock productive opportunities, participants rated themselves as having learned the highest amount out of the five topics, with the average rating being 4.33 and again with only one participant rating themselves at the level 3

On the question of how much their comprehension increased on the topic of data characteristics in index design, participants rated themselves as having learned only a moderate amount, with the average rating being 3.66. Four participants rated themselves at level 3, and one participant at level 2, a limited increase in knowledge

For the final question, rate how much their comprehension increased on key considerations for responsible index insurance, participants rated themselves as having learned a large amount with the average rating being 4.00, with one participant rating themselves at 3 and another at 2

One participant had considerably lower self-ratings of comprehension compared to the other respondents, giving themselves two 2s and two 3s, suggesting that they had a difficult time understanding the contents of the workshop or they rate themselves, in general, more critically than other participants.

Participants' Recommendations

In the post-workshop survey, participants responded that they would have liked to have spent more time on the role of data in index insurance design and the design of weather-based indices. This is demonstrated by the low rating participants gave themselves on their comprehension of this topic. A researcher from IPSARD wanted more time to learn about how the participative process of engaging stakeholders worked in the development of agricultural index insurance.

Participants felt like they needed more actual practice to better understand how to use data to calculate the insurance index, its coverage, and its costs. Other participants responded that they

wanted more information on how to manage basis risk and other key considerations for responsible index insurance.

Participants saw a role for IRI going forwards as a provider of further trainings in data analysis to aid in index design. Multiple participants responded that IRI could provide a more advanced course on some of the topics introduced in this workshop such as calculating insurance rates and data analysis for index creation. To be the facilitator and coordinator of a meeting of insurers, experts, and government representatives was also a role suggested by a participant for IRI going forwards. Representatives from the NCHMF recognized that IRI could improve their capacity through the climate tools IRI has developed and its experience producing seasonal forecasts.

Next Steps

As indicated by participants in their survey responses and in workshop discussions, there is strong interest in a more technical and in-depth training on index insurance design and management. While ACToday Vietnam will not have the time and resources to provide this training in this current project's funding window, ACToday will continue to provide support to our partners in Vietnam and will work to take stock of existing knowledge and resources to facilitate future trainings once funds are available.

A future workshop should go into further depth in the most requested topics: the role of data in index insurance design and the engagement of key stakeholders. Based on observations and feedback, a future workshop should emphasize applications and hands-on practice and should promote more discussion amongst the participants. To better understand the participant's unmet needs and the current applications of index insurance in Vietnam, several participants will be contacted to collect feedback on training effectiveness, to assess uptake of the course material, and to scope the current status of their index insurance projects in Vietnam.

These interviews will be a component of research culminating in a white paper on the current index insurance landscape in Vietnam to be published on the IRI website. The paper will facilitate further work in index insurance by mapping out the legal and policy environment, the results of previous pilot projects, and what projects are currently being implemented. This assessment will require working with colleagues in the Vietnam Ministry of Agriculture at the national and provincial level and with the CGIAR's Center for International Tropical Agriculture (CIAT) and the Financial Instruments Team at IRI.

To provide a freely available, non-technical explanation of the types of index insurance and demonstration of FIST's work, a list of all implementations of index insurance that FIST has worked on will be published on the IRI website. This list will consist of case studies written in narrative form featuring the crop insured, the stressor the crop was insured against, and which index type was chosen to manage that risk and why. Some of the material on the theoretical background of index insurance from the asynchronous portion of this workshop will also be incorporated into a document on IRI's website. These documents will serve as an introduction to

index insurance to engage the non-specialist reader and serve as “teasers” of the full services of FIST and IRI.

Annex 1. Participant List

First Name	Last Name	Affiliation	Role
Tình	Thái Văn	IPSARD	Researcher
Kevin	Vu	Columbia SIPA	Masters Student
Hai	Nguyen	IPSARD	Researcher
Hai Nam	Bui	National Institute of Agricultural Planning and Projection (NIAPP)	Director - International Cooperation
Thi Hoa	Dinh	MARD DCRD	Specialist
Hoàng Việt	Lê	MARD Sustainable Agriculture Transformation (VnSAT)	Technical Staff - An Giang Province
Ngọc Phả	Đoàn	MARD Sustainable Agriculture Transformation (VnSAT)	Deputy Director of the Provincial Project Management Unit (PPMU) - An Giang Province
Thị Thu Huyền	Hoàng	VAAS	Researcher
Thi Mai Huong	Hoang	Vietnam Farmers' Union	Head of Marketing and Business
Thị Xinh	Lê	Vietnam Farmers' Union	Specialist
Van Huong	Nguyen	NCHMF	
Bá Hưng	Nghiêm	PEAPROS Consulting JSC	Manager
Minh Ngọc	Lương	PEAPROS Consulting JSC	Vice President
Nhu Hanh	Nguyen	2NF Software Co., Ltd.	Programmer

Quốc Minh	Trần	Agricultural Projects Management Board (APMB)	Official - An Giang Province
Nghia	Ta Huu	DCRD	Manager - Poverty Reduction and Rural Social Security Department
Hoàn Quý	Lê	MARD Sustainable Agriculture Transformation (VnSAT)	Monitoring & Evaluation Officer - An Giang Province
Tuan Linh	Nguyen	IPSARD	Researcher
Hữu Thành	Lương	Institute for Agricultural Environment (IAE)	Head of Environmental Biology
Thi Viet	Bui	Center for Agricultural Policy (CAP)	Researcher
Xuân Hương	Hồ	School of Interdisciplinary Studies (SIS) Vietnam National University, Hanoi	Official, Training Department
The Hung	Doan	Research Institute for Rural and Highlands Development	Vice President
Thị Bích Phương	Nguyễn	Ministry of Planning and Investment - Academy of Policy and Development	Lecturer, Faculty of Economic Development
Nguyễn	Anh	IMHEN	Official
Thi Mai	Hoang	NCHMF	Weather Forecaster
Ngoc Van	Tran	NCHMF	Weather Forecaster
Thanh Hoa	Nguyen	NCHMF	Weather Forecaster
Bristol	Powell	IRI, Financial Instruments Sector Team	Senior Research Staff Assistant
Dannie	Dinh	IRI, ACToday Vietnam	Program Officer
Dan	Pham		Interpreter