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**Climate Change,
Agriculture and
Food Security**



Workshop report: Mobilizing a CGIAR Agricultural Insurance Research Community

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Mobilizing a CGIAR Agricultural Insurance Research Community

Workshop Report

CGIAR Research Program on Climate Change,
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Abstract

This report summarizes the proceedings of the workshop; “Mobilizing a CGIAR Agricultural Insurance Research Community,” held in Washington, D.C., January 20-22. 29 participants representing 14 CGIAR Centers (AfricaRice, CIAT, CIMMYT, ICARDA, ICRAF, IFPRI, ILRI, CCAFS, IWMI, IRRI) came together to participate in the workshop. The CCAFS Regional Programs of East and West Africa, and South and Southeast Asia were also represented. The workshop aimed to mobilize a community of practice on weather-related insurance for agricultural development and adaptation, take stock of relevant expertise and approaches across the CGIAR, and inform the development of funding proposals under CCAFS Flagship 2: *Climate Information Services and Climate-Informed Safety Nets*. Three opening keynote speakers provided background on index insurance and some of the successfully scaled projects, creating a context for the broader ideological discussions to follow. Some topics discussed included the use of index insurance as a development tool and as part of a greater risk management strategy; how agricultural research can engage the insurance industry; and index insurance data challenges. The second workshop day involved a mapping activity, to take stock of the activities of the CGIAR around the world in agricultural insurance as well as capture the methods, innovations, tools, and gaps and challenges of these projects. The third day supported workshop participants to explore synergies, and take advantage of writing a proposal for a funding opportunity through CCAFS. This workshop guided participants to share ideas, knowledge, approaches and resources, fostering a stronger community of practice across the CGIAR centers. Outputs from this workshop include a more populated community of practice website, several projects on index insurance approved for funding through CCAFS, and plans for a journal special issue.

Keywords

Index insurance; climate risk management

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Introduction

Since index insurance is a significant component of CGIAR Research Programs on Climate Change, Agriculture and Food Security (CCAFS) and on Policies, Institutions and Markets, (PIM), these two CRPs decided to co-organize this workshop. Most CGIAR Centers have some activity or expressed interest related to index insurance. Although Centers can offer a range of expertise and approaches to index insurance, there is a need and opportunity to unite across Centers around a shared vision and common framework for thinking about the roles insurance can play in addressing climate-related development and adaptation challenges. This workshop was designed to identify and create synergies, while also increasing visibility of insurance within the centers. Through greater intra-Center collaboration, there is potential for relevant development organizations and private sector partners to see greater opportunities to partner, which could help position the CGIAR's insurance research community to have greater impact.

CCAFS (Jim Hansen) and PIM (Maximo Torero) jointly sponsored and organized this workshop as an early step in an effort to foster greater coherence and collaboration to the CGIAR's work on insurance. The workshop's specific objectives were to:

- Bring the community together around a shared vision and a consensus framework for understanding the contributions of insurance to agricultural and rural development and adaptation goals;
- Take stock of relevant expertise and approaches across the CGIAR; and
- Inform the design of viable Outcome-driven proposals for an upcoming call under CCAFS Flagship 2: *Climate Information Services and Climate-Informed Safety Nets*.

The workshop was designed to place more emphasis on pathways toward development outcomes than on specific research challenges.

Workshop program

The first day of the workshop agenda (Appendix 1) gave workshop participants opportunities to develop a shared vision for the potential ways that insurance can contribute to climate-related challenges, and consensus around “big-picture” issues. The program opened with three independent (non-CGIAR) keynote presentations to address (a) a typology of functions that insurance can play in climate-resilient agricultural development; (b) a survey of recent and anticipated advances in index-based insurance for agriculture in the developing world, with emphasis on where it is currently scaling; and (c) current insurance and re-insurance industry approaches to index-based insurance. Following the keynotes, the workshop participants engaged in discussions on the role of index insurance in a broader development context.

The second day was designed to share information about the relevant expertise, experience, and approaches across the CGIAR Centers. A mapping exercise identified index insurance activities, strengths, tools, methodologies, and innovations across the CGIAR. After a representative presented on his or her center’s activities, the centers were mapped both on a paper map and on a digital Google map. Discussions emphasized identifying approaches, tools and resources that could complement what other Centers had to offer.

The third day was focused on guiding participants in the preparation of Concept Notes under CCAFS Flagship 2. With an explanation of the priorities and process to apply as well as evaluation criteria, participants had an opportunity to discuss collaboration opportunities with other participants. When groups felt prepared to present their proposal, the rest of the participants provided feedback to strengthen and fine-tune the concept note.

Session 1. Workshop opening

Jim Hansen of CCAFS opened the workshop with an introduction to the themes to be discussed over the course of the three days. Day 1 focused on developing a shared vision for the potential ways that insurance contribute to climate-related challenges, and consensus around “big-picture” issues. Independent (non-CGIAR) keynote presentations provided (a) a typology of functions that insurance can play in climate-resilient agriculture development, (b)

a survey of recent and anticipated advances in index insurance and where projects are scaling, and (c) current insurance and re-insurance industry approaches to index-based insurance.

Michael Carter of UC Davis then gave a keynote presentation about his work in index insurance research. Potentially, insurance can relax risk and capital constraints that limit the adoption of better technologies. Through examining several case studies, Carter highlighted that when risk is minimized, people invest in the quality of soil. One strategy for increasing uptake of insurance products is to bundle products with other risk management strategies and technologies, such as drought tolerant crop varieties. When looking at bundling maize insurance, as in Kilimo Salama, there are some challenges with uptake and monitoring success. Drought tolerance is a longstanding breeding objective, but whether or not it would be enough of an incentive to encourage uptake of insurance is unknown. There are also learning challenges in working over a mid-range of drought tolerance. Spreading word and disseminating knowledge of this technology and bundling technique is challenging, as is the ability to encourage farmers to adapt new technologies that may not cover the full extent of risk. However, bundling technology to cover a mild drought (drought-tolerant crop varieties) and index insurance to cover a more extreme drought can cover more of the associated risks than each of the technologies alone. On the other hand, asset protection, as found in livestock insurance, can smooth consumption. With this sort of asset protection, uptake of risky technologies can incentivize accumulation of higher yielding but riskier assets over time. This sort of risk taking behavior is especially strong in the presence of asset-based poverty traps. Risk transfer instruments of all kinds, not just insurance, can play an important role in a transitional strategy out of poverty. To increase uptake of all kinds of insurance, a contract structure that makes small payments frequently could build trust in the client base. The behavior of the client base can be influenced by what is certain versus what is uncertain. Projected onto an insurance contract, what is certain? The client must pay the premium each year. However, the strategy of a relatively small payment is meant to address people's preferences.

Dan Osgood of the International Research Institute for Climate and Society (IRI) then gave a second keynote presentation about several scaled index insurance projects, and how they got there. Although some projects do not reach more than a couple thousand clients, others scale further. Osgood noted that successful index insurance projects require practical choices that

depend on the context of the site in which insurance is being used. Insurance should be thought of as an adaptation strategy to increase productivity in normal years to cover the loss experienced in bad years. Strategies that increase productivity in most years face increased risk in bad years. Basis risk is not simple to minimize, but it hopefully allows people to take advantage of their opportunities. When looking at various cases of scaled projects, one way to increase uptake is through subsidies and having a compulsory insurance product attached to a bank loan as in India, or without subsidies, but with farmer-driven, participatory design as in R4 in Ethiopia and Senegal. Technology and bundling strategies can also explain some high uptake as seen in Mongolia's Index Based Livestock Insurance Program (IBLIP) with bundling insurance with other risk management products and reducing risk for insurance companies, or Index Based Livestock Insurance in East Africa's asset insurance and using inexpensive technology to predict payouts (satellite data correlated with livestock mortality rates), or Kilimo Salama's strategy of combining bundled insurance products and inexpensive distribution technology. All of these projects designed these insurance products to target a specific risk, to target appropriate groups and levels of risk to leverage other risk management, and make insurance the final piece of a risk management package. People who benefit from these insurance schemes guided the design to understand the strengths and vulnerabilities of the index and can build packages appropriate to their opportunities and risks. These projects build on strong relationships, solid science, strong distribution methods, validation and improvement, transparent, understandable products, and were built slowly from a solid foundation. Although basis risk is a central and inescapable component of index insurance, solid science approaches can minimize it as well as a specific insurance product. However, assessing impacts of these projects is difficult because of time and spatial scales.

Kolli Rao of IRICS/Aon Benfield gave a presentation on agricultural index insurance in India.. The risk covered in India's national insurance schemes is based on production cost. There is minimal distribution cost because insurance is mandatory with a line of credit from a bank. About 12% of people purchase insurance alone, without the bank loan. The claims process is automated, enabling easy transactions. Private insurance providers also offer insurance options, and can have the same level of government support as the Public Insurance Company (AICI). The weather index products in these competing insurance providers also showed significantly different product designs, pricing approach, and benefits. In 2013, a total of more than 31 million farmers held insurance policies. In some products, the correlation

between rainfall and experienced loss is higher than other products that use a heat parameter in the index. Generally, though, weather index products frequently overpay, with a little less than 50% of people experiencing payouts even with no experienced loss, and at the same time, over a quarter of people did not receive a payout even when they lost their entire crop. The spatial basis risk is high due to sparse weather stations. The present weather index product is complex and fares poorly as an insurance mechanism because the payouts are too frequent and too small. Awareness of insurance is driven by level of education, size of landholding and type of farming. Of those protected, about 90% are aware of what risks are covered with insurance, but many may not know where or how they receive payouts.

Session 2: Topical discussions

There were four sets of topical discussions associated with this second session. Participants were grouped into topical breakout groups to discuss four questions, and then summarize the discussion in plenary:

- How does index insurance help with rural development?
- How can insurance be designed to complete the toolbox of risk management in rural development?
- How can index designers correctly use data for design and validation?
- What does the business side of index insurance look like?

Topic 1: How can index insurance help in rural development?

Neha Kumar of IFPRI facilitated the first discussion on how index insurance can help in rural development. Impoverished people face multiple risks, and weather related risks affect food security and people's livelihoods. Formal insurance options are absent in these sorts of places, and informal insurance is often inefficient. Without a safety net such as insurance that can enable risk taking, many poor farmers make suboptimal agricultural decisions, which can lead to low productivity. There are several issues with using index insurance to enable and promote rural development. There are issues with selling an insurance product – on the demand side and supply side, there are operational aspects with the performance of the products, and measuring the impacts of the product across multiple spatial and time scales. Many studies on insurance focus on the number of participants rather than the impacts of

index insurance on rural development. With few studies on index insurance, it is also unclear how sustainable it is as a tool to alleviate poverty and manage risk. There is also minimal evidence on how insurance impacts other agents in the value-chain, and how they can be engaged in the insurance process. Studies also do not show how index insurance can engage with both genders as well as reduce disparity between men and women.

Three questions framed the subsequent group discussion:

1. What do we know, and what do we still need to learn, about designing appropriate index-based insurance?
2. What makes some index insurance projects more successful than others?
3. How can long term panel data be used; going beyond the household level to address e.g. gender?

The goal of index insurance is to cover expenses that allow farmers to take advantage of opportunities for better yields. Currently, index insurance targets farmers who operate as a business. It may not be the right tool for subsistence farmers. In some locations, technology exists and supply chains exist, but there is not always a successful insurance project. The subsequent group discussion noted that even where index insurance is not an engine for development, it can at least serve as a safety net.

The research community has the tools and should potentially try to identify what elements need to be in place to yield a successful index insurance product. With a targeted design, researchers could identify what elements are needed for a successful product. One unknown that an index should try to quantify is the probability that there will be a payout in a bad year. This unknown changes case-by-case, and product-by-product.

Current projects were thought to focus too much on uptake and access. Researchers need to study the impacts of index insurance and then look at whether or not these impacts lead to rural development. Another challenging is assessing the impacts of an insurance product with only minimal uptake, which is typical in many projects. However, subsidies during the initial rollout and pilot period can lead to increased uptake.

It was noted that people in the value chain may be important as potential partners to get involved and invest in the product. Researchers and implementation partners should think

about marketing the product differently in order to target both genders and expand the client base. Index insurance has a complex puzzle of players, including cooperatives, suppliers, farmers, etc., and can affect each differently.

It was noted that across different spatial scales, an index can perform differently. As such it is important to identify what makes “better practices” in index design better, to understand how they apply across scales. Another question to consider is how the project grows and evolves after the initial development process. Indicators of success depend on all elements and players. Bundling of products with other resources and technology adoption could improve uptake and rural development, but not necessarily in the intended way. Finally, it was noted that there should be greater transparency in the payout process. Currently, there is a lack of clarity in payouts, and payouts are not always the same size as the loss experienced.

Topic 2: How can insurance be designed to complete the toolbox?

Miguel Robles of IFPRI then presented an overview of how insurance can be designed to complete the toolbox of risk management strategies for rural development. The toolbox includes other risk management tools and financial options. The issue is whether index insurance should stand alone, or be used or bundled with these other tools. Bundling has advantages and disadvantages that are context, site, and stakeholder specific. Insurance and re-insurance industries seem interested in bundling index insurance with other risk management tools.

Three groups of questions were proposed to frame group discussion:

1. Should insurance be combined with other financial products? If so, how? What theory supports the claim? How can we generate conclusive evidence to answer this question?
2. How do we effectively link insurance with other risk management options to unlock productivity? Should we propose mandatory combined products?
3. How can we make sure index insurance is responsibly covering the important losses?

The workshop participants noted that bundling with other financial products such as credit and savings would reduce costs over time, especially for better off farmers. However there may be complications due to the farmers’ perception that they may lose savings if they opt for insurance. Participants were in consensus that additional risk management is needed to protect

risk management assets. In India, for example, farmers prefer to invest in other risk management strategies—but there is more work needed. Other risk management options include access to seasonal forecasts. The question of whether subsidies are needed was raised. Index insurance does not cover full investment in productivity increasing options, but hopefully can incentivize behavior change.

It was noted that bundling insurance must have an added value for farmers. This could work with correlated risks, as a complementarity. Index insurance designers should work with a trusted provider in the bundling process. They should test farmers' preferences for bundling by offering products as a bundle and the same products separately. The cost effectiveness of the bundle and the ease of transaction should be considered as well.

Topic 3: Data and index design challenges

Helen Greatrex of CCAFS/IRI provided an overview of the issues with data in index validation and design. Data poverty is an issue in many countries, especially in poorer regions with less climate data collection infrastructure. With many index insurance products, historical weather data for the past 30 years is needed to quantify risk. However, with technology and knowledge of agro-meteorology, it is possible to model the information in the index insurance context. Weather stations, rain gauges, robust historical yield data, and mortality rates (for a livestock index) are all data that can be used in the index design. There is, of course, a balance to strike between using all available data for the index design, and making sure there is enough data to validate the index. Surveying farmers about their experienced loss can also validate the index. Communication of the product, new technologies, and basis risk, is also a challenge with using data in index insurance. Satellites, agro-meteorological data, statistics, and directly gathered farmer data can all be used for indexes, and more emerging opportunities in data collection and processing enables greater use of the available data.

The overarching question for group discussion was: How can we work better with data providers to correctly use data in index insurance design and validation? The discussion covered the use and limitations of data from meteorological stations and satellite remote sensing, and on knowledge from agrometeorology and from farmers.

The use of satellite data in index design is an important issue. IBLI, for example, has had issues in resolution and crop filters in order to distinguish types of edible vegetation as it is measured with NDVI. Satellite data continues to improve over time. Satellite data is still noisy, but is still improving, and noise is being reduced. The data is generally trusted but farmers may be more suspicious of it than ground data. Currently, the highest resolution used is 250 m². Agricultural model coverage is low because historical data is low. Adding time resolutions can improve current time series. Soil quality is important, too, in agricultural models, but sometimes it is not captured in climate data.

Data is related to design. Public funds could subsidize climate data acquisition. There is a limit to meteorological data, since many maps can be used to make different predictions. There are challenges in updating data, mostly because it is very costly. It is also important to keep in mind how reinsurers use data. When considering probabilities, there are always huge standard deviations in considering worst-case scenarios. When computing probabilities, computing tails rather than mean or median is critical, but is difficult to do accurately. Farmer input is important in assessing impacts. Farmer knowledge can be used in design to validate and modify the triggers and windows.

Topic 4: Doing business with the insurance industry

Daniel Osgood (IRI) presented on the business side of index insurance. The issue about index insurance is that it does not seem to be a quick money making endeavor for insurance companies. It takes several years for projects to prove lucrative. Insurance should be profitable for farmers, profitable for insurance companies, fair to both of these parties, reliable and responsible, and without surprises. For people building projects, it is important for the insurers and reinsurers to cooperate, offer farmers good and fair prices, and make sure it is a worthwhile project. From the insurer's perspective, they are interested in a predictable, responsible, understandable, and reliable project, as well as sufficient data, a credible business model, good prices, and a worthwhile project. The index structure, distribution methods, and demand, affect these elements for the insurance and reinsurance companies.

Four questions were presented for group discussion:

1. What might be attractive and what might not be attractive to the insurance industry?
2. Are farmers getting their money's worth from the insurance?

3. What kinds of options exist in insurance delivery?
4. When does insurance make sense at individual, group, large scales?

It was noted that delivery can be inexpensive and effective through mobile phone banking. Plus, mobile technology can be used for validation. Group insurance is attractive for the industry but it hides individual basis risk. A proposed solution is gap insurance as a secondary mechanism to cover individual loss, but it has to be very context specific and comes with its own risks. The feasibility of a business plan depends on what data is available and whether or not technical thresholds are met. The business feasibility also depends on the profit motive in the short and long term and the regulatory obligation of the insurance company. There is also high reputational risk for the company. Interests of the farmer and the company should coincide for a successful business venture.

Delivery depends on institutional structure. Partnering with an NGO in rural areas could help with delivery, although, this is not necessarily applicable for urban areas. Mobile phones and technology show opportunities to increase efficiency and help to reach scale.

Insurance companies could be drawn to index insurance because it offers new business areas. Insurance companies may also be interested in improving their corporate social responsibility. However, risks, insufficient data, and complicated delivery could deter many businesses from pursuing index insurance. Bundling insurance with ICTs, loans, credit, fertilizer, and seed for example, as well as use of mobile phones for easy delivery can make index insurance more appealing for companies. Microinsurance coupled with index insurance is another appealing bundling option for insurance companies.

Index insurance has the potential to reach both smallholder farmers and cooperative level, giving the insurance company options of products to cater to these groups. Insuring livestock in addition, could increase scale. Insurers likely want a diverse portfolio. Profitability may be higher in some geographic regions than others. Businesses should look for that critical mass.

The companies should delineate for subsistence, transformation to commercial through public-private partnerships. Over time, insurance sales should become more consistent. Subsidies can sometimes be acquired to increase participants, but there are moral hazards that may come from subsidies. Farmers appreciate timely payouts. In India, for example, payouts

allow recovery of 80% of the cost for premiums. Online enrollement can be a way to increase uptake. In India, for example, the Common Service Center model is used.

Session 3. Mapping where the CGIAR works on agricultural insurance

The second day (sessions 3 and 4) focused on taking stock of (a) the locations where the CGIAR works on insurance, (b) the types of insurance applications, and (c) the range of methods and expertise that CGIAR researchers bring to the table. We also examined how CGIAR capacity aligns with the interests of development organizations and funders. External resource people provided feedback on CGIAR strengths and value-addition. To capture what, where, and with whom, each Center gave a 10-minute overview of their portfolio of insurance-related work.

IFPRI first gave a presentation on their work in index insurance projects. IFPRI has great strengths in its facilities as a research institution. They have conducted six research projects in Ethiopia, India, Uruguay, Bangladesh, and Egypt from 2009 to the present day. They have worked with theoretical models, experimental games, Pilot provision, Randomized Control Trials (RCTs), and product design. The studies have targeted weather based index insurance on smallholder farmers. The risks covered in these projects range from drought, deficit and excess of rain, rainfall deficit corresponding to area yield, and high temperature. Crops covered include soybean, wheat, chickpea, barley, maize, paddy, potato, and tomato. In most of the projects, small farmers are covered, but in the case of projects in Uruguay and Bangladesh where most farmers own 15 hectares and 0.5 acres respectively. Partners involved in these projects include Nyala Insurance Company, National Meteorological Agency of Ethiopia, CRM, HDFC Ergo Insurance Company, Sigma, Microinsurance institution Buusaa Gonofaa, Oromia Insurance Company, I4, USAID, BSE Insurance company, National Met Agency of Uruguay, Uruguay's Department of Agriculture, Radar (Survey company), IADB, BRAC, Gram Unnayan Karma Meteorological Department of Bangladesh, Bangladesh Bureau of Statistics, Bangladesh's Ministry of Finance, Data Analysis and Technical Assistance, Planet Finance, and Social Fund for Development. A couple of the research projects do not yet have clear lessons learned, but others do. Simple and flexible products seem to matter. Price, distance to weather stations, and insurance literacy are demand drivers. Demand is strong when farmers are offered high quality insurance products with low basis

risk. Complementary financial products are also important (savings and lending). Discounts are preferred over rebates. Timing of rebate payment matters – more attractive if the rebate would pay out in the lean/liquidity-constrained period.

Sonia Akter presented on behalf of the International Rice Research Institute (IRRI). A prominent project operated by IRRI is Remote Sensing-Based Information and Insurance for Crops in Emerging Economies (RIICE). Countries where RIICE operates include India, Bangladesh, Thailand, Vietnam, Cambodia, Indonesia, and the Philippines. The risk RIICE addresses is low agricultural production due to extreme weather events. They have developed leaf-index insurance using very high-resolution satellite imagery. Partners include Sarmap, Allianz, CCAFS, GRISP, and GIZ. One example of application is that RIICE estimated damage from typhoon Haiyan.

The International Maize and Wheat Improvement Center (CIMMYT) specializes in providing bundled information and financial services directly to farmers. CIMMYT researches MasAgro Movil, Kilimo Salama, and Bangladesh agricultural index insurance project. CIMMYT performs assessment, design, development, and implementation of insurance products for already existing Mexican insurance companies (in MasAgro Movil). RCTs, marketing and distribution of product via agent network, and extensive public, and private partnerships to reach scale and sustainability are important elements to the projects as well. The indexes in Mexico measure drought and hail, and these indexes typically cover maize. In Bangladesh, the index targets flood and hail risks for maize, and is measured with NDVI, river height, and average rainfall. Partnering with local microfinance institution, Grameen Jana Unnayan Sangstha, CIMMYT has learned that weather index insurance has the potential for increasing adoption of high-risk-high-return crops, multiple weather risks can be covered in the index, farmers are most interested in insurance for hailstorms in Bangladesh which is not simply measured at weather stations, insufficient data for flood modeling for a rainfall index, and insufficient resolution to use RS data for a flood index. Multiple parameters need to be combined in a hailstorm index, which can be hugely complicated.

The International Center for Tropical Agriculture (CIAT) presented on the center's work with bean crop index insurance. CIAT uses current climate and soil data in crop models that can estimate a century of historical data, which is used in the design of the index for dry bean farmers in Nicaragua. The insurance is offered in drought prone areas of Nicaragua, and in

some areas, coupled with micro-finance services, modified to reflect adjustments to soil and water management. Demos and data libraries to cover prospective areas, trial workshops with Microfinance institutions in three regions to improve pricing and appeal to microfinance institutions, and improved weather stations and payout mechanisms will strengthen the insurance product in Nicaragua, Honduras, and other parts of Central America.

The International Center for Agricultural Research in Dryland Areas (ICARDA) specializes in dryland farming systems, wheat productivity, and food security in arid and semiarid environments. ICARDA's research projects have been conducted in Syria, and are currently in the pipeline in Morocco, Kazakhstan, and Uzbekistan. They have worked in product design, impact evaluation, and experimental games within these projects. The indexes were designed to protect against low rainfall, yield shortages, price fluctuations, and river discharge. The crops that the insurance projects cover include wheat, cereal grains, cotton, and other crops. The indexes used in these projects include NDVI, RD, area yield, rainfall, price, water levels, and evapotranspiration. The projects target protecting small farmers, governments, international agencies, and medium scale producers. Partners include NAPC, INRA, Met Agency of Morocco, Soyuz Atameken, Kazakhs Space Agency, AgroProm, and KRASS. Some innovations include risk-pooling options for protection. ICARDA's long experience with international projects, state interests, religious questions, have enabled strong relationships with various stakeholders in their projects.

The International Livestock Research Institute (ILRI) works primarily in East Africa on a large index insurance project that protects livestock. The Index Based Livestock Insurance (IBLI) program uses NDVI correlated with livestock mortality rates to determine payouts in times when drought is predicted in the regions. When there is low NDVI, there is low edible vegetation for livestock. ILRI's role has been to inform pastoralists of IBLI products within a supportive policy and insurance environment. Partners include Care, World Vision, Mercy Corps, Cornell University, University of Sydney, Maxwell School of Syracuse University, I4, Vito, JRC of the European Commission, Kari, Oromia Insurance Company, Takaful, APA Insurance, UAP, Swiss Re, and Equity Insurance. Some innovations in this project include the asset protection that this product provides, as well as this unique correlation of NDVI and livestock mortality rates. Another innovation with this project is easy delivery of information

and an extensive web-based system allowing for index automation, interactive information provision, and information dissemination.

AfricaRice and the French Agricultural Research Centre for International Development (CIRAD) conduct research projects primarily in West Africa. Current research projects include assessments of risk due to extreme temperatures, recommended crop varieties, definition of optimal sowing windows to minimize risk, and water constraint risks in Senegal River valley and Central Senegal. The insurance is designed to protect irrigated and rain fed rice. Future plans for the rained rice insurance product is to combine it with already existing projects for maize and peanut. Other projects CIRAD is involved in include projects in Senegal, Burkina, and Benin where they play a role in the design of rainfall based indices, agronomical diagnosis, communication with partners, and research of potential interest of insurance by coupling crop modeling and farm economical modeling. Partners include World Bank and PlaNet Guarantee. Lessons learned from work done so far by CIRAD and AfricaRice include: farmers and farmers organizations are interested and understand how index insurance works; credit institutions are also interested in participating; the main constraint to purchasing is the price of premiums; and other constraints include basis risks and limited rain gauge data input access.

The International Center for Research in Agro-Forestry (ICRAF) conducts work in agroforestry in East Africa. No current index insurance projects are in the pipeline, however interest has been discussed with local stakeholders in self-help groups in Kenya. Current literature review and review of Kilimo Salama's reputation on the ground is underway in Kenya. Partners include Comart Foundation, COADY International Institute, St. Xavier University, and CARE Kenya.

Session 4. Mapping what the CGIAR offers to agricultural insurance

To capture key research expertise, methods, tools and innovations, each interested Center scientist gave a 10-minute summary of these aspects of their Center's most significant insurance project or activity. Tools, methods, expertise, innovations, and gaps and challenges were captured during this activity.

CIMMYT presented on their insurance activity in Mexico. Ground cover is measured to calculate a yield index for maize. Field data is often farmer reported to calibrate the field

maps. Satellite verification is used to monitor farmer practices, and recommendations are used if farmer practices are poor. The insurance providers provide free recommendations and information to farmers with crop insurance delivery through mobile platforms. MasAgro Movil is the platform through which farmers can receive weather, market info, insurance services. Currently SMS delivery is used, but they are developing ability to receive info from farmers, as well. CIMMYT's expertise in ground cover remote sensing, maize knowledge, bundled insurance with sustainability recommendations, and mobile platforms allows for a strong product. Besides the technological innovations in CIMMYT's use of mobile platform delivery system and remote sensing, satellite verification of farmer practices is another innovation of this project.

ICARDA presented specifically on their work in Syria. Because of political unrest, the project had to end early, but there are still a number of lessons to be learned from their work. Through using CropSyst Model calibration, MODIS 250m NDVI data, and ICARDA long-term rainfall records, ICARDA designed an index for the semiarid areas specifically examining the use of high resolution remote sensing to reduce basis risk. Through methods such as interviews with farmers, Bayesian modeling, and burn correlations analysis, the index was strengthened and validated. Other innovations include research on using crop simulation models to replace missing historical records, regional risk pooling in regions with diverse farming systems in a regional context, and comparison of different index design approaches. Gaps and challenges with this project involved farmer communication of technical terms and instability of the political infrastructure that led to the project's termination.

IFPRI scientists presented about several projects that are underway at the institute. The first project, studying complementarity and substitutability of abiotic stress tolerant cultivars and weather index insurance in Bangladesh has been funded already for year one out of three. By examining both technological and financial means of managing drought risk, IFPRI can look at if and how the bundling of these two projects is a viable and preferred method of drought protection or if these risk aversion strategies are more effective on their own. Through choice experiments and randomized control trials, the farmers' decision-making strategies are studied. This project is the first of its kind in Bangladesh. Farmer feedback in these findings will be considered in future decision making for project design. Data quality has been a challenge for this project.

IFPRI conducts another project in India. The project is in its third and final year, to protect smallholder soy, wheat, and chickpea farmers. The goal of the project has been to determine the impact of weather insecurities on farmers' welfare and production and consumption decisions. Impact of price distance to weather stations and insurance literacy training on the demand for simple insurance products have been the key outputs of this project, as well. Decisions made by the farmers will indicate how the insurance has improved their welfare. Methods used in this project include focus groups, offering separate building blocks of insurance to cover a set quantity of risks, designing individualize risk profiles, assigning different triggers and products each month, insurance literacy training, and analysis of weather stations. Tools employed include theoretical model surveys and econometric analysis. Expertise demonstrated in this project includes theoretical modeling, product design, identifying indices, estimate probabilities, and a derivatives approach. An innovative aspect of this project is the building block idea, allowing farmers to choose a range of securities from a "menu" of products. There is, however a challenge with slow uptake in this project.

IFPRI presented on another project taking place in Bangladesh. The index in this project addresses crop loss due to drought and pestilence and disease. This research project is new, starting in 2013, and only supposed to last through this year. The primary objectives of the project are to focus on the outcomes of offering index insurance with credit and savings groups as a means to reduce basis risk. Next stage of the project will be to link insurance to credit. Partners include Palli Karma Sahayak Foundation, Grm Unnyan Karma, Meteorological Department, Department of Agricultural Extension, Data Analysis, and Technical Assistance. Tools include theoretical models, surveys, and econometric analysis. Expertise highlighted in this project include extensive cooperation with policies and institutions, linking farmers to these policies, and researching successful schemes that include climate smart agriculture.

One project that highlighted collaboration between IFPRI and IWMI was a research project in India. The objectives for research were: to develop improved relationships between weather deviation and crop loss, and to improve farmer satisfaction by engaging them in measuring, reporting, and verifying crop losses and management of crop insurance schemes. Through community managed individual farmer insurance, farmers can be compensated for their experienced losses, at the discretion of the community group, which then empowers the

community program. Another difference in this kind of community insurance is that it offers flexible sum insurance, flexible premiums, transparent use of technology for claims, quick settlement of claims, financial literacy, and value added services like agro-advisories. Pilots of these projects have been rolled out in several locations to protect groundnut, chickpea, rice, and potato crops for 350 farmers. The expertise in this project includes evolving new institutional engagement and community engagement. The tools used extensively in this project include use of crop models, regional statistics, spatial soil, weather and variety databases, digital enrolment of farmers, and geo-tagging images of fields to ground-truth indemnity claims. Innovations in this project include developing materials and encouraging a community based approach for claim settlement via field photos and community discussions; linking with technology providers such as mobile networks to create new software to make this possible; allowing access to indemnity products as well as an index product based on gauges; without subsidies it works as a 'top up' for farmers already part of NMIS or WBCIS; and monitoring throughout the season is possible with photos. There are however, challenges because technology is costly and access is limited, plus there are legal issues. In the future, the project will work to incorporate remote sensing and economic modeling.

IFPRI and CCAFS- International Water Management Institute (IWMI) have another project in Northern India. The project is designed to review the willingness of farmers to pay for climate service interventions. The data is gathered by linking farmers to policymakers and conducting choice experiments on various government programs and interventions. Meta analysis is used to draw out best practices in conducting insurance projects. Capacity building in Nepal is an important element of the project, as well as participatory measuring, reporting, and verification of crop losses. Using community managed farmer insurance with cellphones to aid in delivery and reporting, is a new and innovative scheme in insurance practices now. Some challenges faced in this project include gathering farmers' opinions on needed products or technology changes based on current conditions.

WorldFish, as part of the International Fund for Agricultural Development (IFAD) project in Bangladesh, works to develop best practices in index insurance. The IFAD objectives are to help produce climate information through research with and by local institutions, help improve systems to communicate this information, develop tools to support farmers and decision makers in managing climate risks, and build capacity of farmers and decision makers

on use of climate information and tools. In Bangladesh specifically, IFAD's objective is to link key players in index insurance and work with smallholder farmers to develop index insurance products. WorldFish has put together capacity building materials for farmer index design and prototype indices for test locations. They also organized a workshop to bring together key players in index insurance in the country. A community of practice (COP) has carried on the workshop connections, enabling mapping of stakeholders and staying in touch, and communicating on best practices. WorldFish provides expertise in aquatic agricultural systems and index insurance applications. This project, besides offering the unique COP also provide Bangla Farmer Design materials, engaging local actors in sharing knowledge and materials. Some challenges associated with this project, and specifically with the COP is coordinating who will lead discussions and keep people sharing their work and turning discussions into actionable outcomes.

Session 5. Informing outcome-driven CCAFS Flagship 2 projects

The third day of the program was dedicated to preparing concept notes for CCAFS Flagship 2. Keeping in mind centers' skills, expertise, and current activities, people teamed up to discuss potential opportunities for synergies and developing a concept note. First, Jim Hansen provided an overview of what will be expected in the concept note.

The Flagship offers a different type of funding; bidding is done based on the how well the judging criteria is met. This criterion asks for projects to specifically list development outcomes, and incentives are given in this particular flagship for cross-CGIAR collaboration, external partnerships, and "knowledge-to-action." Successful proposals should contain climate-based methods, tools for seasonal agricultural prediction and disaster risk management; knowledge and methods for designing and implementing climate information and advisory services for smallholder communities; food security safety nets and policy interventions for dealing with impacts of climate-related shocks; and knowledge and methods to design and target equitable weather-related insurance programs that benefit smallholder communities. Each project can be awarded between 250,000 USD and 1 million USD annually. Concept notes will be due at the beginning of March 2014. Funding will begin 2015. Criteria for evaluating the concept notes: delivery of outcomes (25%), alignment with CCAFS theory of change and regional priorities (20%), value for money (15%), demonstrated capacity and partnerships (20%), innovation (10%), and attention to cross-cutting issues

(10%). A strong proposal will have compelling development outcomes with a plan to scale and evidence of likelihood; insurance applications that have specific function and are connected to other aspects of development; demonstrates partnerships between centers and relevant external partners; connect to major global index insurance initiatives; and builds on other parts of CCAFS as relevant.

Session 6. Workshop closing and action items

After centers worked together, they presented their proposals and received feedback from the other workshop participants. At the end of the day, participants shared their feedback and suggestions for future workshops.

Action items include continuing to develop concept notes and answer questions. In the meantime, the workshop participants will develop a special journal issue. There is a proposal to also develop a clinic to provide impact evaluations and expertise. A spatial mapping and synthesis product will be developed to display various types of insurance that addresses specific problems. A community of practice portal, which has been established prior to this workshop, will be available for the participants. There will be discussions of setting up a follow up meeting. There will be future focus on the private sector. More communications will happen when the winning proposals are announced.

Conclusions

After three days of lively discussions, ranging from the broader picture of index insurance to the specific tools offered by the centers to beginning discussions of future synergies, there were several notable outcomes from this workshop. Firstly, this workshop fostered new collaborations across CGIAR institutions in response to the CCAFS Flagship 2 Call and other potential opportunities. Secondly, in the spirit of collaboration, a journal special issue on index insurance across the CGIAR was proposed. Finally, some participants suggested creating cross-Center “clinics” to provide technical resources and advice for specific projects.

Appendix 1. Workshop agenda

Monday, 20 January

Mobilize a community around shared vision and consensus framework

8:45	9:00	Workshop Introduction and Objectives	
9:00	9:45	Keynote 1: What roles can weather-related insurance play in agricultural development? Discussion	Speaker: Michael Carter Discussion facilitator: Kevin Coffey
9:45	10:30	Keynote 2: Where is insurance for smallholder farmers scaling? Discussion	Speaker: Dan Osgood Discussion facilitator: Miguel Robles
10:30	11:00	<i>BREAK</i>	
11:00	11:45	Keynote 3: How can research and industry partner to insure farmers against climate risk? Discussion	Speaker: Kolli Rao Discussion facilitator: TBD
<i>Topical discussion sessions for the remainder of the day:</i>			
<ul style="list-style-type: none">• 10 minute overview of the issue, by the facilitator, covering: key gaps or challenges, emerging opportunities for the CGIAR, and up to 3 specific discussion questions• 20 minute breakout discussion (groups of about 4)• 20 minute plenary report and discussion			
11:45	12:40	Topic 1: How can index insurance help in rural development?	Facilitator: Neha Kumar
12:40	1:40	<i>LUNCH</i>	
1:40	2:30	Topic 2: How can insurance be designed to complete the toolbox?	Facilitator: Miguel Robles
2:30	3:20	Topic 3: Data and index design challenges	Facilitator: Helen Greatrex
3:20	4:10	<i>BREAK</i>	
4:10	5:00	Topic 4: Doing business with the insurance industry	Facilitator: Dan Osgood
5:00	5:30	Day 1 synthesis, overview of Day 2	Jim Hansen & Maximo Torero

Tuesday, 21 January
Mapping and Mobilizing the CGIAR's Expertise on Agricultural Insurance

9:00	10:30	Mapping where the CGIAR works on agricultural insurance <i>To capture what, where, and with who, each Center will give a 10-minute overview of their portfolio of insurance-related work.</i>	Facilitator: Kevin Coffey, Helen Greatrex, Samantha Garvin
10:30	11:00	<i>BREAK</i>	
11:00	12:30	Mapping what the CGIAR offers to agricultural insurance <i>To capture key research expertise, methods, tools and innovations, each interested Center scientist will give a 10-minute summary of these aspects of their most significant insurance project or activity.</i>	Facilitator: Kevin Coffey, Helen Greatrex, Samantha Garvin
12:30	1:30	<i>LUNCH</i>	
1:30	3:00	Mapping what the CGIAR offers to agricultural insurance (continued)	Facilitator: Kevin Coffey, Helen Greatrex, Samantha Garvin
3:00	3:30	<i>BREAK</i>	
3:30	5:00	Discussion: How can the CGIAR best mobilize around its strengths, and bring them into strategic partnerships to deliver development Outcomes?	Facilitator: Miguel Robles
5:00	5:30	Day 2 synthesis, overview of Day 3	Maximo Torero & Jim Hansen
		<i>WORKSHOP DINNER</i>	

Wednesday, 22 January
Inform the design of Outcome-driven CCAFS Flagship 2 projects

9:00	10:30	Overview of the CCAFS Flagship 2 call Discussion: What feedback would be helpful, and how can we best structure it?	Jim Hansen
10:30	11:00	<i>BREAK</i>	
11:00	12:30	Group proposal development	
12:30	1:30	<i>LUNCH</i>	
1:30	3:00	Group proposal development	
3:00	3:30	<i>BREAK</i>	
3:30	4:30	Report to plenary on group proposal development	
4:30	5:00	Workshop closing	

Appendix 2. Workshop participants

Abdoulaye	Moussa	CCAFS
Alexa	Jay	CCAFS
Andrew	Mude	ILRI
Berber	Kramer	IFPRI
Bertrand	Muller	AfricaRice
Coffey	Kevin	CCAFS
Dan	Osgood	IRI
Deissy	Martinez Baron	LAM
Francisco	Ceballos	IFPRI
Giriraj	Amarnath	IWMI
Helen	Greatrex	IRI/CCAFS
Ihtiyor	Bobojonov	ICARDA
James	Kinyangi	CCAFS
Jim	Hansen	CCAFS
Jonathon	Hellin	CIMMYT
Kaikaus	Ahmad	IFPRI
KN	Rao	IRICS/Aon Benfield
Leocadio	Sebastian	CCAFS
Lisa	Fuchs	ICRAF
Maximo	Torero	IFPRI
Michael	Carter	U.C. Davis
Miguel	Robles	IFPRI
Neha	Kumar	IFPRI
P.K.	Joshi	IFPRI
Peter	Laderach	CIAT
Pramod	Aggarwal	CCAFS
Samantha	Garvin	IRI
Sonia	Akter	CIMMYT
Urs	Schulthess	CIMMYT