Disaster Risk Financing for Agriculture
Technical Learning Series

Disaster Risk Financing & Insurance Program

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WORLD BANK GROUP

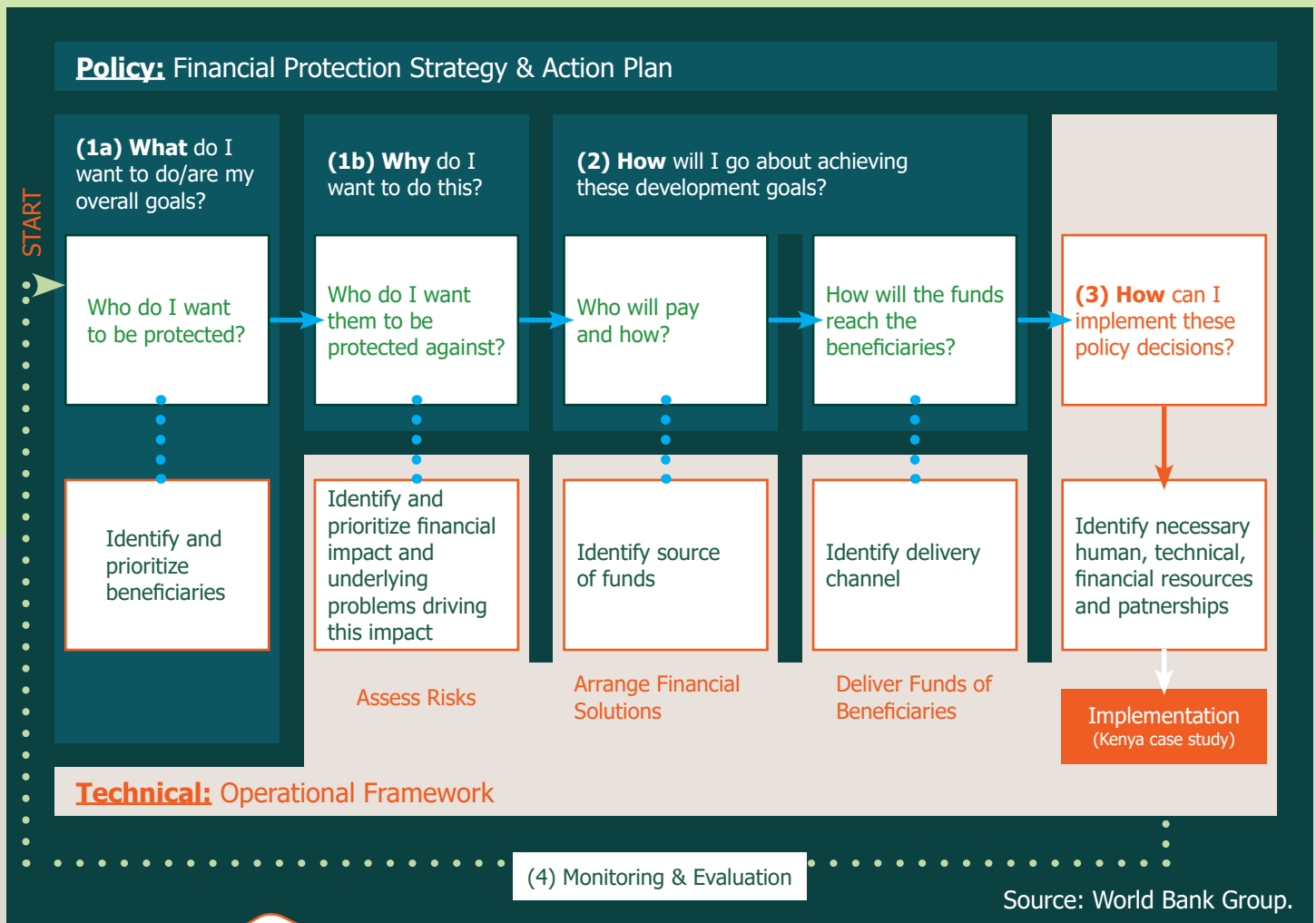## Structuring a Financial Protection Scheme for Agriculture

This knowledge series aims to bridge the knowledge gap for government officials and practitioners about the development and use of disaster-responsive financing mechanisms and instruments for the agriculture sector. Completion of the series will provide a grounding for Ministries of Finance and other related ministries to establish, evaluate, and implement Disaster Risk Financing for Agriculture (DRFA) programs as part of their overarching disaster risk financing strategy. The content builds on the Fundamentals of Disaster Risk Financing (FDRF) training series, which provides an overview of the principles of disaster risk financing and their application in different contexts. Familiarity with the FDRF content is assumed as a basis for this DRFA webinar and fact sheet series, and further resources and information can be found here.

This module, the fifth in the series, will outline how to operationalize a national agriculture disaster risk financial strategy and programs. The session will discuss the actual disaster risk financing tools used, the operational structure, and the roles and responsibilities of the different stakeholders. This session uses the decision-making framework for structuring a financial protection scheme, and it draws on case studies to explain how such schemes are implemented in practice. This session also discusses the key challenges faced during implementation as well as lessons learned. Finally, the module will focus on the importance of monitoring and evaluation (M&E) and the ways it can be built into agriculture financial protection schemes.

Implementing a financial protection scheme for agriculture

The main focus of this session will be the key operational questions (shown in orange in figure 1, the decision-making framework) and how addressing these questions could work in practice. Throughout the implementation of a financial protection scheme, key decisions need to be made around the assessment of risk and about the financial solutions required to deliver funds to beneficiaries. The decisions made are then implemented via targeted partnerships and reviewed and assessed via the M&E framework.

FIGURE 1: DECISION-MAKING FRAMEWORK

Policy: Financial Protection Strategy & Action Plan

START

(1a) What do I want to do/are my overall goals?

Who do I want to be protected?

Identify and prioritize beneficiaries

(1b) Why do I want to do this?

Who do I want them to be protected against?

Identify and prioritize financial impact and underlying problems driving this impact

Assess Risks

(2) How will I go about achieving these development goals?

Who will pay and how?

Identify source of funds

Arrange Financial Solutions

How will the funds reach the beneficiaries?

Identify delivery channel

Deliver Funds of Beneficiaries

(3) How can I implement these policy decisions?

Identify necessary human, technical, financial resources and patnerships

Implementation (Kenya case study)

Technical: Operational Framework

(4) Monitoring & Evaluation

Source: World Bank Group.

Throughout this factsheet, you will find key considerations from the decision-making framework highlighted in orange boxes (to link to the orange sections in figure 1). The purpose is to link the case study back to the operational and policy questions in the decision-making framework, and in this way to emphasize how the framework guides the implementation process.

The framework's role can best be understood via case studies. In this module, Kenya's disaster risk management strategy-consisting of many different programs (both sovereign- and micro-level programs)-is the case study for implementation. For best practice M&E, which involves measuring impact and value to the target audience, we look at index insurance as an example.

Case Study: Kenya

Setting the scene

Over 80 percent of Kenya's total land area is classified as arid and semi-arid lands (ASAL) and is considered at risk of desertification. The ASAL region is home to about 30 percent of Kenya's human population and 50 percent of its livestock (World Bank 2018).

FIGURE 2: LAND USE MAP OF KENYA SHOWING AGRO-PASTORAL AND PASTORAL REGIONS
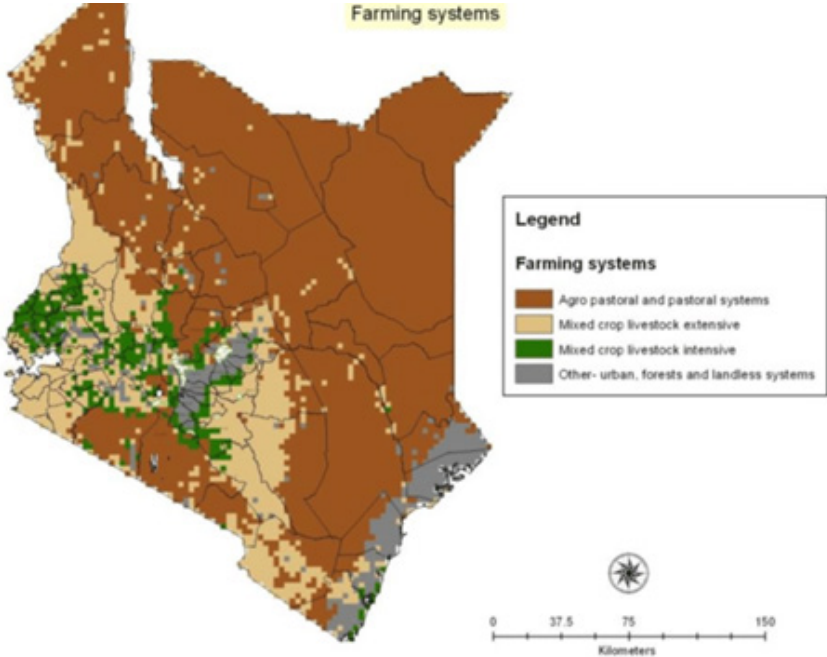

Source: Ochungo et al. 2016.

The agriculture sector in Kenya is vital in maintaining economic growth, but it is heavily exposed to weather-related perils. During 2008-2011, Kenya suffered US$ 12 billion of drought costs-equivalent to 28 percent of 2011 GDP. This resulted in a loss of production across all sectors. The gains that had been made in reducing poverty over prior years were reversed by these agricultural shocks, which led to demand for more efficient and predictable response programs.
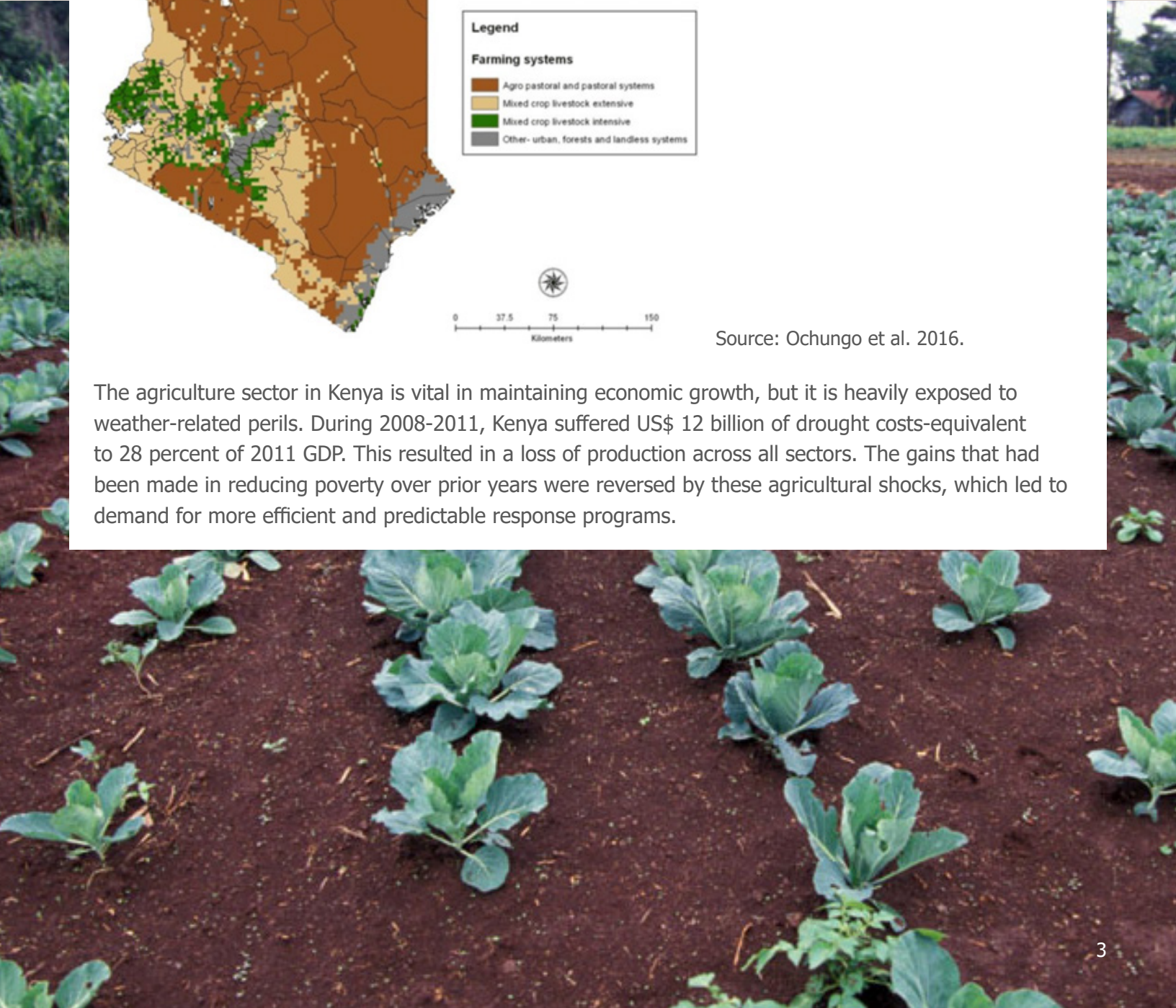
What to protect and why?

Assess risks
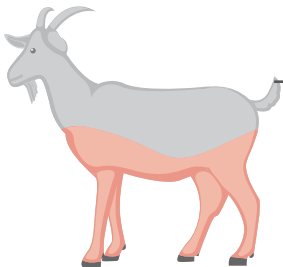
50% of ASAL population depend on livestock

Kenya is incredibly vulnerable to climate shocks. Some 50 percent of the ASAL population depends on livestock for livelihood, meaning that 3-4 million Kenyans are affected annually by climate shocks.

39% of Rural poverty

Rural poverty characterizes around 39 percent of the population. This high level of rural poverty results in low levels of productivity and access to credit.

8% of GDP every 5 years

Drought impose a high fiscal and economic cost-for example, annual average response in 2007/08 and 2010/11 came to K Sh 9.2 billion, and analysis shows that drought costs are equivalent to 8 percent of GDP every five years.

Droughts can exacerbate existing conflicts and place the agriculture-dependent population at especially high risk. There is a 5 percent increase in odds, of a conflict due to droughts.

The response to drought shock in Kenya, prior to the DRFS was <u>inefficient</u>:
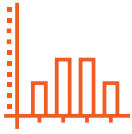
On average, US$ 325 million a year was provided in humanitarian assistance between 2010 and 2019. But such aid often arrives too late, and in Kenya did not efficiently address the losses incurred.

For the 2008–2011 droughts, US$ 860 million was received in humanitarian aid-compared to US$ 12.1 billion of damages and losses to the economy.

The key priorities of the Government of Kenya (GoK) were developing a coordinated approach to increased resilience, increasing financing capacity, protecting the most vulnerable, and empowering ministries and counties. The two overarching development goals were:

To sustain economic growth and protect economic gains from disaster shocks

To reduce the economic impact of disasters on the poorest and most vulnerable people, as identified in Kenya's Vision 2030

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Building and implementing the DRFS for the GoK required various players to support the country's institutional architecture for disaster risk management, as shown in figure 3.

FIGURE 3. VARIOUS STAKEHOLDERS FOR DISASTER RISK MANAGEMENT ARCHITECTURE

National government

- The National Disaster Operations Centre
- The National Disaster Management Unit (NDMU)
- The National Drought Management Authority (NDMA
- National Treasury

Local government

- Country governments
- State departments responsible for livestock and crop development
- State departments responsible for special programs

Private sector

- Financial service providers
- Mobile service providers

Source: World Bank Group.

How to implement policy decisions?/ Identifying human resources

The key players have crucial roles in implementing the DRFS and are vital in continually supporting a strong disaster risk management framework.

The disaster risk financing approach includes various intervention layers. Prior to the establishment of the DRFS, the various programs mentioned below were not coordinated and were being implemented in silos. The DRFS, when developed, pulled them into one framework and aligned them. Figure 4 shows the different programs under the DRFS and how they make use of risk retention and risk transfer instruments as part of the disaster-layering framework.

FIGURE 4: NATIONAL DISASTER RISK FINANCING STRATEGY

National Disaster Risk Finance Strategy

- Priorities: coordinated approach, increase financing capacity, protect vulnerable, empower ministries and counties
- Development goals: (i) to sustain economic growth and to protect economic gains from disaster shocks; and (ii) to reduce the economic impact of disasters on the poorest and most vulnerable people, as identified in Kenya's Vision 2030

World Bank CAT DDO (US$ 200M)

ARC drought coverage for 2014/15 and 2015/16 (max coverage US$ 30M), no payouts: DISCONTINUED

- Index Based Livestock Insurance (IBLI)
- Insurance and Risk Management Program (KAIRMP)
- Kenya Livestock Insurance Program (KLIP)
- Kenya Agriculture Insurance Program (KAIP)

Risk Transfer

Sovereign Risk Transfer

African Risk Capacity (ARC)

Risk transfer for farmers in arid and semi-arid counties

Crop Insurance

Livestock Insurance

Risk Retention

Contingent Financing

WB IDA CAT-DDO

Contingent Grants

HSNP Program

Contingency Funds (National Drought Contingency Funds)

Emergency funding

- Contingencies fund (up to US$ 10M)
- National Drought Emergency Fund (US$ 20M + potential additional contributions)
- EU Drought Contingency Fund (US$ 4.5M exhausted)
- Work on county level contingency funds

Kenya Social and Economic Inclusion Project (US$ 250M): US$ 72m for protecting the poorest from drought **impacts. Disbursed US$ 15M** in 2020

Source: World Bank Group.

Note: Cat DDO = Catastrophe Deferred Drawdown Option; HSNP = Hunger Safety Net Programme; IDA = International Development Association.

The following sections go into detail about the implementation of these different programs.

Catastrophe Deferred Drawdown Option (risk retention instrument)

The Catastrophe Deferred Drawdown Option (Cat DDO) is a World Bank/International Development Association loan for development policy operation projects and budget support. This instrument was set up between the World Bank and the Government of Kenya to support strengthening of disaster risk financing via three key pillars:
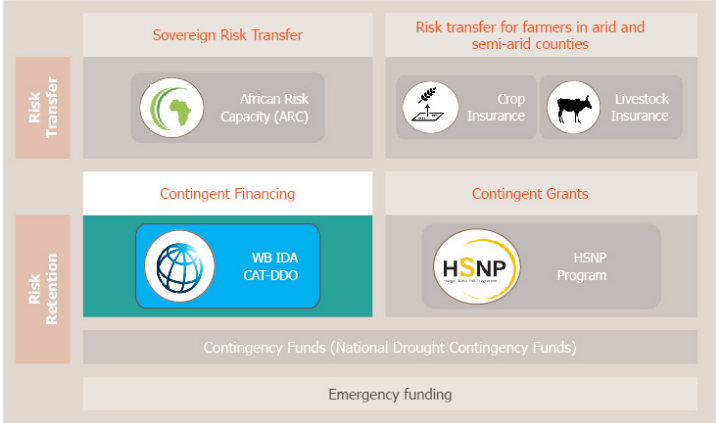
1. INSTITUTIONAL, PLANNING, & POLICY FRAMEWORKS

2. DISASTER & CLIMATE RESILIENCE IN URBAN & WATER SECTORS

3. FINANCIAL CAPACITY FOR CLIMATE ADAPTATION, MITIGATION, & RESPONSES

The objective of the Cat DDO is twofold: it seeks to (i) advance Kenya's disaster risk management strategy by supporting policy reforms that strengthen disaster risk finance, disaster risk reduction, and climate change adaptation measures in the country; and (ii) help Kenya secure financing in advance to meet immediate liquidity needs after a disaster caused by natural hazards or health emergencies.

Arranging financial solutions

The Cat DDO arrangement between the GoK and the World Bank was set up with a total budget of US$ 200 million, split between contingent financing, which can be drawn down in the event of a disaster, and technical assistance, which is used to explore possible risk management interventions.
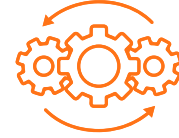
How to implement policy decisions?

To ensure continued access this funding, the Kenyan government agreed to the following intervention measures, intended to **strengthen the policy and financing framework for disaster risk management:**

Policy reforms across disaster risk management (including assessment of the use of insurance)	Establishment of urban and climate risk financing	Formation of a national DRFS

These **prior actions** have associated **results indicators** that are to be measured through the lifetime of the project. For example: County level emergency and/or contingency plans adopted that strengthen response capacity.

Having access to technical assistance and funding allowed the GoK to engage with the Agriculture Insurance Development Program[1] on insurance products and with the UK Foreign, Commonwealth and Development Office (FCDO) on broader social protection programs such as the Hunger Safety Net Programme (HSNP), which is discussed in the next section.

Who is involved?

Identifying partnerships and financial & human resources

Implementation of a CatDDO requires involvement from multiple line ministries and strong coordination (in Kenya's case this was the function of the National Treasury).

How will impact be measured?

How to implement policy decision

Result indicators should be set realistically with achievable timelines. Kenya's initial indicators for the Cat DDO turned out to be somewhat overconfident, and achievement was made difficult when the COVID-19 pandemic hit the country.

[1] A joint program launched by the World Bank and the Netherlands Ministry of Foreign Affairsto reduce farmers' financial vulnerability to crop and livestock losses

Hunger Safety Net Program (risk retention instrument)

Assess risks

One of the key challenges faced in Kenya is that emergency food and cash transfers have in the past been financed by donors on an adhoc basis after an event-an approach that limits their development impact, creates political challenges, and threatens sustainability.

Arrange financial solutions

The HSNP is a flagship social protection program of the Government of Kenya, funded in part by the FCDO, that supports poor and vulnerable households in the ASAL regions of Northern Kenya. HSNP was established to provide emergency cash transfers in response to weather shock events.

HSNP consists of two key components:

Regular cash transfers. These go to approximately 100,000 targeted households—the most chronically poor and vulnerable.

A shock-responsive social protection mechanism that scales up cash transfers vertically and horizontally in times of severe drought. It uses remote sensing satellite data (the Vegetative Condition Index) as an objective early warning indicator to trigger payouts; via pre-established mobile bank accounts, emergency transfers reach up to a further 180,000 vulnerable households. Between 2015 and 2018, 205,000 households (approximately 1.2 million people) received about US$ 26 million in emergency transfers in response to droughts and one flood.
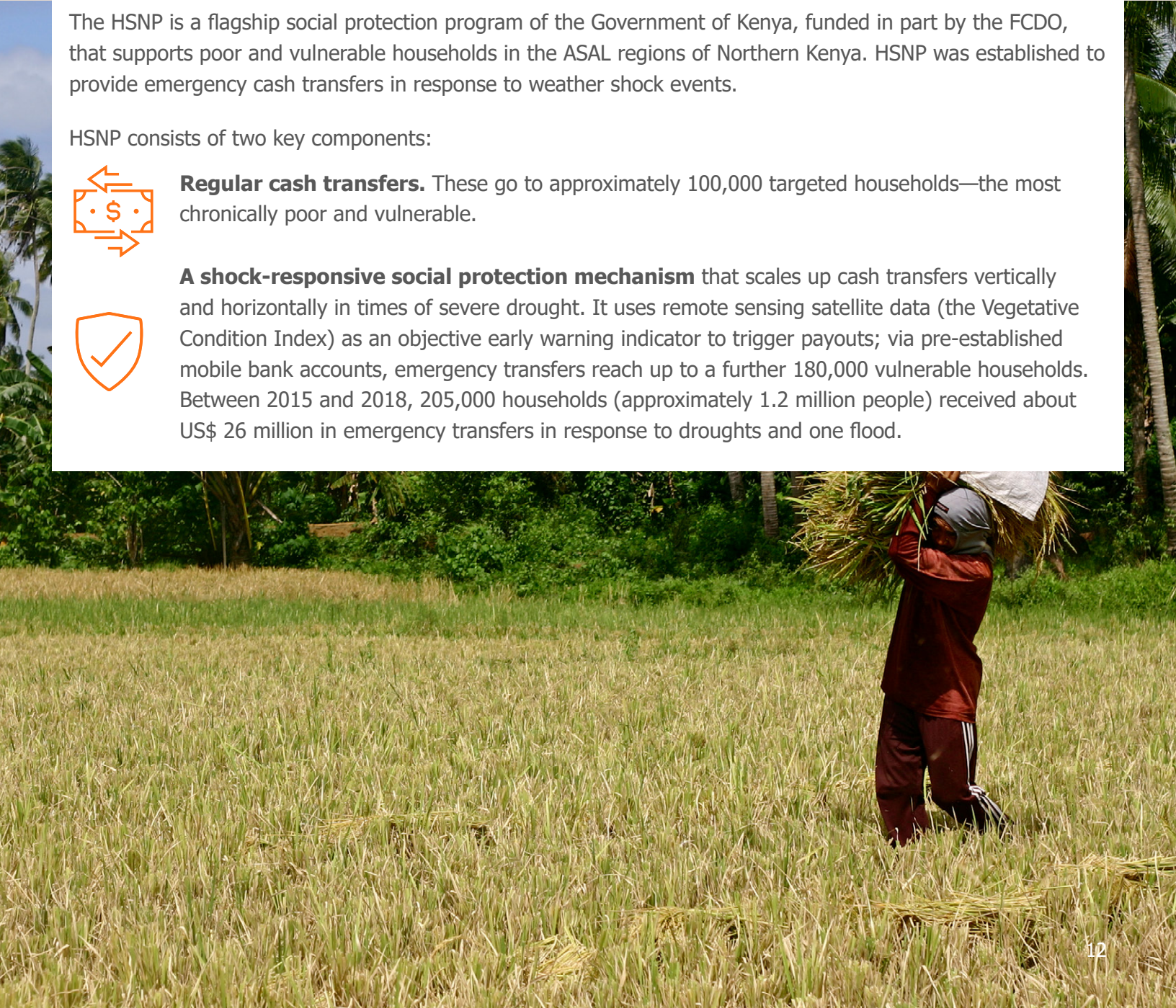
How will money be available when it is needed?

Delivering funds to beneficiaries

The funding required to ensure timely response should be pre-planned. The source of funds for shock-responsive social protection-whether a particular fund or a range of instruments-should be clear ahead of time to ensure payouts in full are made quickly.

Effective delivery-mechanism systems must be in place before a shock event. The funds need to be efficiently channeled to disaster-affected populations. Payment systems are critical in delivery and distribution of funds to beneficiaries. Mobile and digital money not only offer speed but also provide security and flexibility in the face of widespread physical destruction.

How best to design the program?

Arranging financial solutions

It is vital to understand the potential cost of response before the disaster. Without a clear understanding of the response costs, it is impossible to assess whether such a system is financially feasible or determine the most appropriate way to trigger and finance a response.

African Risk Capacity – Sovereign risk transfer program

African Risk Capacity (ARC) is a specialized agency of the African Union, which was established in 2012 as an African-owned, index-based weather risk insurance pool and early response mechanism. It combines the concepts of early warning, disaster risk management, and sovereign risk finance.

ARC's mission, according to its website, is to "use modern finance mechanisms such as risk pooling and risk transfer to create pan-African climate response systems that enable African countries to meet the needs of people harmed by natural disasters."

ARC launched its sovereign-level drought risk insurance program in 2014/15, and four countries, including Kenya, purchased cover. Kenya renewed the cover in 2015/16, but as there were no payouts in either year, it subsequently declined to renew cover with ARC and instead is supporting the Kenya Livestock Insurance Program (KLIP), discussed in the next section. Given this decision by the GoK, details of the implementation process are not provided. One key lesson of the experience with ARC is that building understanding of the structure of insurance products, including when payouts should be expected, is vital.

Kenyan Livestock Insurance Program & Kenya Agriculture Insurance and Risk Management Program: Risk transfer instruments specifically for farmers

BACKGROUND

Kenya has two index-based insurance products for farmers, the Index-Based Livestock Insurance (IBLI) program targeted at commercial pastoralists (launched in 2009), and a modified-level index product to protect the livelihoods of vulnerable pastoralists against drought, the Kenyan Livestock Insurance program (KLIP), launched in 2014.

KLIP was purchased as part of the national drought risk management strategy, and the GoK fully pays the KLIP premium; IBLI does not receive GoK premium subsidy support. This raises an interesting question of how to design programs with smart premium subsidies—that is, subsidies that develop demand and markets for the products without creating an avoidable dependency on subsidies. (The challenges of developing such subsidies are discussed in session 4).

Figure 5 shows how IBLI and KLIP complement each other to support different segments of pastoralists, as well as how these programs and the HSNP work as part of the risk-layering framework for the GoK.

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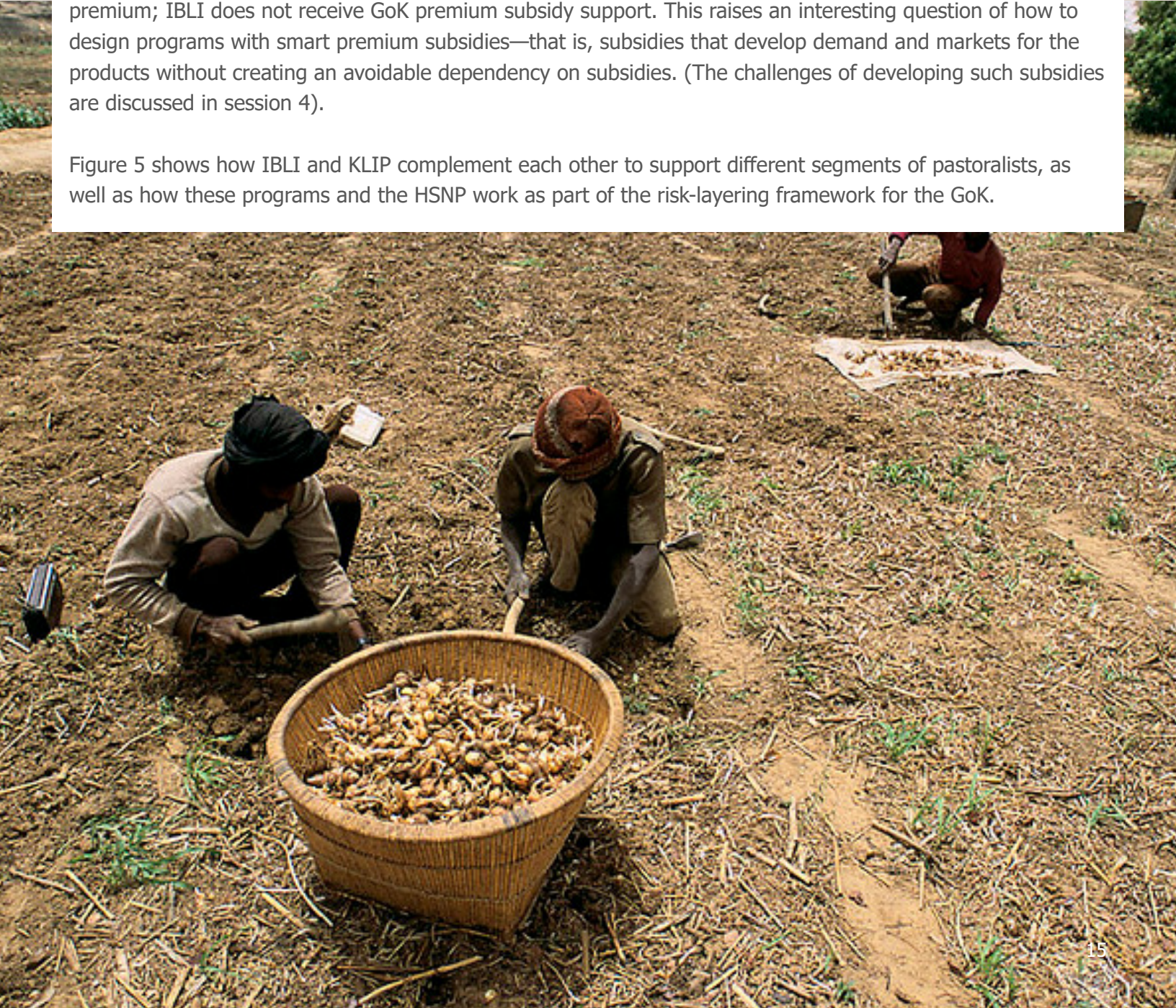
Arranging financial solutions

FIGURE 5. RISK FINANCE MECHANISM DIFFERS BY INCOME LEVEL

Risk Financing Instrument	Income Level	Livestock Safety Net and Insurance Programs	Target Audience	Cost Share
Commercial Micro-Retail Livestock Insurance (IBLI)	Above	ILRI-IBLI Subsidized commercial livestock insurance	Medium-large Pastoralists	● Partial premium cost sharing by SDL-GOK
Macro-level Drought Risk Insurance (KLIP and other Disaster Protection)	Low Income	SDL Macro-level NDVI insurance program for 70,000 vulnerable pastoralists above HSNP poverty levels	Vulnerable Pastoralists 5 – 20 TLU's	● Premium 100% subsidized by SDL-GOK
Scalability Mechanism – Drought Risk Fund	Vulnerable	HSNP, providing SCALABLE cash transfers to an additional 180,000 vulnerable households	Very few or no livestock	● Costs 100% subsidized by NDMA
Cash Transfers Social Protection Fund	Chronically vulnerable	HSNP, providing unconditional cash transfers to 100,000 very poor households.	Very few or no livestock	● Costs 100% subsidized by NDMA

Source: World Bank.

Note: ILRI = International Livestock Research Institute; NDMA = National Drought Management Authority; NDVI = Normalized Difference Vegetation Index; SDL = State Department of Livestock; TLU = Tropical Livestock Unit.

The Kenyan Agriculture Insurance and Risk Management Program (KAIP) launched in 2016 was a similar program to KLIP but focused on maize and wheat losses. For example: farming areas are divided into insurance units – if average production in one of the units falls below a threshold, all insured farmers in the unit receive a payout. The program is starting up in 4 regions and will to expand to more regions in future years.

How to implement policy decisions?

Starting in 2014, the GoK has actively supported the development of crop and livestock insurance for smallholder farmers in partnership with private sector insurance companies. Strong public-private part-nerships (PPPs) of this kind are vital in efficient and effective implementation of programs; the different parties each play key roles.

Further details on index-based insurance programs, including their structures and operational framework, will be provided in the next session (session 6).

What role did the GoK play in implementation of insurance programs?

Identifying partnerships

Figure 5 shows the large involvement of Kenya's State Department of Livestock (SDL)-part of the Ministry of Livestock, Agriculture and Fisheries (MALF)-in supporting the KLIP initiative. The GoK also undertook the following:

Collected data jointly with the private sector in Kenya
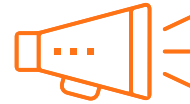
Promoted a coinsurance pool to limit the risk faced by any one individual insurer

Kenya's state Insurance Regulatory Authority has also played an important role in creating an enabling environment for the KLIP pool and in implementing consumer insurance literacy awareness programs.

What role did the private sector play in implementation of insurance programs?

Arrange financial solutions/Identify human and technical resources

In Kenya, private sector insurers elected to form a coinsurance pool to underwrite KLIP, both because shared design and implementation lowered overall costs, and because pooling's risk diversification lowered the cost of reinsurance. The primary role of these private sector insurers has been to design and price the index product, to underwrite the risk and place the reinsurance with international reinsurers, to settle claims payouts, and to conduct insurance education and training for participating KLIP beneficiaries. Insurers have worked very closely with SDL-MALF in program implementation since 2015/16.

Figure 6 and figure 7 respectively show typical public and private sector roles in implementing an insurance program. It can be seen that the roles under the different headings generally complement one another.

FIGURE 6: TYPICAL PUBLIC SECTOR ROLES IN A PPP AGRICULTURAL INSURANCE PROGRAM SUCH AS KLIP (MANDATE OF MALF HIGHLIGHTED)

FINANCIAL SUPPORT

MANDATE OF MINISTRY OF AGRICULTURE

DATA
- Collect
- Audit
- Manage

OUTREACH
- Link to social safety nets
- Link to credit
- Premium subsidies
- Awareness building

RISK FINANCING
- Public sector reinsurance
- Promotion of coinsurance pool

SUPPORT PRODUCT DESIGN AND DEVELOPMENT
- Product development and pricing (short run)
- Technical support for insurers (long run)

ENABLING ENVIRONMENT
- Institutional framework
- Legal framework
- Consumer protection

Source: World Bank Group

FIGURE 7: TYPICAL PRIVATE SECTOR ROLES IN A PPP AGRICULTURAL INSURANCE PROGRAM SUCH AS KLIP

DATA
- Collect
- Audit
- Finance

OUTREACH
- Innovative distribution channels
- Link to credit

RISK FINANCING
- Underwriting of risk
- Participation in co-insurance pool

PRODUCT DESIGN AND DEVELOPMENT
- Product development
- Pricing
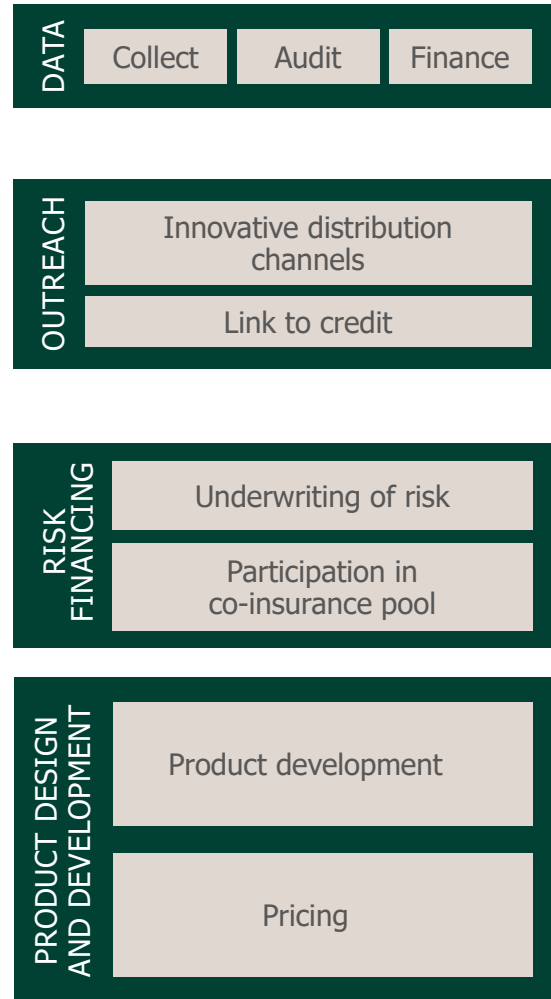
Source: World Bank Group

Who is involved?

Identifying human and technical resources and partnerships

Public-private partnership. The PPP can enhance the overall mission by harnessing support and bringing expertise that would not be available to the individual private or public enterprises.

Government leadership. KLIP originates from a clear commitment of the GoK to support and scale an innovative index insurance solution that builds pastoralists' resilience to drought. The active participation and financial involvement of the public sector have been fundamental to the rapid expansion of the program's geographic scope and the number of insured households, and is critical for continuation of the program.

Private sector centrality and clearly defined role. The private sector has been the engine of KLIP, relying on experience and capacity built over years of implementing IBLI. The private sector also plays a critical role in the program's long-term sustainability by supporting awareness creation efforts and stimulating the expansion of retail insurance. Note, that to avoid operational challenges, the private sector role needs to be clearly defined.

How is the program best designed?

Arranging financial solutions

Smart subsidized coverage. To reduce the likelihood that beneficiaries will rely on full premium subsidies, subsidies need to be designed in a smart way, targeting different types of beneficiaries and increasing incentives for risk sharing between client and insurer.

How will impact be measured?

Implementing policy decisions

M&E is important in assessing impact and determining whether the program is meeting objectives. M&E is not a one-time activity; programs need regular review and refinement to ensure that impact can be measured and that lessons learned are fed back into the program. M&E is discussed in detail below.
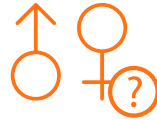
Monitoring and evaluation

Monitoring and evaluationis a broad concept touching on many different aspects of institutional and programmatic effectiveness and success. Robust M&E frameworks support the growth of social protection systems and offer the most productive tools to simultaneously assess a program's effectiveness and provide guidance for improvements. It is an ongoing process over the lifetime of the program, involving the routine observation and recording of program activities. M&E seeks to answer a number of key questions:

Does this program provide operational efficiency?	Does this program improve the welfare of the beneficiaries?	Does the program address gender inequalities?	How does this program interact with local economies?

For different instruments, different approaches to M&E are appropriate, and in some cases could combine qualitative and quantitative assessments. To assess the impact of scalable social protection, for example, you could choose to measure reduction in poverty. To assess a sovereign-level insurance contract, you could choose to measure the return from unused budget allocations (or external borrowing).

For this session, to demonstrate the value of evaluation and its impact on ensuring and measuring quality, we focus on a selection of case studies that highlight the assessment of **index insurance**. Note that the concepts around design and best practices discussed below apply beyond index insurance to other disaster risk financing and insurance programs. Integrating quality assurance and impact assessment into program planning ensures that project value can be measured, and that learnings and innovation can be fed back into design to increase the value of the financial protection scheme.

Integrated impact evaluation

There are many ways to help ensure that program implementation is successful and that the desired development impacts are achieved. One way is through integrated impact evaluation, which incorporates evaluation into program rollout from the very beginning. There are many different kinds of impact evaluations; randomized controlled trials are a well-known example. What is most important to note about impact evaluations is that building in a mechanism to study the effects of a program will provide invaluable information about program effectiveness and value for money. The findings of an impact assessment will also inform future policy implementation and scaling.

For example, a study by Elabed and Carter (2018) cites rigorous evidence showing that risk transfer products like index-based microinsurance can reduce households' reliance on costly coping strategies (e.g., distressed asset sales or meal reductions) that ensnare people in a cycle of poverty; further, such products help people avoid the most severe possible consequences of bad weather and build their confidence to invest in additional income-generating opportunities. Such evidence from impact evaluations can help governments make spending and policy decisions that are most beneficial for citizens, such as deciding to spend public funds on index insurance, which triggers payment in the event of a climatic shock. Sovereign products have been shown to support government budgets when climate shocks increase government fiscal obligations.

In addition, evidence generated by monitoring and impact evaluations can be used to adjust and effectively scale for maximum development impact. Based on an assessment of IBLI, which was launched in Kenya in 2009, the GoK asked the Agricultural Insurance Development Program—a partnership between the World Bank and USAID as part of a multi-donor trust fund—to design and pilot a modified product aimed at protecting a different (more vulnerable) group of pastoralists. This led to the launch of the KLIP program in 2014.

A worthwhile resource for monitoring an index insurance scheme is the 3-D Client Value Assessment Tool Kit (see Further Readings section). This resource allows anyone interested in measuring the value of their agricultural index insurance products to work through a series of analytical questions assessing the product's design, distribution, and delivery. This exercise offers users a multi-dimensional understanding of the product's value proposition for potential or existing clients. The very first indicator of value included in this tool kit is an evaluation of a Minimum Quality Standard (MQS) for index insurance, which is an objective measure of quality to ensure that a product, at a minimum, does no harm to those it is supposed to protect.

Before rollout	During implementation	After implementation

Evaluation of a product
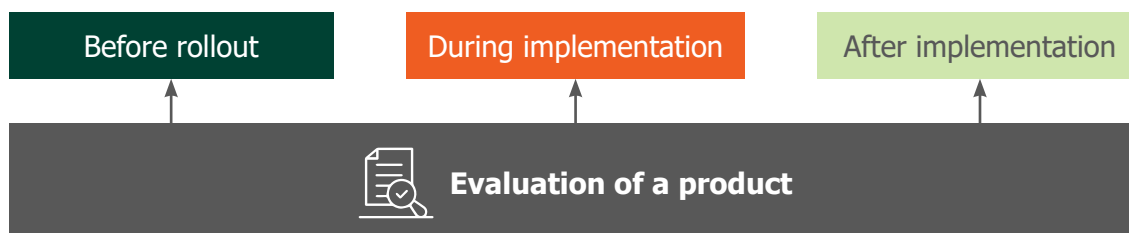
Building quality into index insurance

Why does quality matter in index insurance?

Quality certification for index insurance is critical because farmers, donors, and national governments can't tell whether an index insurance product is likely to pay for losses as promised. While index insurance always carries the risk it will fail to pay out accurately, how likely a product is to fail and under what circumstances can have an enormous impact on households' present and future well-being. More broadly, low-quality insurance products waste finite development resources and undermine take-up for future high-quality products. There are many well-publicized examples of these failures at both the microinsurance and sovereign insurance levels. A better understanding of why evaluating insurance products is so important can help prevent such failures from occurring in the future.

To further demonstrate why evaluating the implementation of a disaster risk financing insurance scheme is so important, the rest of this section looks at assessment of an index insurance product's quality.

A **high-quality** index insurance contract does different things depending on its type.

High-quality microinsurance adequately protects farmers against income fluctuations.

High-quality sovereign insurance stabilizes government budgets, assuring more rapid and effective disaster response.

Both types protect the reputation of firms and other stakeholders.

Consider an analogy to improved seeds: Like the quality of hybrid maize seeds, the quality of index insurance is a hidden trait; farmers cannot look at the contract paper and tell if it will protect them anymore than they can look at a maize seed and directly discern its genetics. And for both insurance and seeds, a high-quality product is more costly to develop and supply than a low-quality product. Given the difficulty of discerning a product's quality and given the price paid for high quality, low-quality contracts may drive out the high-quality. Certification can solve this problem, as discussed later.

Minimum Quality Standard

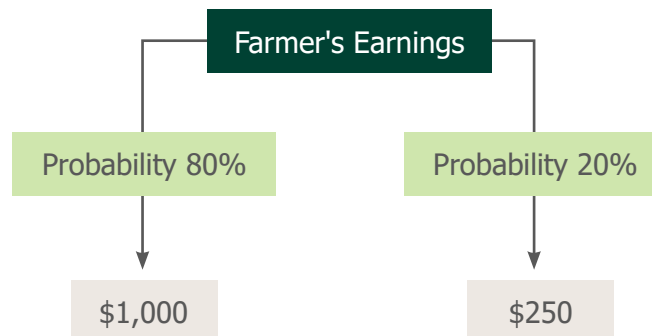### How to define, measure, monitor, and improve index insurance quality

An index insurance contract that meets an MQS can be defined relative to the farmers it is meant to protect: such an insurance contract leaves farmers who face environmental risks better off (or at least no worse off) than if they had no insurance. An index insurance product should certainly have the potential to provide these farmers more stability than no insurance at all. A good contract should of course exceed the minimum standard and make farmers much better off than if they had no insurance. But a poor-quality insurance contract that fails at a high rate will reduce farmers' well-being because it destabilizes income.

> **A simple definition of the Minimum Quality Standard (MQS):**
> The expected economic well-being of the insured is no lower with the insurance than without the insurance (i.e., insurance meeting the MQS does not hurt people by making them worse off).

So how do we measure "expected economic well-being"? Economics offers several ways, and here we rely on the standard "expected utility" approach, which is most appropriate for insurance quality measurement for a variety of reasons. To explain this approach, let's use a simple agricultural example that illustrates economic well-being with and without insurance.

Imagine that a farmer has an 80 percent chance of earning $1,000 and a 20 percent chance of earning only $250. The pink/orange bars in figure 8 illustrate this agricultural example, with the incomes shown on the horizontal axis and the probabilities on the vertical axis.

```
                    Farmer's Earnings
                   /                 \
          Probability 80%        Probability 20%
                |                      |
              $1,000                 $250
```

In this example, the farmer's average earnings over the years would be $850. However, the farmer risks those off-years when she will have to get by on only $250, and she knows that she and her family will suffer in those years. If possible, she would gladly trade her variable income stream for a guaranteed income that would likely be well less than $850. The minimum guaranteed income that she would accept in place of her variable farm income is called the "certainty equivalent" of her farm income stream. Certainty equivalent is a measure of her expected economic well-being as an uninsured farmer.

For a moderately risk-averse farmer, the certainty equivalent in our simple example would be $725, meaning she would give up $125 (the difference between her average income of $850 and her certainty equivalent income of $725) to avoid the risk of bad outcomes. A farmer even more averse to bad events—one for whom the $250 causes severe suffering—would have an even lower certainty equivalent income.

Using this idea, we can now consider how insurance works. The blue bars in figure 8 show how a "perfect" insurance contract would work. In this perfect insurance scenario, the contract pays the farmer $400 in all bad years. The pure premium cost for this insurance would be $400 x 20 percent, or $80. Assuming a 50 percent markup of insurance costs, the market price of this insurance would be $120. After paying the premium every year, the farmer's income in good and bad years would be as shown in the blue bars in the figure. Note that perfect insurance squeezes in farmer income, getting rid of the lows and the highs. Because of the markup, the insurance lowers the farmer's average income from $850 to $810.

The key insurance quality question, then, is whether the farmer's expected well-being would be higher with this insurance contract (where she gives up some money on average to get rid of the risk of super-low outcomes) than it would be if she went it alone without insurance. If her well-being increases, then this contract would pass the MQS.

Using expected utility theory, we can calculate the farmer's certainty equivalent income when she has insurance. The graph in figure 9 shows the moderately risk-averse farmer's certainty equivalent income under this perfect insurance, which has a zero-failure rate as it always correctly detects losses. Where the green, downward sloping line intersects the vertical axis, we can see that the farmer's certainty equivalent income with perfect insurance will be $790. The black horizontal line shows the farmer's certainty equivalent income without insurance, which is $725. Because $790 is greater than $725, this perfect contract easily passes the MQS test.
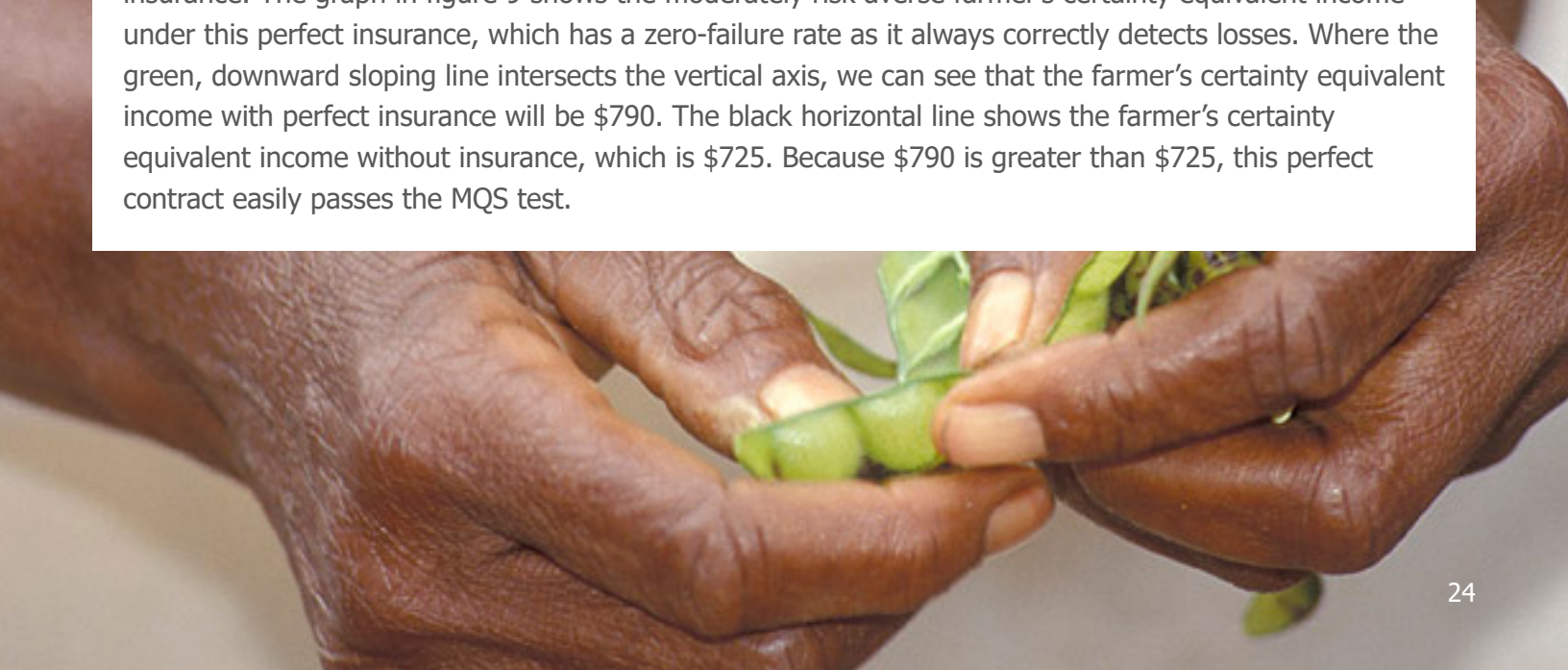
Now, what about a more realistic index insurance contract that sometimes fails to properly identify losses? The green bars in figure 8 illustrate how an index insurance contract that correctly predicts losses only half the time would work. While this may sound like a low rate, it is on par with many index insurance contracts currently being offered. As can be seen in the figure, the worst outcome for the farmer is worse with this insurance contract: her worst outcome without insurance used to be an income of $250, but with insurance it is an income of only $130 (the $250 income less the $120 insurance premium). Other times, the insurance still works and lifts her income to $530.

It is now less obvious whether the risk-averse farmer should buy this failure-prone insurance, which sometimes makes her better off, sometimes makes her worse off, and always lowers her average income. Returning to figure 9, we show the calculated certainty equivalents for the farmer with index insurance. As the failure rate increases from zero (perfect insurance), the certainty equivalent value of having insurance steadily declines from $790. As can be seen, if the failure rate reaches 50 percent or beyond, the farmer would be better off without insurance (certainty equivalent of $725) than with insurance (certainty equivalent less than $725). Failure-prone index insurance contracts will not pass the MQS test.

FIGURE 8. INCOME LEVELS WITH AND WITHOUT INSURANCE
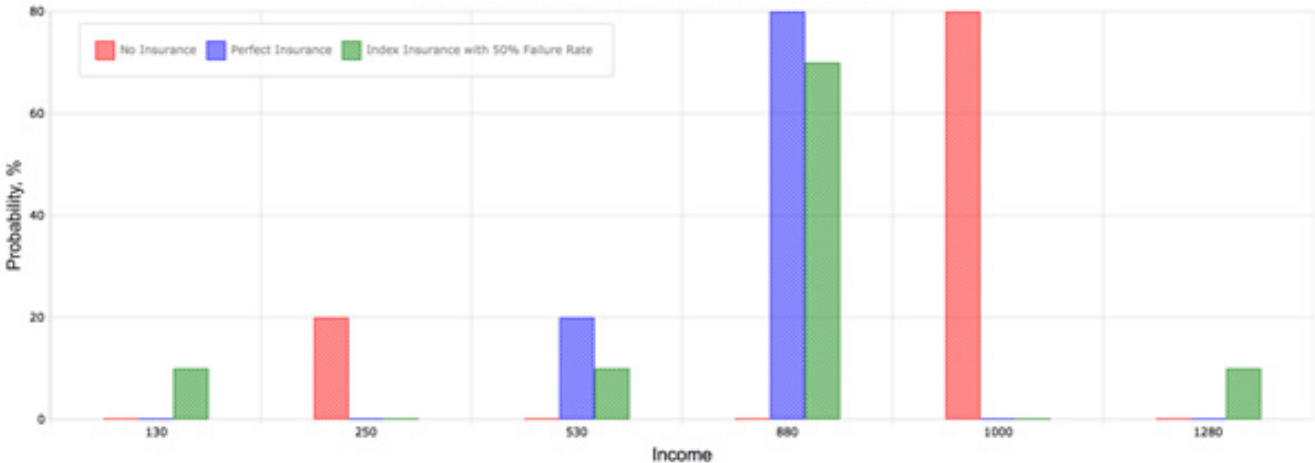
Source: Michael Carter

FIGURE 9: INCOME LEVELS WITH AND WITHOUT INSURANCE ASSUMING A FAILURE RATE
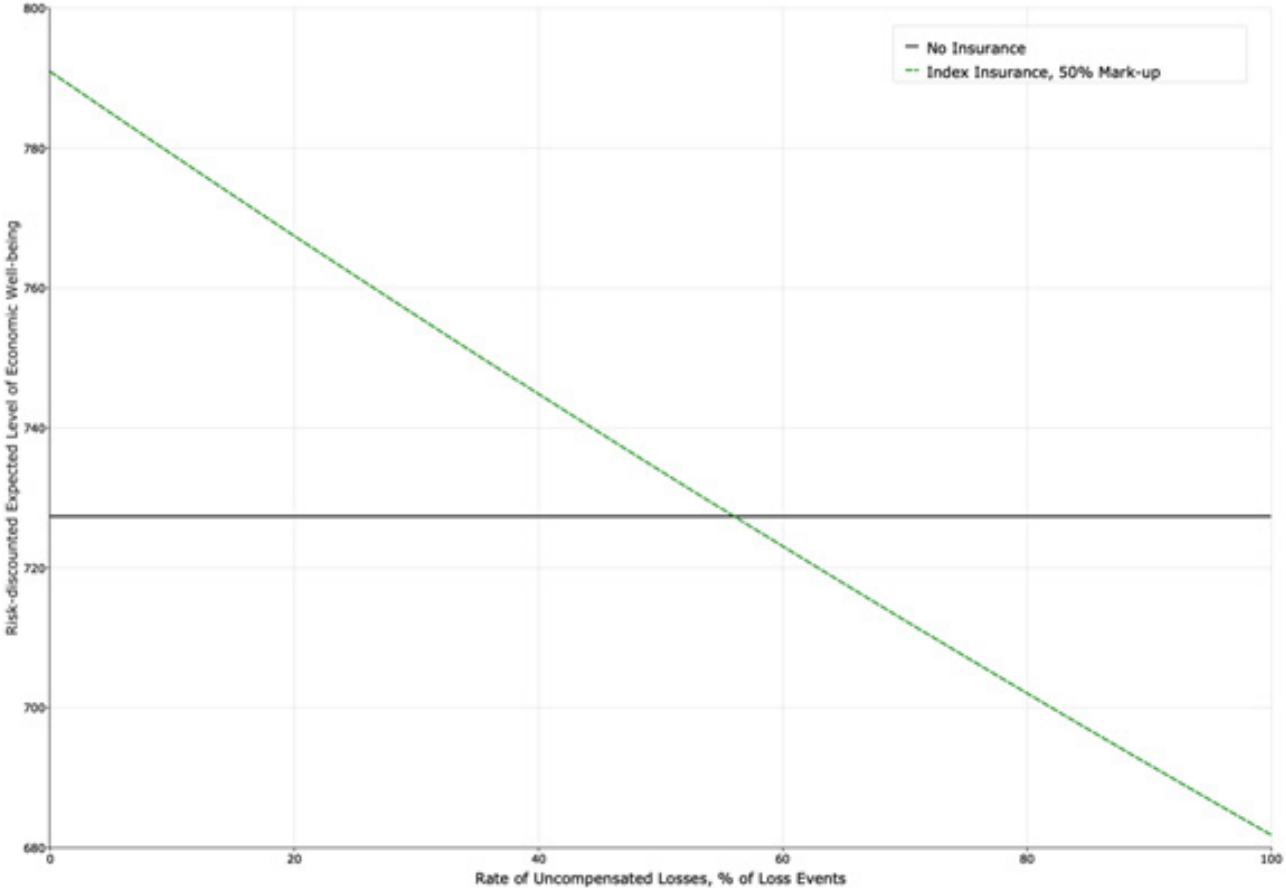
Source: Michael Carter

We have thus far developed the tools to measure the quality of an index insurance contract using a very simple example, where all possible outcomes and probabilities are known. But if we collect data on real-world farmers, we can carry out the same exercise to evaluate the quality of real-world insurance contracts. Figure 10 shows the certainty equivalent for rice farmers in northern Tanzania without insurance (the black horizontal line) and with an array of possible index contracts. These range from an expensive-to-implement area yield contract to cheaper-to-implement remote sensing–based contracts. Benami and Carter (2021) discuss this example in more detail and explain why the hybrid "Satellite with Audit" contract offers the highest contract value using the certainty equivalent standard.

FIGURE 10. MINIMUM QUALITY STANDARDS TO ASSESS SCENARIOS OF WHEN TO BUY OR NOT BUY INSURANCE

Index Insurance quality varies by index type and premium for rice farmers in Tanzania
Quality assessed as difference between no insurance & index insurance certainty equivalent at a given premium
Solid vertical lines reflect estimated premium value for each index type

Index Type — No Insurance — Rainfall — Satellite — Satellite with Audit — Area Yield (Survey)
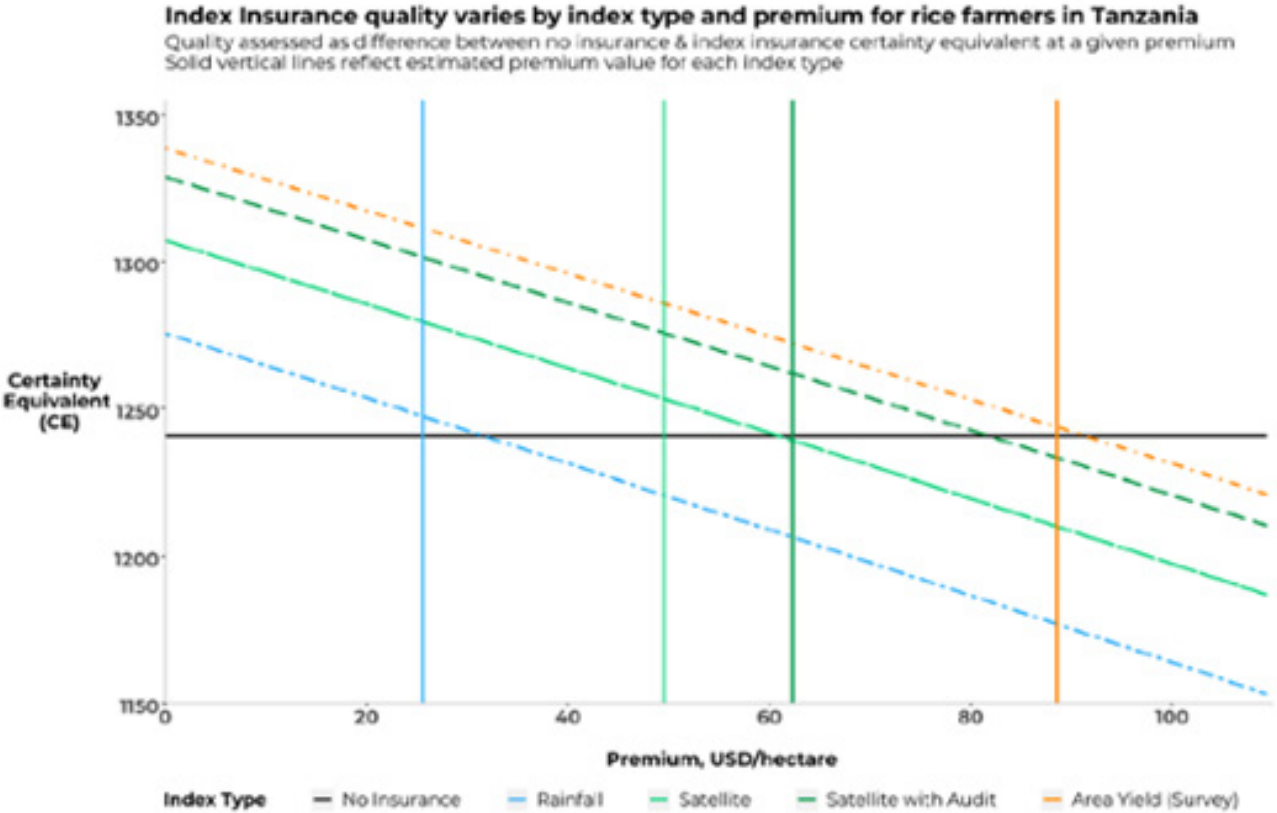
Source: Benami and Carter 2021.

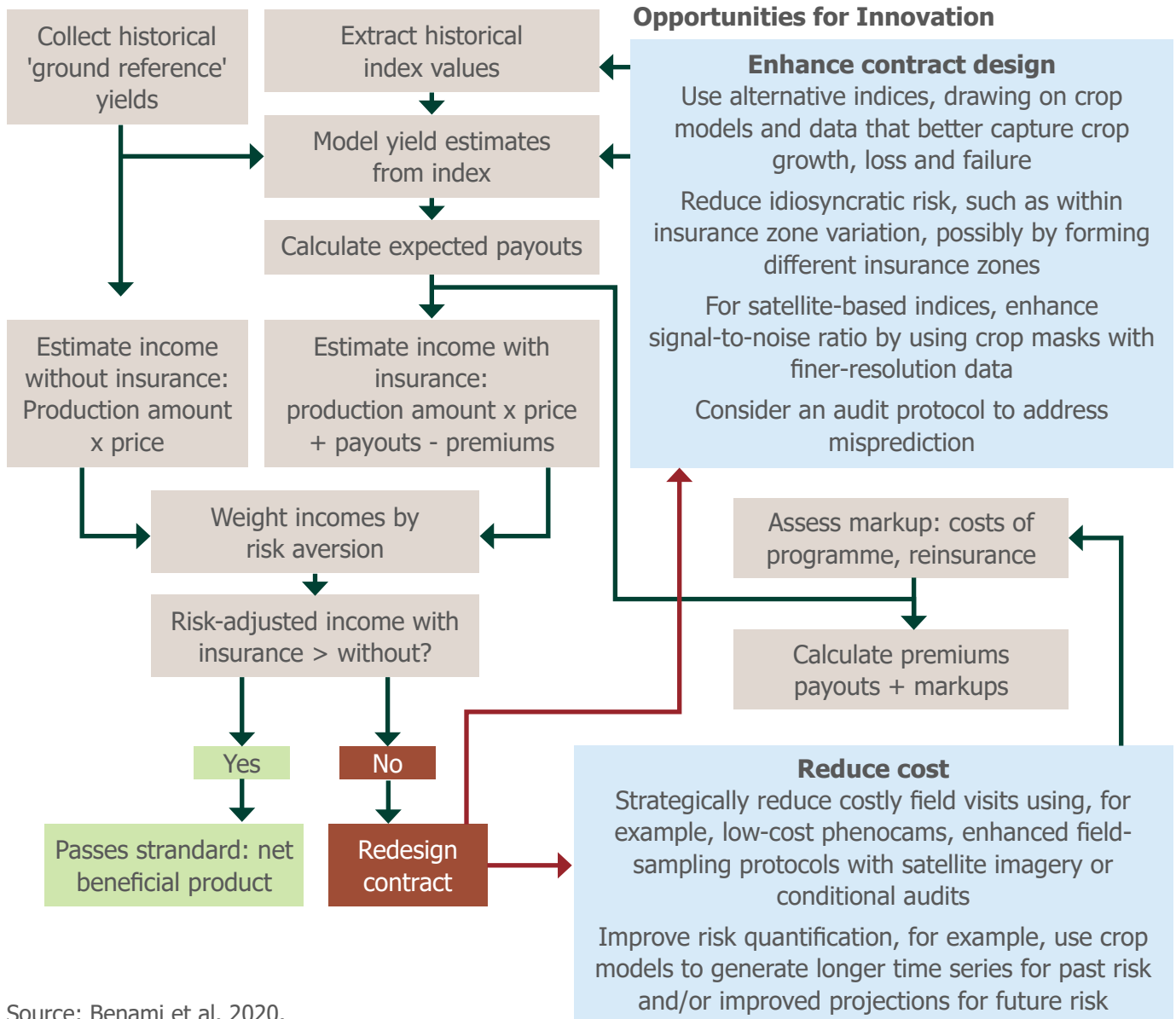**How to embed MQS within product design?**

This brings us to the question, how do we use this concept of MQS to design better insurance contracts? Evaluating minimum quality standards is part of an iterative process that moves beyond understanding whether a contract will protect farmers or not. The analysis can be used to improve a product that initially fails MQS or is of just passable quality.

FIGURE 11. PROCESS TO EVALUATE THE DESIGN OF AN INDEX INSURANCE CONTRACT

Opportunities for Innovation

Collect historical 'ground reference' yields	Extract historical index values

Model yield estimates from index

Calculate expected payouts

Estimate income without insurance: Production amount x price

Estimate income with insurance: production amount x price + payouts - premiums

Weight incomes by risk aversion

Risk-adjusted income with insurance > without?

Yes

No

Passes strandard: net beneficial product

Redesign contract

Enhance contract design
Use alternative indices, drawing on crop models and data that better capture crop growth, loss and failure

Reduce idiosyncratic risk, such as within insurance zone variation, possibly by forming different insurance zones

For satellite-based indices, enhance signal-to-noise ratio by using crop masks with finer-resolution data

Consider an audit protocol to address misprediction

Assess markup: costs of programme, reinsurance

Calculate premiums payouts + markups

Reduce cost
Strategically reduce costly field visits using, for example, low-cost phenocams, enhanced field-sampling protocols with satellite imagery or conditional audits

Improve risk quantification, for example, use crop models to generate longer time series for past risk and/or improved projections for future risk

Source: Benami et al. 2020.

Figure 11 shows the importance of being able to evaluate an index insurance contract such that opportunities for more efficient contract design can be fed back into further iterations.

The example above looked at a microinsurance product, but the minister of finance faces a similar difficulty in discerning the quality of a sovereign index insurance contract and judging when it is smart public policy to use limited and costly budget resources to purchase insurance.

Sovereign-level insurance example

It is important to ensure the quality of insurance for governments or other entities seeking to stabilize budget obligations that can be shocked by climate events. Sovereign index insurance contracts can provide governments with budgetary support for the costs of infrastructure replacement and excess social protection payments that accumulate in the wake of hurricanes and droughts. But how do we evaluate whether implementing these contracts is the correct choice? As part of the monitoring and evaluation process, we need to determine whether the protection offered by such sovereign contracts makes good public finance sense.

Figure 12 looks at the estimated loss to the National Drought Management Authority (NDMA) of Kenya with and without the purchase of the rangeland insurance contract. The rangeland contract is a remote sensing–based rangeland forage index contract similar to the IBLI/KLIP program, and includes some prediction error. As can be seen, sometimes the forage index over predicts and sometimes it under predicts social protection needs. A sovereign contract based on this index would thus not only provide exactly the amount of money the government might need.

FIGURE 12. PAYOUTS WITH AND WITHOUT RANGELAND SOVEREIGN INSURANCE CONTRACT
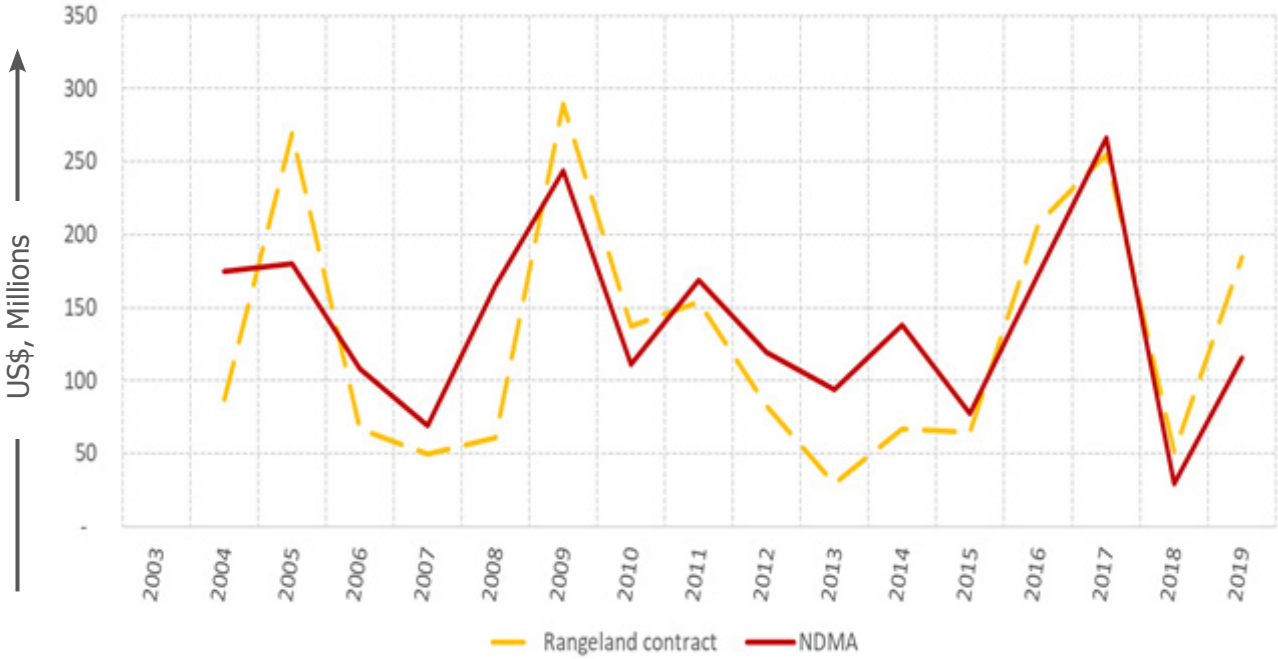
Source: Carter, M., Marcos Sugastti, F. Fava and N. Jenson (2021)

There are two ways to measure the quality of the product. As with micro insurance, the measures compare the situation with and without a sovereign insurance contract and ask which is better. In the case of a sovereign insurance contract, we can:

1. Ask if the full macroeconomic cost of meeting a policy goal (e.g., raising all poor households up to the level of the poverty line) is cheaper with or without insurance. Note that approach assumes that the government must always mobilize funds to meet its policy target.

2. Ask if the government can create higher social welfare (the well-being of its target population) with or without sovereign insurance, assuming that the government has a hard budget constraint and can only spend a fixed amount of funds on its social protection program.

The use of these two concepts is illustrated using data from Kenya and analyzing the efficacy of a parametric sovereign risk contract developed to meet Kenya's excess social protection needs caused by drought events in the rangeland areas. While the benchmark data available to evaluate the contract are imperfect, evidence shows that the proposed contract performs better under both metrics than a go-it-alone (no insurance) policy. The proposed contract falls well short of what a perfect parametric contract could achieve, suggesting the importance of quality assessment methodologies to compare alternative options. The larger takeaway is that when evaluating the implementation of a sovereign-level insurance scheme, the methodology should allow for comparing the performances of different sovereign-level parametric insurance contracts and establishing a minimum quality threshold.

How to assure and institutionalize index insurance quality

It is important to determine a metric that can provide a coherent measure of quality both for micro-level insurance and for meso-and macro-level products. In this case it is the quality of the index insurance product we are concerned with, but this question is applicable to any financial protection schemes for agriculture.

Given the importance of a high-quality index insurance product, how can the requirement for high quality be formalized within the industry to make impact evaluations, operation structure, and monitoring more transparent and consistent?

Quality Index Insurance Certification (QUIIC) provides an answer:

Quality certification for index insurance is critical because farmers, donors and national governments can't tell whether an index insurance product is likely to pay for losses as promised. While index insurance always carries the risk it will fail to pay out accurately, the likelihood a product will fail and when it fails both can have an enormous impact on a family's present and future wellbeing. More broadly, low-quality insurance products waste finite development resources and undermines take-up for future high-quality products.

QUIIC pairs insurance index and household data with groundbreaking statistical and economic quality measurement tools to estimate both the like likelihood an insurance product will fail and whether it will fail when families are most in need. In collaboration with the Regional Centre for Mapping of Resources for Development (a NASA-affiliated remote sensing group in Nairobi), the Feed the Future Innovation Lab for Markets, Risk and Resilience is working with public and private sector partners to develop QUIIC as a voluntary certification mark of index insurance quality. Based on this analysis, the QUIIC team can certify whether a product meets a minimum level of quality by not leaving a family worse off than if they had no insurance at all.

There are numerous examples of voluntary certification standards for commodities whose quality is not easily discernable by consumers (e.g., Fair Trade; the ISO series; UL for electronics in the US) and where the private sector voluntarily abides by quality standards established by a third party.

There is an information gap, and development of a profitable and sustainable market can be advanced with expertise from an independent institution and effective indications of quality for farmers. When public or donor funds are being used, ensuring the product is not low-quality is an essential responsibility of the funders.

While the first index insurance certifications are underway, there is still a need to further test the business case for voluntary certification. There is a real opportunity for donors and governments that support or subsidize index insurance to require index insurance standards and certification in order to catalyze the market for individual insurance contracts, a step that could help vulnerable populations manage climate change.

Key Takeaways from Fact Sheet 5

- **Designing and implementing programs and a DRFS can take time** and also requires strong governance, stakeholder engagement, the establishment of necessary procedures, and the building of capacity in key personnel.

- **Strong government involvement and support** at all stages of the operational framework is vital for ensuring buy-in and keeping the program focused on meeting its objectives.

- **Programs are not a one-time activity but need regular review and refinement.** M&E is important for assessing impact and determining whether the program is meeting its objectives.

- **Designing a way to measure quality in a program is important** because it helps determine whether a scheme makes economic sense.

- **M&E assesses whether a program is of economic value for the audience.** When implementing an index insurance scheme, assessing the quality of the insurance contract is an integral part of the monitoring and evaluation process. We have the tools necessary to guide the design of better insurance contracts; improvements to the product can be made to ensure that a disaster risk index insurance scheme does not in fact make people worse off and that intended development impacts are maximized.

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Abbreviations

ARC	African Risk Capacity
ASAL	Arid and Semi-arid Lands
Cat DDO	Catastrophe Deferred Drawdown Option
DRFS	Disaster Risk Financing Strategy
FCDO	Foreign, Commonwealth and Development Office
FDRF	Fundamentals of Disaster Risk Financing
GDP	Gross Domestic Product
GoK	Government of Kenya
HSNP	Hunger Safety Net Programme
IBLI	Index-Based Livestock Insurance
KLIP	Kenya Livestock Insurance Program
M&E	Monitoring and Evaluation
MALF	Ministry of Livestock, Agriculture and Fisheries
MQS	Minimum Quality Standard
NDMA	National Drought Management Authority
PPP	PublicPrivate Partnership
QUIIC	Quality Index Insurance Certification
SDL	State Department of Livestock

Work Sheet 5 – Implementing a Financial Protection Scheme for Agriculture

Test your knowledge and record your insights through this easy, DIY work sheet!

Activity 1: Identify which of the following statements are true or false.

#	Statement	True	False
1.	The Kenya Livestock Insurance Program is a risk transfer program targeting low-income pastoralists.		
2.	The Hunger Safety Net Programme provides both unconditional and scalable cash transfers to target the most vulnerable population.		
3.	Sovereign-level risk transfer products are harder to implement than micro- or meso-level risk transfer products.		
4.	Monitoring and evaluation is something that should be considered after implementation of a program.		
5.	Monitoring and evaluation assesses whether a program is of economic value for the audience.		
6.	Low-quality products waste finite development resources and undermine take-up for future high-quality products.		
7.	DRFA Programs are a one-time activity, but need regular review and refinement.		

Activity 2: Can you identify three questions your government could look to answer when implementing a financial protection scheme for agriculture?

[1]

[2]

[3]

Activity 3: Reflections

[1] These are my top two takeaways from this fact sheet.

[2] Here are two concepts or ideas that I would like more information about.