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# Building preparedness on the climate frontline:

How risk transfer can help smallholder farmers to grow yields, increase incomes and cope with the natural disasters of today, and the future





# Contents

01	Introduction	04	03	Part 1: Smallholder farmers serve as change agents on the frontline of multiple, intersecting global crises	22
01-1	Radical Collaboration	05	04	Part 2: Nature and extent of climate risks facing smallholder farmers	24
01-2	Integrating parametric insurance into the agricultural development toolkit	06	04-1	Key vulnerabilities linked to SHF livelihood strategies	27
01-3	The imperative for multi-stakeholder partnerships	08	05	Part 3: A pivotal role for parametrics	28
01-4	Navigating this report	10	05-1	Critical success factors	29
02	Executive summary	12	05-2	Benefits of parametric insurance	30
02-1	Smallholder farming – the cornerstone of global food security and natural capital stewardship – stands on the climate frontline	13	05-3	Technology enablers	32
02-2	The cost of uncertainty – why traditional risk transfer tools have failed to close the protection gap	15	05-4	The data revolution and the rise of e-platforms	34
02-3	The opportunity to build preparedness in smallholder agriculture through parametric insurance	17	06	Part 4: Discussion questions	36
02-4	Capturing the parametric opportunity: A call to action	21	07	Part 5: Case studies	37
			08	References	48
			09	Footnotes	50



# 01 Introduction

This is a briefing for the growing community of stakeholders seeking to develop innovative risk transfer solutions that empower vulnerable communities around the world to build preparedness and resilience against climate risks.

Although a wide range of constituencies and natural assets can benefit from subsidised access to risk transfer solutions, our focus is on an underserved sector that stands on the frontline of climate change: **smallholder agriculture**.

## Defining smallholder agriculture

Farm size of 2 hectares or less is a generally accepted yardstick used to define smallholder farming, including by the UN FAO and the World Bank Group.

However, definitions should retain flexibility to accommodate widely different conditions across developing countries: from agroecology and soil type to farm input and output prices, and demographic and technological factors.

In general, concepts underpinning definitions of smallholders and family farms overlap, as family farms tend to remain small due to high supervision costs.<sup>i</sup>

## 01-1 Radical collaboration

Developers of parametric insurance solutions have made significant progress in recent years, creating strong foundations to scale coverage. Even so, the vast majority of smallholder farmers (SHFs) – who represent 84% of farms worldwide – remain uninsured and face poverty traps due to more frequent and severe climate shocks, and the lack of available tools to mitigate them.

Our vision, therefore, is to help expand parametric protection through premium support to cover hundreds of millions of smallholder farmers. Achieving this step-change in coverage would not only close the yawning protection gap for smallholders, whereby just 1 in 10 currently has cover – it would create a safety net to enable resilient prosperity for a farming population that plays an under-recognised but pivotal role in safeguarding global food security and natural capital.

The precondition for success will be deep collaboration and alignment of actions and objectives across the full spectrum of sector stakeholders. Hence, the purpose of this briefing is to explore collaboration opportunities – including with digital platforms and other solution sets in agricultural finance – and to enrich discussion amongst partners as momentum builds around the rollout of parametric cover in rural settings.

### “ Expert insight

From drought in East Africa that displaced millions to devastating floods in Pakistan, farming communities in Africa and South Asia are already among those suffering most from climate change, even though they are least responsible for it. Home to 3 billion+ people, these regions also have the world's largest concentrations of poverty and malnutrition.

Most people in these areas depend on an incredibly climate-sensitive occupation to support their families or get their food: raising crops and livestock on a small parcel of land. Coming together to help smallholders adjust to these changing conditions and increase their output of nutritious foods could mean outsized gains in poverty reduction and health.<sup>ii</sup>

**Rodger Voorhies,**  
President, Global Growth & Opportunity,  
Bill & Melinda Gates Foundation



## 01-2 Integrating parametrics into the agricultural development toolkit

With recent advances in connectivity infrastructure and agricultural technologies in markets that host significant smallholder populations, there is an unprecedented opportunity to extend access to risk transfer products to climate-vulnerable farming communities at global scale.

We believe parametric insurance – made accessible through coordinated premium subsidy support from development partners and mission-driven investors – can become an integral part of the risk mitigation solution set needed to support smallholders to become financially prepared, climate resilient and ultimately more prosperous.

While most development actors have not historically viewed insurance as a core feature of their toolkit, emerging evidence indicates that parametrics can achieve outsized development impact in key SDG-aligned areas – from food security to poverty alleviation, health, education and mitigation of excess rural out-migration – **even in circumstances where claims are not triggered.**

This is because smallholders with access to the safety net provided by risk transfer solutions are empowered to invest more into items that help break entrenched poverty cycles – from productivity-enhancing agricultural inputs and equipment to higher value crops and household items like nutritious foods, healthcare and education.

This multiplier or 'amplification' effect of insurance cover can be substantial: as a flagship global report from Lloyds on underinsurance identified, a 1% increase in insurance provision reduces the disaster recover burden in developing countries by some 22%.<sup>iii</sup>

### Use case for premium subsidies

'Subsidies' are often perceived as an uneconomic giveaway that prevent price discovery and market functioning. While this can apply to mature products, premium subsidies in smallholder agriculture will enable the development of new—and necessary—products that would not gain traction without price support. In this sector, where 90%+ of smallholders lack any insurance, subsidies will create rather than distort markets, generating positive demonstration effects where none previously existed.

Importantly, subsidies will allow disaster and climate risk insurance schemes to geographically diversify. This is necessary if we are to increase access by scaling the number of active schemes. Diversification will also unlock private finance and insurance sector capacity at the scale necessary to respond to growing needs as climate change accelerates. In this way, subsidisation can be a cost-effective use of donor funds as well as a valuable complement to investments in adaptation and resilience. Stable finance for premium subsidies also allows for new models, approaches and tools to be developed to de-risk, finance and advance risk reduction in agriculture.





# 01-3 The imperative for multi-stakeholder partnerships

The true untapped potential of parametrics in agriculture will not be realised until a cascade of inter-linked stakeholder coordination challenges are addressed. While climate risks for smallholders are often hyper-localised, collaboration to develop appropriate risk transfer solutions needs to blend global and the local, public and private. Going forward, multi-stakeholder partnerships should focus on four key interfaces:

- **Between farmer organisations and their corporate suppliers and off-takers** (i.e., providers of improved seed, fertiliser and crop protection products to SHFs, and aggregate buyers of their produce). These farmer-facing businesses have the deepest existing relationships and incentive alignment with smallholders.
- **Between governments and farmer organisations, aggregators and rural retailers** (e.g., adapting largescale government development programmes and extension services to promote parametric insurance uptake, and educating farmers on the benefits of adoption).
- **Between multiple categories of private stakeholder involved in parametric product development and distribution** (including insurers, reinsurers, brokers, financial institutions, mobile network operators, cloud storage firms, data providers, and AgTech startups).
- **Between donor agencies/foundations and all of the stakeholders listed above** (including alignment and learning between different donor-funded parametrics projects to avoid siloes and duplication).

Please see **Part - 03-3: A pivotal role for parametrics** for discussion of the way forward around the key coordination requirements

Figure 1. Agri-insurance stakeholder landscape



Source: ISF Advisors & Microinsurance Network. 'State of the Sector: Agri-Insurance for Smallholder Farmers.' (2022)



# 01-4 Navigating this report

Workshop participants short on time can skip straight to Part 4 which provides a set of key discussion questions.

For those seeking a deeper assessment of smallholder agriculture’s contribution to food security and climate mitigation (Part 1), the climate risks facing farmers in developing countries (Part 2), the role parametrics can play in addressing such risks (Part 3), and case studies of innovation in farmer-focused parametrics (Part 5), please read on below.

## Who should read this briefing and why

### Farmers-facing agribusiness

Understand the potential for parametric insurance to strengthen off-take arrangements with smallholders

### Impact investors

Build awareness of parametric insurance provision and enabling technologies as an investment class

### Insurers and reinsurers

Identify early-mover opportunities to create parametric insurance capability and generate attractive financial & non-financial returns

### NGOs, foundations and development actors

Develop broad constituencies of support for uptake of parametric insurance in agriculture, linking farmers to insurers

### Government agencies and regulators

Understand the requirements for a strong enabling policy environment for parametric insurance

### Farmer organizations

Build awareness and adoption of parametric insurance to mitigate the climate risks of the future and boost farm productivity





# 02 Executive Summary

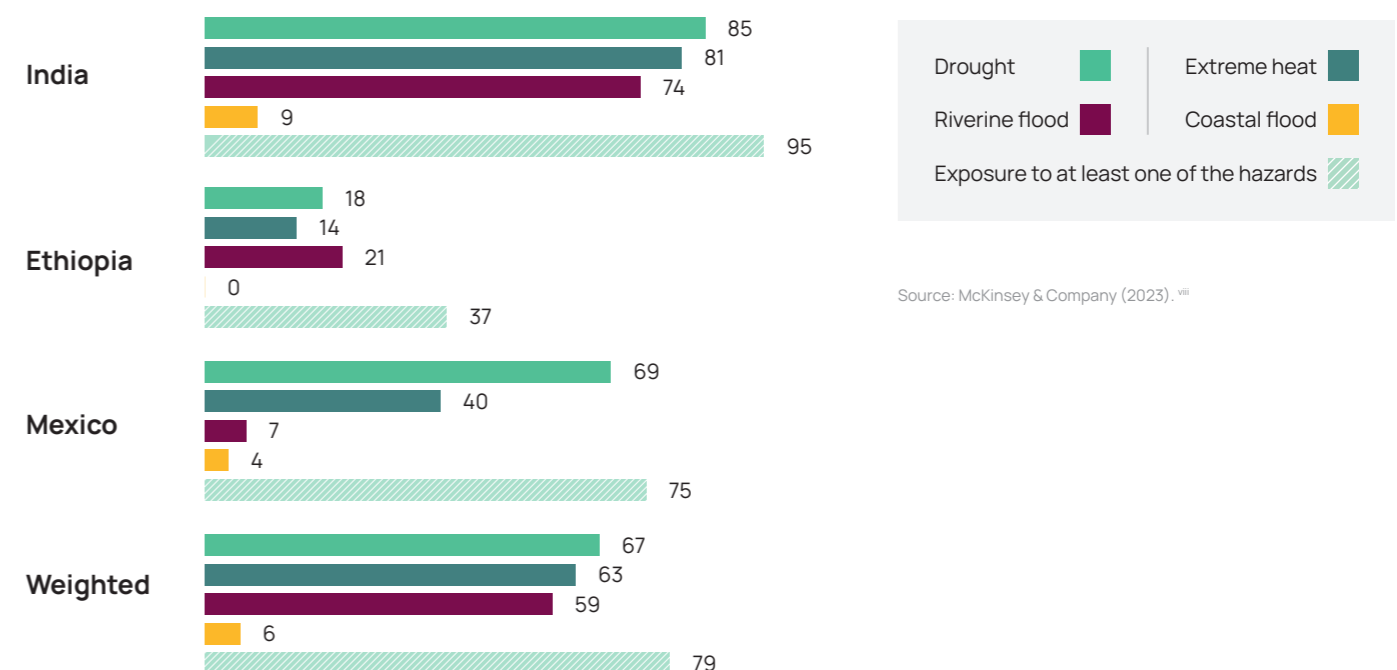
## 02-1 Smallholder farming – the cornerstone of global food security and natural capital stewardship – stands on the climate frontline

The world's estimated 608 million smallholder farmers – defined as family-owned enterprises producing crops or livestock on smallholdings of two hectares or less – are already experiencing amongst the earliest and most severe impacts of climate change.<sup>iv</sup> Warming temperatures and weather disruptions have reduced food productivity worldwide by 12.5% in recent decades, according to the UN Intergovernmental Panel on Climate Change (IPCC).<sup>v</sup>

Looking ahead, from droughts and extreme heat to riverine and coastal flooding, land used in the world's 'breadbasket' regions for smallholder cultivation – South Asia, East Asia, and Sub-Saharan Africa – is under unprecedented threat.<sup>vi</sup>

Indeed, a recent forecast of three low and middle income (LMIC) countries that host large smallholder populations assessed that 79% of farmers will face a moderate or high risk from at least one climate hazard by 2050 under a 2°C global warming scenario (Figure 2).<sup>vii</sup>

Figure 2. Percentage of smallholders facing at least one climate hazard by 2050 in large LMIC economies





Unless steps are taken to support farmers to adapt to climate change, global agricultural productivity may – under credible worst case scenario models – decrease by 17% by 2050 from current levels, and by as much as 50% in Africa. Smallholders, most of whom lack access to modernised irrigation and improved seed varieties, risk bearing the brunt of worsening climate conditions.<sup>x</sup>

The mounting climate threat facing smallholders matters not just for farmers' livelihood strategies but also for global food security. Against a backdrop of increasingly scarce arable land, the world's food and commodity needs cannot be achieved without unlocking the full potential of small-scale farms.<sup>x</sup> This is especially true for developing countries, where four-fifths of food consumed is produced by smallholders who typically face a combination of high financial risks and low returns.

The urgency of global emissions reduction goals provides further imperative to invest in risk mitigation and resiliency for smallholder agriculture. Despite the relatively low emissions contribution of smallholder farming, small-scale farmers have a mission-critical role to play in lowering global greenhouse gas (GHG) emissions.<sup>xi</sup>

This is because smallholders act as stewards of many of the world's most biodiverse landscapes and important carbon sinks. It is also because they are well placed – as 'hands on' owner-managers of farm holdings – to spearhead the transition towards sustainable, lower-carbon cultivation techniques while still maintaining and growing food output.

The emerging field of regenerative agriculture – in which sustainable technologies and context-specific farming practices are applied to a production system to improve yield, crop resiliency, soil health and biodiversity while cutting emissions – is well suited to small-scale farming. Smallholders are more likely to favour mixed farming systems and to rely less on costly synthetic inputs to begin with. Indeed, in a 2021 meta-analysis published in the journal *Nature*, smaller farms were shown to have higher yields and greater crop and non-crop biodiversity – on average – than large farms at both the farm and landscape level.<sup>xii</sup>

For a deeper assessment of smallholder agriculture's contribution to food security and climate mitigation, please read '**Part 1 - Smallholder farmers serve as change agents on the frontline of multiple, intersecting global crises**' below.

## 02-2 The cost of uncertainty – why traditional risk transfer tools have failed to close the protection gap

Across all geographies, smallholder farmers face high barriers to accessing the financial tools required to buy improved farm inputs, store and market their produce effectively, and build wealth through productivity-enhancing investments. Financial needs, which may be met individually or in aggregate via farmer organisations and cooperatives, include access not just to affordable and flexible loans but also to savings products and efficient payments services.

Both bank and non-bank lenders have traditionally proven reluctant to serve small-scale farming customers due to a combination of high costs to serve; low understanding of agricultural value chains (due to the highly localised nature of agricultural needs across agro-climatic zones and farming communities); and a widely held perception that primary agriculture is inherently high risk.

As a result, on average, agricultural lending typically represents only 3% – 5% of bank assets;<sup>xiii</sup> just 15% of smallholders have access to a savings account; and only \$50 billion of the estimated \$200 billion in credit needed by smallholders is currently provided by formal and informal financial institutions across Africa, Latin America, and South and Southeast Asia.<sup>xiv</sup>

### Barriers to traditional agricultural insurance

In sub-Saharan Africa, where smallholder farmers form the backbone of the food system, agriculture insurance currently has uptake of less than 2%.<sup>xv</sup> Worldwide, just 10% of smallholders have access to any type of insurance.<sup>xvi</sup>

In the insurance sector, the barriers to market penetration and uptake of traditional products by small-scale farmers are manifold. Indeed, amongst the emerging market-focused insurers and reinsurers interviewed in the course of our research, there was a near-universal perception that applying traditional models of microinsurance to a smallholder customer base was not commercially viable, absent necessary supporting infrastructure.





Below, we outline the structural challenges that have hamstrung the sector over recent decades (assessed in detail in Part 2):

### Factors constraining provision of traditional agricultural insurance

	Supply-side barriers	Demand-side constraints
<b>Cost</b>	<ul style="list-style-type: none"> <li>• Baseline risks are high due to farming practices and climate change</li> <li>• High risk concentration as farmers face aggregate risk</li> <li>• Limited risk pooling due to low populations of farmers insured</li> <li>• Positive basis risk increases cost of insurance</li> </ul>	<ul style="list-style-type: none"> <li>• High cost of premium relative to farmers' disposable income</li> <li>• Downside basis risk reduces value of product, may create mistrust, and undermines farmer's welfare</li> <li>• Some insurance products do not cover a sufficient range of risks facing farmers</li> </ul>
<b>Access</b>	<ul style="list-style-type: none"> <li>• Geographically dispersed farmers are difficult and costly to reach</li> <li>• Seasonality of crop production can result in high turnover of sales agents and agricultural extension officers, making education and awareness-raising expensive during every insurance season</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal access to service providers due to limited physical presence in rural communities (lack of 'last mile' human touch points)</li> <li>• Low trust in formal financial services providers amongst farmer populations that are often served by SACCOs or informal/family lenders</li> <li>• Low access to insurers may lead to poor service delivery and responsiveness</li> </ul>
<b>Customer experience</b>	<ul style="list-style-type: none"> <li>• Insurers generally lack agronomic and crop-specific expertise which makes it hard to design specialised products and target the highest priority risks</li> <li>• Low contract values/premiums do not justify high costs of customisation</li> <li>• Limited farm- and customer-level data for accurate risk assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Low trust level due to limited business interaction</li> <li>• Traditionally long turn-around times on claims processes and payouts</li> <li>• Non-transparent payout determination</li> <li>• Lack of product customisation means highest priority farmer needs are unmet</li> </ul>

Source: Adapted from World Bank Group Disaster Risk Financing & Insurance Programme, 'Fact sheet: Disaster Risk Financing Solutions for Climate-resilient Livelihoods in the Agricultural Sector'. (Undated)

Clearly, the barriers to provision of indemnity-based insurance for small-scale farmers are daunting. Several of the challenges are systemic and lie beyond the control of any single insurer. But for the reasons outlined above – including distributional efficiency, payout speed, breadth of coverage, and no requirement for loss assessment or collateral – parametric insurance holds the potential to overturn this equation.

Not alone, however. The reason the use case for parametric cover has become so compelling is that rapid advances in enabling technologies have driven down costs to serve, enhanced product accuracy, and opened up a vastly bigger addressable market in agriculture. Part 2 below explores these technology enablers in more detail.

## 02-3 The opportunity to build preparedness in smallholder agriculture through parametric insurance

Given the multi-dimensional role smallholders are set to play on the climate frontline, how can risk transfer solutions best be deployed in order to:

- (1) Safeguard the productivity and sustainability of rainfed family farm holdings; and
- (2) Unlock inclusive, transformational growth in agriculture by enabling more small farms to step up crop volumes and invest in mechanisation and commercialisation?

In the sections that follow, we spotlight the compelling use case for parametric insurance in addressing these critical questions, demonstrating how this emerging class of pre-defined financing instrument can cut through longstanding barriers.

Parametric insurance is a novel class of insurance which brings greater flexibility and alternative applications when compared to traditional indemnity-based cover. Policies with a 'parametric trigger' pay out a specified sum when a specific measurable event occurs (the 'parameter'), with no requirement that the loss be measured or assigned a cash value.

In a nutshell, this mode of risk transfer allows for an unprecedented level of (i) cost efficiency and scale in the distribution of premiums to rurally located

policyholders (especially when mobile phone networks and mobile-money platforms are used), (ii) speed of disbursement in the event that insured risks occur, as well as (iii) broad coverage of the full range of perils facing farming livelihoods.

Taken together, these attributes make it feasible, for the first time, to work via farmer-facing partner organisations to offer affordable microinsurance to smallholders who are both highly price sensitive and widely dispersed.

Parametric cover brings particularly valuable benefits in the context of farming systems where the need to manage slow, uneven cash cycles and crop seasonality is key. Examples, assessed in more detail in Part 3 - **A pivotal role for parametrics**, include:



### Fast payouts

Payments made within days of a trigger event **provide liquidity for farmers to purchase inputs in time for the next planting season**. When farmers receive the funds quickly, there is no need to sell critical assets to survive. This avoids long-term economic scarring that can trap families in cycles of poverty.

### No collateral

With no requirement for the customer to provide fixed insurable assets, **farmers with uncertain land title and/or limited physical assets can still access cover**.

### Optionality on payouts

Depending on programme design, disbursements following the triggering of an index threshold can be used either for defined purposes (e.g. via electronic vouchers for emergency food supplies and shelter equipment), or they can be unrestricted (i.e., cash which can be used for whatever purpose farmers deem most appropriate to safeguard their livelihoods). Payout options will vary by product: the key point is that instead of payouts being solely focused on repairing the asset or loss insured, there is **flexibility to design for a range of needs and outcomes**.

### Low cost of claims handling

With no claims adjustment process, **costs to administer policies are low**. Examples of smallholder-focused parametric products profiled in the Case Studies below include **premiums with an entry-level cost of under USD \$0.50**.

Because claims are predefined and transparent, there is also **limited scope for contestation of claims**.

Further, in parametric insurance the underwriter's assessment can focus entirely on the risk of the loss event occurring. This allows greater price certainty, which makes parametric pricing more stable over the long term. It also eliminates the impact of inflation on coverage costs.

### Predictive weather modelling

The forward-looking approach underpinning parametric data models is well-suited to the evolving climate risks in agriculture which have no historical precedent.

Moreover, **unlike conventional insurance, parametric cover can be priced without a loss history**. This is especially helpful for product development in economies where historic damage / loss data from natural hazards is limited.

### Multi-peril coverage and customisation

Parametric models are well-suited to crop insurance because several of the forces that can damage crops can be objectively measured (including precipitation levels, wind speeds and temperature).

Unlike indemnity insurance, products can be **tailored to the parameters that matter most for each policyholder – rather than being standardised**. There is also a high degree of flexibility over the premium amount paid per customer.

### Safety net

Farmers no longer need to fear losing their entire harvest in a bad season. This provides a safety net that **stimulates investment of surplus cash into agricultural equipment, technologies and higher value crops that generate more income in subsequent seasons**. Rather than planting areas of low value mixed subsistence crops as a form of 'insurance' against crop failure, farmers can move up the value chain and specialise more.

Significantly, one Africa-focused provider of parametric cover observed that **farmers on their insurance platform invested 20% more in their farms and earned 16% more than farmers who did have access to parametric cover**.<sup>xvii</sup>

### Closing the gender gap

Creating a safety net for smallholders through parametric insurance will have **outsized positive impact both on women and on investment into households to break entrenched poverty cycles**. Although women are less likely to own land across all continents, and women-owned plots often have poorer soil quality, studies show that women (i) account for nearly half of the world's smallholder farmers; (ii) produce 70% of Africa's food; and (iii) reinvest up to 90% of their farm earnings back into their households by spending on more nutritious foods, healthcare, school, and income-generating activities.<sup>xviii</sup>

Moreover, as Neven Mimica, former European Union Commissioner for International Cooperation and Development, observed: "We know that **agricultural yields would rise by almost a third if women had the same access to resources as men**. As a result, there would be up to **150 million fewer hungry people** in the world. And we know that children have significantly better prospects for the future when their mothers are healthy, wealthy and educated. Especially during the first 1,000 days of a child's life."<sup>xix</sup>



As the following diagram shows, the cumulative impact of these benefits can be to spur a virtuous cycle of reinvestment at the farm level – in contrast to the vicious cycle of under-investment that threatens smallholders who lack adequate mechanisms to manage external shocks.

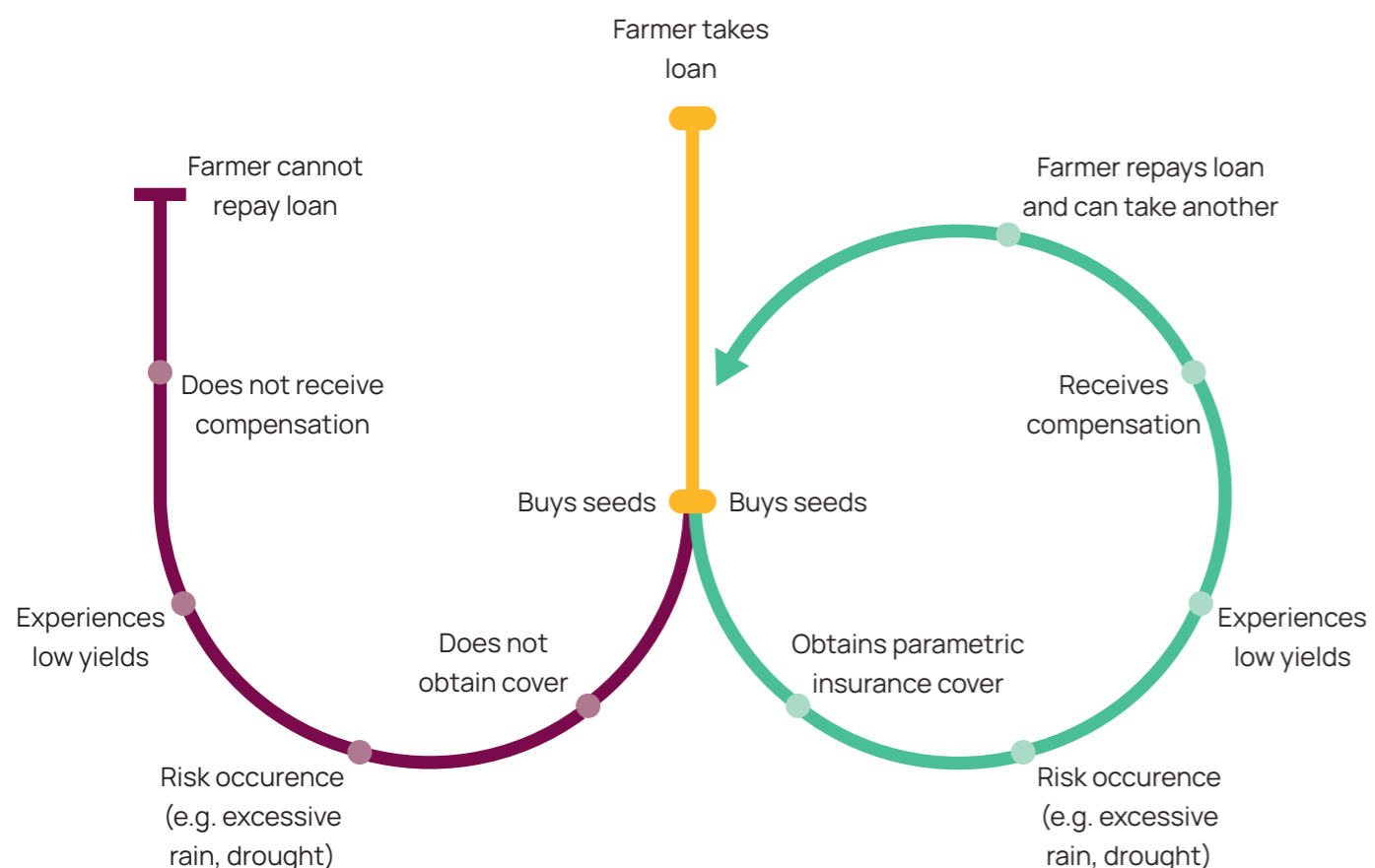
### Impact of parametric cover across growing seasons

#### Scenario #1: No cover

**Cycle of under-investment** – lack of cover blocks access to productivity-enhancing inputs and technologies in subsequent growing seasons

#### Scenario #2: Parametric cover

**Cycle of reinvestment** – insurance cover enables access to improved farm inputs and technologies in subsequent growing seasons



Source: adapted from ACRE Africa (acreafrica.com)

## 02-4 Capturing the parametric opportunity: A call to action

As advances in AgTech and higher penetration of mobile networks catalyse parametric delivery models, we view parametric insurance not as a standalone opportunity but rather as part of a suite of complementary risk mitigation, resilience building and market-building measures designed to support SHFs – a menu spanning farmer access to inputs, finance, savings, agronomic knowledge, technology, and markets.

Indeed, the greatest opportunity to distribute parametric cover to smallholders at scale lies in bundling premiums together with other value adding services that help borrowers build resilience, smooth consumption and mitigate exogenous shocks. E-platforms and partnerships with agribusinesses, input providers or government programmes present opportunities to achieve this 'bundling' at meaningful scale.

The potential rewards from large scale coverage are clear. Recent evidence suggests that even a 1% increase in insurance penetration cuts the disaster recovery burden on developing countries by some 22%, a ratio that likely underplays the impact for farmers who stand on the frontline of several global crises simultaneously – from climate change to poverty alleviation and food security. <sup>xx</sup>





# 03 Part 1: Smallholder farmers serve as change agents on the frontline of multiple, intersecting global crises

Most smallholder farmers operate on a 'semi-subsistence' model, keeping part of the farm's production for the farm family's own consumption and selling part commercially. These sales contribute approximately 35% of worldwide food supply, though this aggregate figure underplays the true significance of smallholder production.<sup>xxi</sup>

Across Africa and Asia, smallholders produce the majority of all domestically consumed staple food crops such as maize and rice (up to 70% and 80% respectively), with small-scale agriculture accounting for 55% of total employment on average across the two regions. As a share of GDP, smallholder farming contributes around one quarter of total output (23% in Africa; 28% in Asia).<sup>xx</sup>

From an export commodity perspective, smallholders play an equally central role. As the 2023 edition of the International Finance Corporation's Smallholder Handbook highlights, several commercially important crops are dependent on smallholder production and supply – including cocoa, 70% of which is produced by smallholders; coffee (60%); cotton (75%); as well as a range of protein-rich pulses. This is because smallholder farming has competitive advantages over industrial farming in certain contexts—often demonstrating higher crop diversity, per capita land productivity, social impact, and environmental sustainability.<sup>xxiv ii</sup>

An under-recognised attribute of smallholder farming is its ability to proactively manage risks in a changing agricultural system by drawing on deep, hyper-local knowledge of growing and market conditions, as well as flexible and motivated family labour.<sup>xxv</sup> In a variety of contexts, this can enable SHFs to manage change while generating per-unit farm output that exceeds the efficiency of larger farms.<sup>xxvi</sup>

Looking to the future, these advantages will be compounded as a crisis-hit global food system – imperilled by pandemic- and conflict-induced supply chain disruption and volatile fertiliser prices – seeks to meet the food needs of 10 billion people by 2050, up from around 8 billion today.<sup>xxvii</sup>

Two factors explain why, as demand for affordable and nutritious food rises, small family-run farms will play an outsized role:

I. **Smallholdings have stronger social license to operate**, compared to plantation agriculture, in many of the jurisdictions that host the world's 1.4 billion hectares of suitable arable land not yet used for crop production (65% of the world's uncultivated fertile land is located in Africa, primarily in Angola, Democratic Republic of Congo, Mozambique and Sudan).<sup>xxviii</sup> This means that food and agriculture conglomerates often prefer to source from smallholders rather than taking on the land title and reputational risks involved in directly-owned largescale production.<sup>xxix</sup>

II. **Rapid advances in scale-neutral agricultural technologies** mean that some of the best opportunities for achieving a step-change in cropping intensity and yields – without compromising sustainability objectives – lie in smallholder farming. For example, around one third of food produced for human consumption each year (1.3 billion tonnes) is lost or wasted, with post-harvest losses due to spillage, spoilage or pests especially high in the farm to retail stage of smallholder supply chains.<sup>xxx</sup> But emerging scale-neutral technologies provide viable solutions to this challenge – from modular solar-powered cold-storage units on small farms to use of modernised storage, sealed packaging and natural compounds that inhibit bacterial growth.





# 04 Part 2: The nature and extent of climate risks facing smallholder farmers

Even as smallholder agriculture takes on a more critical role in safeguarding food security and creating low-carbon pathways for farming, the challenges confronting SHFs appear more daunting.

As a previous assessment under TechnoServe's Initiative for Inclusive Agricultural Business Models observed, "Increasingly volatile rainfall and temperature patterns, unusual pest and disease outbreaks, and shifting crop suitability – combined with lack of access to irrigation or crop insurance and limited knowledge of how to address these challenges – puts smallholders at a growing risk of losing part or all of their harvest along with any corresponding investment they may have made in high-quality inputs."<sup>xxxix</sup>

Or as former UN Secretary General Ban Ki Moon frames the challenge, farmers in the developing world will bear the brunt of climate change – and "if we want a world free of hunger and poverty while adapting to and mitigating the climate crisis [...] we need to put smallholder farmers right at the center of our efforts to 'build back better'."<sup>xxxix</sup>

Because most small-scale farming in developing countries is rainfed and configured for past climates, smallholders are especially exposed to common climate stresses such as changing rain patterns, altered seasonality, and more extreme drought, heat, salinity, and weather events.<sup>xxxix</sup>

Droughts, in particular, will wipe out harvests more often in future as tens of millions of acres of farmland become substantially drier in South Asia and sub-Saharan Africa. And the damage will not be contained to crop production: livestock will also be affected as animals eat less and produce less milk and meat.<sup>xxxix</sup>

Even when average temperature and rain during a growing season appear to be commensurate with historical averages, more abrupt swings in rainfall or heat levels can severely undermine crop survival and yield. A common example is flash flooding, which can disrupt irrigation or even wash away entire fields of crop.

A further example that has fewer past precedents – but which we expect too become more common –

is the knock-on impact of rising temperatures on the presence of pests and diseases in a given agroclimatic zone (crop-eating pests may steadily infest more acreage as they find more hospitable environments to live in).

Finally, in coastal areas, saline intrusion and rising sea levels may directly undermine traditional cultivation techniques and crop acreage.

## By the numbers

- Morgan Stanley estimates that at least **44%** of wheat, **43%** of rice, **32%** of maize and **17%** of soyabean production comes from at-risk areas set to suffer from climate change.
- Climate change-induced disasters could put at least **\$314bn** of annual food production in jeopardy.<sup>xxxv</sup>
- Unilever estimates that extreme weather events could increase palm oil prices by **12-18%** by 2050, depending on the extent to which rising temperatures can be limited.
- Other food and commodities ingredients may rise by **14% - 21%** during the same period.<sup>xxxvi</sup>
- Food insecurity will also be exacerbated by water shortages. Agriculture accounts for ~70% of freshwater consumption globally, though in regions such as Asia it can be higher. 2bn people currently lack access to clean, safe drinking water and by 2030, demand for freshwater is forecast to exceed supply by **40%**.
- Research from as far back as 2007 found that around **30%** of year-to-year fluctuations in tonnes of crops grown per hectare were due to changes in the climate.<sup>xxxvii</sup>
- CGIAR's Adaptation Atlas – an Africa-focused interactive data platform for evaluating climate risks and estimating the impacts of adaptation – shows that by the end of the decade, **200 million** people in Africa will be living in areas that have exceeded 2 degrees C in warming over pre-industrial levels—the point at which we can expect significant harm to crops and livestock. Without interventions, by 2050 that number could soar to **1 billion**.<sup>xxxviii</sup>



More subtle future impacts of climate change on farming include a shortening of the growing season. At 4 degrees Celsius of warming, most of sub-Saharan Africa could see the season shrink by 20% or more.

A further consequence of these challenges, if left unaddressed, would be sharp increases in the price of basic foods for populations in developing countries

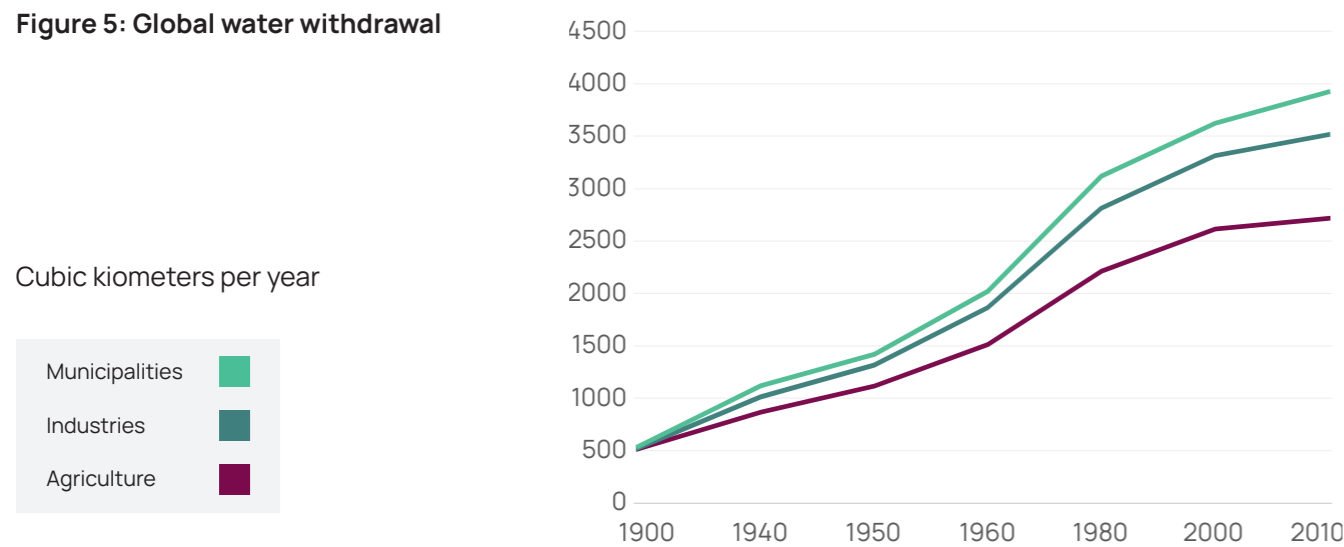
that already spend as much as half their income on food on average. Higher food commodity price volatility can also be anticipated.

As Bill Gates concludes, when you're already living on the edge, "any one of these changes could be disastrous [...] If you don't have any money saved up and your crops die off, you can't go buy more seeds; you're just wiped out."<sup>xxxix</sup>

**Figure 4: Climate change's impact on crops by the numbers**



**Figure 5: Global water withdrawal**



Source: Financial Times

## 04-1 Key vulnerabilities linked to SHF livelihood strategies

Climate vulnerability for smallholders is also partly the result of specific aspects of traditional SHF livelihood strategies. The following issues stand out:

**Overreliance on traditional cultivation methods**, some of which degrade soil fertility and cause erosion. Limited physical and economic access to markets, which is compounded by a lack of modernised storage infrastructure, high transport costs in rural areas, and poor access to market and price information.

**Low crop diversity**: According to the UN FAO, over the past century, 75% of global crop diversity has been lost as farmers switch to genetically uniform high-yielding varieties.<sup>xi</sup>

**Low organization at the production level**, with only ~19% of Latin American farmers, 14% of Asian farmers and 7% of African farmers being members of cooperatives, which could improve market access through collective ownership of trucks and storage facilities.

**Land insecurity**, including a lack of formal land title ownership, which makes it difficult for smallholders to consolidate landholdings or use their land as collateral for financing.

**Weak access to credit** due to farmers' poor collateral and the seasonality of their produce, among other factors.

**Low literacy and numeracy**, as many SHFs have little formal education, which limits their ability to keep adequate written records or learn about improved agricultural practices.

**Inefficient intercropping techniques**, because subsistence and cash crop cultivation are often combined on the same farm in ways that can reduce marketable yields.<sup>xii</sup>

To sum-up: without access to appropriate and affordable tools to pre-empt climate risks, smallholder farmers cannot invest to maximise yields and income potential.

This risks creating a vicious cycle of farm underinvestment and cycling down by farmers into low prices subsistence crops.

Unless the downside risks imposed by key perils (flood, drought, pests and crop disease) are contained within a manageable envelope, farmers cannot specialise and invest in increased mechanisation; yield enhancing inputs such as improved seed varieties; higher production volumes; and modernised storage to prevent post-harvest losses.



# 05 Part 3: A pivotal role for parametrics

Parametric insurance pays out when an event that surpasses an agreed-on severity threshold (or 'trigger') takes place, as measured by an objective and independently modelled dataset. The occurrence of the event alone triggers the policy, so that if organisation A says event B has happened, insurer C will pay \$D to policyholder E.

The insured loss event must have the potential to cause a negative impact on the insured, but that impact – the loss – need not be measured or assigned a cash value. This is because parametric cover does not pay out according to the actual damage or losses sustained.

Parametric payout triggers typically divide into two subcategories:

## i. Pure parametric trigger:

Whereby the payout is based on the physical characteristics of a risk event. Examples include rainfall amount within a specific location and time period; river gauge indices that measure for flood risk; wind speed of a hurricane or cyclone; or prevalence and duration of a crop-damaging pest or disease.

Importantly, triggers can be forecast-based, meaning that funds can be automatically paid out before a risk event occurs if the likelihood of impact reaches a pre-agreed limit.

Although parametric products that operate on this forward-looking, preemptive principle are still nascent in the private market, real-world examples are available from the humanitarian ecosystem.

For instance, Oxfam and Plan International deployed a forecast-based parametric product in response to Typhoon Ursula, which hit the Philippines on Christmas Day in 2019. The index tracked Ursula from December 23; the following day, the payout was triggered, releasing donor funds via electronic transfer to those in the affected area one day before the typhoon hit. This gave policyholders time and funds to make arrangements to evacuate or to reinforce resilience measures.<sup>xliii</sup>

## ii. Modeled loss trigger:

Whereby the payout is predicated on independently estimated losses for a given risk event.

Often, multiple triggers are included under a single parametric cover, or as part of a suite of solutions offered to different categories of farming operation. For smallholders focused on food crops, drought is typically the highest priority peril; whereas for poultry farms, which are often more commercialised and closer to the 'medium-scale' farm category, preferences around peril cover may include the risk of zoonotic disease outbreak (e.g., avian flu forcing culling or temporary farm closure). And where there are multiple triggers, there will often be different levels of payout across different tiers of policyholder.

## 05-1 Critical success factors

Under all scenarios, critical success factors – which together determine levels of trust in the parametric product – include:

**1. The trigger must be independently verifiable** by a third party immediately after a risk event has occurred (e.g., using daily updated satellite data), without the need for on-the-ground damage and loss assessments.

**2. The payout should correlate as closely as reasonable possible to actual losses** incurred by policyholders.<sup>xliiii</sup> This reduces the scope for 'basis risk' – that is, the potential for a payout sum to differ from actual losses observed.

**3. No party to the transaction should be able to influence the trigger event** and how it is communicated.<sup>xliiv</sup> Rather, the insured loss event must be fortuitous – one that happens by chance.







## 05-2 Benefits of parametric insurance

The direct and indirect benefits of parametric insurance in the context of smallholder agriculture can be summarised as follows.

	Direct benefits	Indirect benefits
 <b>Efficiency</b>	<ul style="list-style-type: none"> <li>• Cost efficiencies (especially when last mile distribution of coverage is mobile phone and mobile-money based).</li> <li>• Payout speed (days/weeks).</li> </ul>	<ul style="list-style-type: none"> <li>• Boosts crop yields and incomes by stimulating on-farm investment and giving confidence to farmers to upgrade to higher value crops</li> <li>• Ultimately drives economic growth in agriculture-dependent economies.</li> </ul>
 <b>Agency</b>	<ul style="list-style-type: none"> <li>• Certainty of coverage (i.e., policyholders not left wondering if their insurance will pay) allows farmers to make optimal choices when investing in on- and off-farm priorities to break through poverty traps.</li> </ul>	<ul style="list-style-type: none"> <li>• Parametric cover empowers farmers by providing greater choice and agency.</li> <li>• This helps retain youth participation in agriculture and supports development of home-grown 'agripreneurs'.</li> </ul>
 <b>Scale</b>	<ul style="list-style-type: none"> <li>• Strong potential to scale-up parametrics using tech-enabled platforms to extend coverage at minimal marginal additional cost per farmer insured.</li> <li>• Breadth of coverage (parametrics can cover the full spectrum of loss).*</li> </ul>	<ul style="list-style-type: none"> <li>• At the system level, parametric insurance adoption creates parallel incentives for farmers to invest in resilience (e.g., drought-resistant varieties) in order to keep baseline risks and premiums as low as possible</li> <li>• Mass uptake of insurance drives structural change in farming systems by generating flows of usable risk data and predictive analytics, as well as overarching governance frameworks to manage critical risks.</li> </ul>
 <b>Accessibility</b>	<ul style="list-style-type: none"> <li>• Eliminates the need for customers to provide fixed insurable assets.</li> </ul>	<ul style="list-style-type: none"> <li>• Improves farmers' eligibility for finance.</li> <li>• Reduces bank lending risks which helps closes the overall agricultural finance gap.</li> </ul>
 <b>Accuracy</b>	<ul style="list-style-type: none"> <li>• Ease of product customisation enables providers to focus on the perils that matter most to farmers who often face hyper-localised risks.</li> </ul>	<ul style="list-style-type: none"> <li>• AgTech tools and technologies developed to enable the insurance market have broader sector-wide applications (e.g. real-time satellite data and remote sensing technologies).</li> </ul>
 <b>Flexibility</b>	<ul style="list-style-type: none"> <li>• Ability to insure emerging and evolving risks (unlike conventional insurance, parametrics can be priced without a loss history).</li> </ul>	<ul style="list-style-type: none"> <li>• Forward-looking, predictive model is well-suited to agricultural markets facing unprecedented climate risks – and enables forecast-based payouts ahead of a risk event occurring if desired.</li> </ul> <p>Predictive models have cross-application for interventions focused on agri-inputs, value chain integration, and market access.</p>

	Direct benefits	Indirect benefits
 <b>Impact</b>	<ul style="list-style-type: none"> <li>• Outsized positive impact on women (studies show that women account for nearly half of the world's smallholder farmers).**</li> </ul>	<ul style="list-style-type: none"> <li>• Positive pass-through effect of parametrics on income growth/stability stimulates household-level investment in education and health.</li> </ul>
 <b>Collaboration</b>	<ul style="list-style-type: none"> <li>• Extensive optionality regarding funding structures, including scope for 'blended finance' models.</li> <li>• Funding options include group purchase by public institutions, which can be supported by bond issuances or tax levies; or voluntary purchase by individuals, supported by subsidy; or risk pooling whereby public institutions risk share/co-fund with private institutions, farmer organisations, agribusinesses, donor agencies, or philanthropic organisations.</li> <li>• This facilitates blended finance structures in which relatively small amounts of concessional donor funds can be used as a 'first loss' buffer to improve risk-reward profiles for insurance products that would be 'uninvestable' for private insurers on strictly commercial terms. In turn, this crowds in larger amounts of private capital, contributes towards broader market development, and creates opportunities to drive high standards around impact measurement, transparency, and disclosure.</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to bundle parametric cover with other financing tools, as well as to integrate with complementary risk mitigation measures such as social safety net programmes.</li> <li>• Opportunity to integrate parametric indices with complementary datasets.</li> <li>• Example: parametric cover can be combined with government-led early warning systems to enable a comprehensive approach for farming communities at particular risk of perils such as flood or drought.***</li> <li>• This involves creating seamless connections using APIs that facilitate data exchange – e.g., between the data-driven triggers of the insurance policy and real-time alerts generated by the early warning system, enhancing the effectiveness of both.****</li> </ul>

\*\* Parametric insurance can be used to cover the "uninsurable": e.g., the knock-on impacts of third-party failures, delays, reputational harm, or any other tangible or intangible loss arising from an insured event.

\*\* Source: World Economic Forum, 'Women grow 70% of Africa's food. But have few rights over the land they tend'. (2018)

\*\*\* Early warning systems can also educate and build awareness amongst communities about disaster preparedness and response, fostering a culture of resilience, reducing loss and potentially boosting uptake of parametric insurance.

\*\*\*\* In the case of flood risk, rainfall forecasts would be continuously assessed and would trigger a warning in real-time if excessive rains are expected to occur. As well as providing advanced warning of flooding – enabling communities to take proactive measures such as evacuating high-risk areas or securing agricultural equipment – a payment can be made, triggered by the forecast.

This would cover costs of flood preparedness; and if the predicted excessive rainfall does occur (measured using river gauges and satellite and hydrologic data), a second payment could be made to fund clean-up costs and compensate farms affected by the event.



## 05-3 Technology enablers

The emergence of key enabling technologies provides strong tailwinds for parametric insurance adoption. As connectivity infrastructure improves across many emerging markets, payout speeds for parametric insurance covers will accelerate further as disbursements to farmers can be made and monitored automatically via mobile money.

The same mobile-enabled platforms facilitate cloud-based management and storage of insurance policies as well as efficient customer engagement, whether by SME text or instant messaging via smartphone. This drives down costs to serve and ultimately the fee farmers are charged for premiums.

Improved network coverage has accelerated the spread of mobile phone and digital payments adoption amongst rural farmers. In sub-Saharan Africa, more than 80% of farmers will have mobile access by 2023, for example.

In turn, this strengthened digital infrastructure enables agribusinesses that source produce from smallholders – as well as public sector organisations and NGOs – to deepen their engagement with smallholders (including via use of global positioning systems, cloud-based management information systems, and tablet computers to deliver advisory and extension services).<sup>xiv</sup>

In addition, game-changing agriculture technologies ('AgTech') are coming to market. They include: in-field remote sensing; high resolution and high frequency satellite imagery (which reduces the need for expensive remote field visits); drone applications (e.g., for crop monitoring and pest control); and digitised precision farming techniques (such as soil mapping and disease diagnostics) that enable farmers to increase yields while reducing inputs. In addition, several emergent technologies have direct applications for insurance delivery (Figure 6).

Adoption rates for these emerging AgTech solutions vary according to product availability, up-front costs and payback timescales, SHF income level, and farm business model. But the overall trajectory is clear: when a survey of agriculture digitisation in Africa was conducted in 2019, 60% of smallholders in the sub-Saharan region expected to integrate new technologies into their farm operations in the next three years, for example.<sup>xvi</sup> And as uptake amongst farmers increases, financial institutions, aggregators and off-takers can use the resulting farm-level data to tailor products and services to individual needs.

Figure 6. Use of AgTech to scale up agricultural insurance

New technologies options	Useful functionalities
<ul style="list-style-type: none"> <li>Satellite remote sensing – Optical and SAR</li> </ul>	<ul style="list-style-type: none"> <li>Crop type identification</li> </ul>
<ul style="list-style-type: none"> <li>Weather data – automatic weather stations and synthetic weather data sets</li> </ul>	<ul style="list-style-type: none"> <li>Crop emergence and condition during vegetation cycle</li> </ul>
<ul style="list-style-type: none"> <li>Drones (operator, BVLOS, fully autonomous, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Crop damage after risk events</li> </ul>
<ul style="list-style-type: none"> <li>GIS software with analytical capabilities (risk location, risk accumulation, risk analysis, portfolio monitoring)</li> </ul>	<ul style="list-style-type: none"> <li>Crop yield estimation (still challenging due to accuracy for various crop types)</li> </ul>

Source: World Bank Group Disaster Risk Financing & Insurance Programme and USAID. 'Disaster Risk Financing Solutions for Climate-resilient Livelihoods in the Agricultural Sector', Webinar Series. (2023)





## 05-4 The data revolution and the rise of e-platforms

Crucially, as data becomes more ubiquitous and affordable in rural locations, we are seeing a step-change in the role of agricultural data analytics – from reliance on static observational farm data with limited usability towards generation of real-time, high frequency and even predictive farm-level data.<sup>xlvii</sup>

A related development is the rise to prominence over the past half decade of farmer-focused 'e-platforms'. These are digitised marketplaces that create links across the agribusiness value chain and integrate previously fragmented supply and demand of produce.

E-platforms leverage mobile-money systems to reach large numbers of smallholders across rural landscapes. Participation reduces the costs and risks to farmers of identifying and transacting with suppliers and buyers. These benefits partly result from increased certainty, as e-platforms enable farmers to understand and trust market requirements around quality and safety standards, volumes, and delivery timing.<sup>xlviii</sup>

Looking ahead, 'super-platforms' with even greater functionality are set to emerge combining agricultural market linkages with a broader menu of integrated

services—from market-pricing data, agronomic advice and farm management tools to mobile credit and insurance, distributed energy solutions, household consumables, and other nonagricultural services such as mobile health solutions and 'telemedicine' (medical advice delivered via phone).<sup>xlix</sup>

These innovations promise to transform the entire structure of agricultural markets in developing countries, undoing many of the binding constraints previously imposed on provision of agricultural insurance. But different LMIC economies will make the transition towards tech-enabled agricultural marketplaces and vastly higher volumes of available agricultural data at different speeds.

### Pathfinders include:

- **India**, host to one of the world's most sophisticated software and fintech innovation hubs.
- **Kenya**, where dominant network operator Safaricom announced the extension, in November 2023, of its 5G network to 35 of the country's 47 counties.
- **Indonesia**, home to the TaniHub e-platform which manages cold chain and storage functions for farmers.
- **China**, home to 500mn smallholder farmers and host to the largest farmer-focused e-marketplace platforms globally (example below).



China-based PinDuoDuo is a platform that enables agricultural demand aggregation and creation (introducing products to markets) through recommendations, and provides insights on consumer preferences and market pricing to farmers. By the end of 2019, PDD's total agricultural transactions were worth US\$21.3 billion, benefiting 12 million farmers nationally.

The merchants are individual farmers, cooperatives, entrepreneurs, and distributors. Recognising the problem of highly fragmented food supply, PDD has partnered with provincial governments through its Duo Duo Farms initiative to develop pilot farms that adopt improved financial, wagonomic, and technological innovations to boost farm productivity and raise farmer incomes.



# 06 Discussion questions

Below, we highlight key questions to help guide collaboration around development of an effective, transparent and scalable marketplace for parametric insurance in the agriculture sector.

## Partnership & opportunities

- Which community stakeholders do we need to bring together to scale-up risk transfer solutions in smallholder agriculture?
- What are the best opportunities to align with complementary (non-insurance) initiatives focused on agricultural transformation?
- How can we mobilise transformational pools of concessional capital for farmer-focused risk transfer?
- How can we deepen awareness across global philanthropy that parametric risk transfer can amplify their impact and help achieve ambitious climate goals?
- What are the best models for multi-stakeholder partnership?
- How can we deepen partnerships between public and private agricultural insurance – including unlocking private sector involvement and innovation through government-led premium support at systemic scale?
- How can the Climate Action Trust (CAT) play a pathfinding role?

## Tools and technologies

- What are the most promising breakthrough technologies for reducing costs to serve for parametrics in agriculture?
- As connectivity infrastructure improves, what are the data-driven business models of the future in parametrics?
- What is the best way for digital-first platforms to bundle risk transfer products with input financing, agronomic advice and market access to create a combined value proposition for farmers?
- Can we take a 'risk layering' approach by syncing parametrics with other forms of risk mitigation at the micro-, meso- and macro-scale?

## Addressable market

- What is the scale of global demand for risk transfer products in smallholder agriculture?
- Which are the areas of greatest need?
- Which distribution channels provide the best access to large pools of uninsured farmers?
- How do insurance needs differ between crop, livestock and aquaculture-focused farmers?

## Market structure

- How can we build strong market foundations for parametrics in agriculture?
- How can global and local insurers/reinsurers best structure and distribute appropriate products for communities of smallholders?
- How can we improve farmer awareness and trust around parametrics?
- What are the critical barriers to provision of farmer-focused parametric insurance, especially around 'last mile' community access?
- Which regulations are needed to create a strong enabling environment for parametrics?

## Risk mitigation

- Which parametric insurance models are likely to prove self-sustaining in the long run?
- What are best ways of reducing concentration risk (i.e., large economic losses of co-located insured)?
- How do we ensure subsidies have the most impact and accelerate farm-level resilience, productivity gains and income growth?
- How will we know when certain approaches are failing and require course correction?

## Impact measurement

- Which impact data do we need to assess the performance of parametric insurance in agriculture?
- Which indicators and standards are required to drive market transparency and uptake of risk transfer?
- Can we develop a global index or 'map' of parametric coverage in agriculture to build awareness and track progress?
- How do we ensure such data is credible and continuous?



# 07 Case studies

Below, we profile a selection of case studies that illustrate the potential for smallholder-focused risk transfer products.

## Location

- Registered insurance surveyor in Kenya
- Insurance agent in Rwanda and in Tanzania
- Projects in Uganda, Ghana, Malawi, Senegal, and Mozambique

## Insured crops/ livestock

- Registered insurance surveyor in Kenya
- Insurance agent in Rwanda and in Tanzania
- Projects in Uganda, Ghana, Malawi, Senegal, and Mozambique

## Partners

### Insurers

- Kenya: UAP Insurance, APA Insurance, CIC Insurance Group Limited, Allianz Kenya, Jubilee, APA, Heritage, CIC, and AMACO
- Rwanda: Soras Insurance, UAP Insurance
- Tanzania: UAP Insurance Tanzania

### Reinsurers

- Swiss R
- Africa Re

## Insured perils

### Crops

Drought, excess rain and storms, frost damage, fire, uncontrollable pests and diseases

### Livestock

Risks associated with pregnancy losses for calving cows, and the financial loss caused by the death of livestock due to disease

Launched in 2013

US\$5, average premium 8%<sup>liii</sup>

Average cost of insurance

## In-depth:

### Summary

- ACRE Africa provides a pathfinding parametric microinsurance product distributed by mobile phone and mobile-money platforms.
- ACRE's technology-driven model drives affordability and scalability.
- Clients are smallholder farmers in rural Africa.
- Distribution partners include microcredit institutions and local retailers who sell agricultural inputs (seeds, fertiliser, and pesticides) to smallholders.
- ACRE Africa, the brand name of Agriculture and Climate Risk Enterprise Ltd, was created when Kilimo Salama, the Syngenta Foundation's former insurance program for smallholders, became a company in 2014.<sup>liii</sup>
- ACRE Africa is not an insurance company but rather a service provider working with local insurers and other stakeholders in the agricultural value chain.

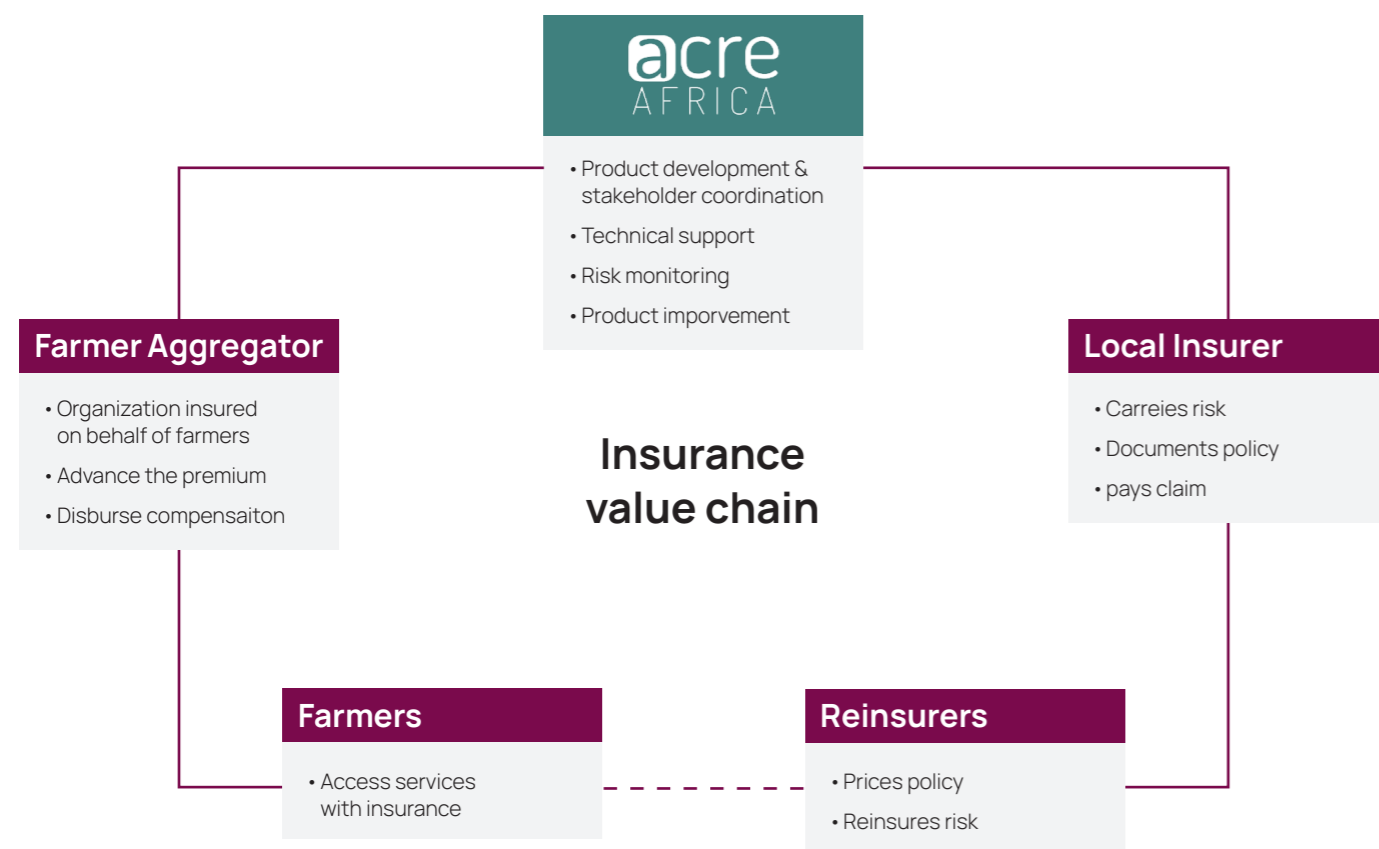


## ACRE in action

ACRE's platform links farmer groups and cooperatives; development institutions; mobile network operators; farmer-facing agribusinesses that engage in contract farming with smallholders; lenders that provide agri-input loans (banks, Microfinance Institutions (MFIs), and savings and credit cooperatives (SACCOs)); and medium-scale farming operations.

When a farmer buys the insurance product, a microcredit officer or retailer registers the purchase by scanning a quick-response code via mobile app. The purchase is logged onto a cloud-based server and the farmer receives an automated SMS text with his or her policy number.

At the end of each growing season, weather statistics collected from solar-powered weather stations are automatically compared to an index of historical weather data. Rainfall measurements (and vegetation imagery) are entered into agronomic models to quantify farm losses remotely. Payouts are then calculated and sent via automated mobile payments, with no claims process.



Source: ACRE Africa

## Success factors

**Telecoms partnerships have been the cornerstone of ACRE's success.** For example, Syngenta Foundation's partnership with Kenya's leading mobile network operator, Safaricom, enables access to a trusted, nationwide network for insurance offerings and customer communication. Moreover, Safaricom's M-PESA mobile banking system has high participation levels in rural areas, ensuring that index insurance premiums remain cashless, affordable and accessible.

**Use of scratch cards and bundled products has boosted uptake.** ACRE's weather index insurance is purchased by farmers through a scratch card sold together with a bag of seed or fertiliser. The farmer activates the card by mobile and pays an initial premium of \$0.37. The farmer can top-up by text to increase the level of coverage. The insurer then geo-tags the farm using a mobile localisation service.<sup>lv</sup> This approach reduces insurers' costs to

serve as site visits and inspections are generally not required. This in turn drives larger scale adoption and makes the product more attractive to reinsurers.

**ACRE has also invested in human touch points and physical infrastructure** to overcome the bottlenecks created by weak rural connectivity, digital literacy gaps, and low user trust. This hybrid offline/online approach was essential because many farmers were initially reluctant to spend on insurance. In-person training and localised capacity-building modules help deepen awareness of the benefits of insurance products traditionally viewed as intangible.

**Smart contract automation has reduced the product cost by 80%.** These savings have reportedly been passed on to farmers through a 27% increase in the sum insured. Moreover, 100% of claims were reportedly processed within 24 hours by the time of the second pilot phase.<sup>lvi</sup>

## Impact

- **1.7mn+** farmers in East Africa have cumulatively insured agricultural investments valued at over **\$181mn** via ACRE.
- In Kenya, ACRE had expanded to **15** counties – serving more than **70,000** farmers – as of 2022.
- ACRE's insurance cover gives farmers protection from adverse weather as well as a safety net that promotes a virtuous cycle of investment.
- According to analysis by ACRE, insured farmers on their platform invested **20%** more in their farms and earned **16%** more than uninsured farmers.
- **40%** of farmers reported improved quality of life due to reduced stress, increased ability to purchase agricultural inputs, and greater knowledge of improved farming practices.



# Further case studies:



## Lead:

UN Capital Development Fund (UNCDF)  
in partnership with Howden

## Approach

- UNCDF and Howden provided subsidy support for the premiums of beneficiaries in Fiji vulnerable to damage from tropical cyclones and floods – including smallholder farmers, fishermen, market vendors, female-headed households, and people with disabilities.
- The project forms part of UNCDF's Pacific Insurance and Climate Adaptation Programme (PICAP)
- PICAP, through its private insurer partners, FijiCare, Sun Insurance and Tower Insurance, developed two products for the Fiji market covering losses from heavy wind and rainfall events.
- Both products offer payout options of FJ\$1000, FJ\$2000 and FJ\$3000, with a VAT-free premium of 10% per annum.
- In January 2023, Fiji experienced heavy rainfall resulting in a trigger payment. Payments were transferred digitally to 536 beneficiaries who received payouts into their mobile wallets 10 days after the final verified data was received from the Fiji Meteorological Office and the index monitor, thus demonstrating the value and agility of parametric risk transfer.<sup>vii</sup>



## Lead:

Insurtech firm, Blue Marble  
(blue-marble.co.uk)

## Approach

- London-based insurtech Blue Marble launched a weather-index insurance programme for smallholders in rural Pakistan in 2021.
- The pilot covered 500 farmers in partnership with Asia Insurance, which will serve as underwriter, and Reap Agro, a Pakistan-based MFI specialising in agri-lending.
- Using Blue Marble's AgSuite platform, the programme will provide tailored parametric insurance coverage against excessive rainfall, droughts and other natural disasters.
- Payouts trigger automatically for policyholders based on a pre-defined index that measures event magnitude.
- Customer reach was enhanced via Reap Agro's sales channels which already provide fertiliser, seeds, pesticide and agronomic advice to farmers.
- According to the Global Climate Risk Index, Pakistan ranks fifth among nations most susceptible to climate change, with nearly 10,000 lives lost and economic damages worth \$3.8 billion incurred between 1998 and 2018.
- Until Blue Marble's pilot program, farmers in Pakistan have – according to the company – not had access to parametric insurance. Smallholder farmers comprise 60% of the country's 8.2 million farmers.
- In 2023, Blue Marble also partnered with Nestlé to launch a weather insurance pilot for 800 coffee farmers in Indonesia.<sup>viii</sup> In addition, a pilot programme in the Kyrgyz Republic has been launched in partnership with the World Food Programme (WFP): this sub-sovereign weather index-based insurance protects 4,500 vulnerable livestock farming families from drought.
- Blue Marble is owned by a consortium of multinational insurance entities including Aspen Insurance, Grupo ASSA, Marsh McLennan, TransRe and Zurich Insurance.<sup>ix</sup>







**Lead:**

African Risk Capacity Limited  
(www.arc.int)

**Approach**

- ARC Ltd is a financial affiliate of African Risk Capacity (ARC), an agency of the African Union designed to improve responses to climate-related food security emergencies.
- ARC Ltd. is a mutual insurance facility comprised of its country members which have included Kenya, Mauritania, Niger, Senegal, Mali, Malawi, Gambia, Burkina Faso, Chad, Zimbabwe, Togo, Madagascar and Zambia.
- Membership includes capital contributors who have provided premium subsidies, including USAID, UK FCDO, Germany's KfW, the UN International Fund for Agricultural Development (IFAD), African Development Bank (AfDB), and WFP.
- In 2023, ARC announced a partnership with data provider Floodbase to develop, distribute, and scale parametric flood microinsurance solutions in Africa to cover farmers against agricultural risk.
- Products under this partnership will pay out within days or weeks when the magnitude of flooding exceeds a predetermined threshold. They will be designed with prearranged pricing and thresholds based on Floodbase's 23 years of monitored flood history.<sup>lx</sup>

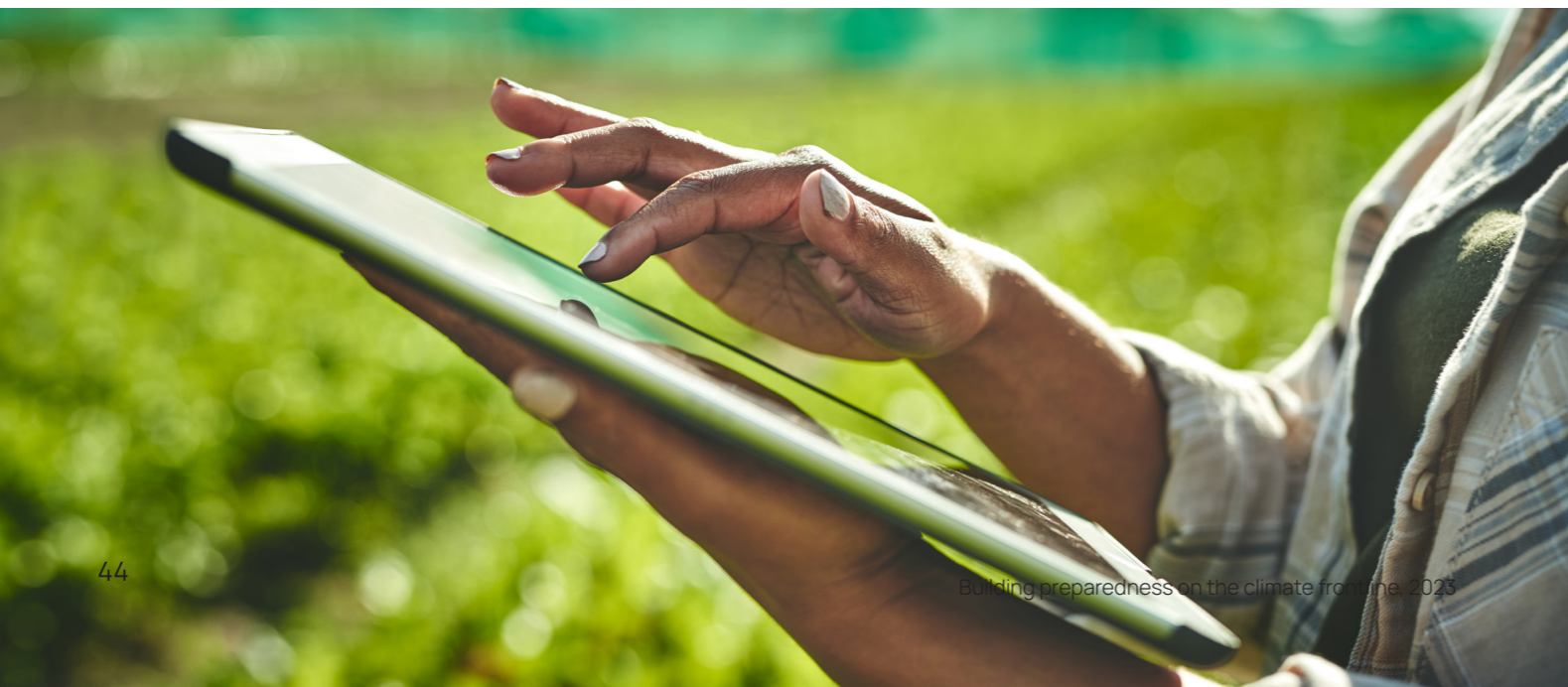


**Lead:**

Farmer-focus insurance provider, Kshema  
(kshema.co)

**Approach**

- Kshema provides farmers with resilience from financial distress caused by extreme climate events and perils through localized insurance products.
  - The fast-growing company offers parametric insurance to smallholder farmers in India, reportedly reaching some 4 million farmers with multi-peril coverage.
  - Kshema covers a wide range of crops – almost twice the number covered by existing insurance products in the Indian market, according to the company.
  - Kshema places equal emphasis on social impact, environmental impact and commercial viability. The company defines its positive impact according to four segments:
    - **Resilience for Cultivators:** Products offer a financial cushion from income shocks caused by extreme climate events. The company's goal is to offer this to 10 million cultivators in 5 years.
    - **Rural Entrepreneurship:** Kshema offers multiple entrepreneurial opportunities to support customers including to gain additional sources of incomes. 250,000 people will earn an additional INR 25 Billion over the next 5 years, according to the company.
    - **Women Empowerment:** 30% of the company's rural entrepreneurs – in the form of agents, onboarding partners and counselors – will be educated women. Kshema will provide employment and incomes in the region of INR 8 Billion for rural women in the coming years.
    - **Combating Climate Change:** Kshema will incentivize adaptation of sustainable cultivation practices among their customers through premium discounts, in order to encourage participation in the combat against climate change. The goal is to contribute 270,000 tons of CO2 sequestration by the year 2025.<sup>lxi</sup>
- Other product differentiators include:**
- Taking a farm-based rather than area-based approach;
  - Offering 'bite sized' microinsurance products for the poultry, livestock and aquaculture customer segments;
  - Individualized premiums based on location-aware risk evaluation;
  - Spatial diversification of risk;
  - Technology enabled product transparency and seamless data sources; and
  - Timely information on risks.





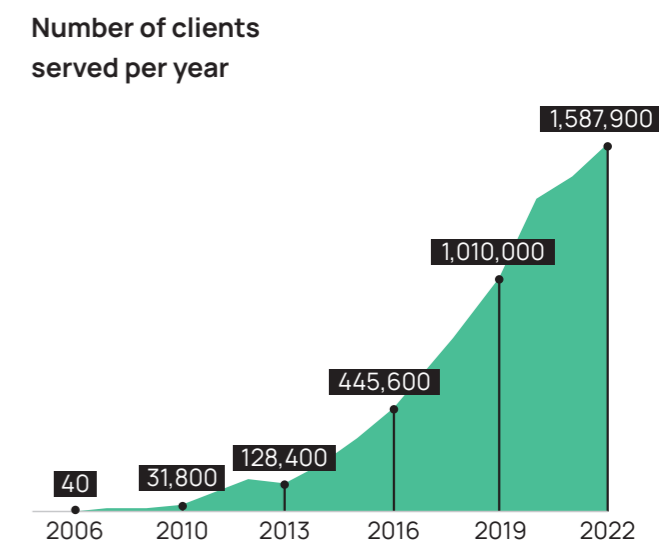
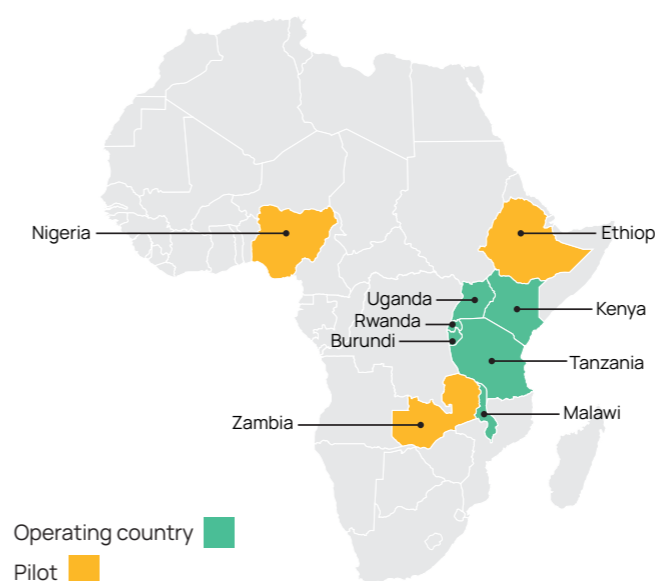


**Lead:**

One Acre Fund (OAF), non-profit servicing low income farmers (oneacrefund.org)

**Approach**

- As a feature of One Acre Fund's (1AF) mission to equip farmers with the tools they need to grow more food and earn more money, they provide insurance. This tool is key part of a suite of interventions that creates a safety net to help mitigate the impact of external shocks, which are increasing in frequency as climate change worsens. In the organisation's own words, "expanded insurance coverage for farm families will mean stronger protections against hunger and poverty when harvests fail."
- Some 1.5 million farmers are insured by 1AF annually across Africa, with \$5 million+ in payouts made since 2015.
- To unlock the next level of farmer impact, 1AF is now launching a first-of-its kind "reinsurance fund", One Acre Fund Re. By building its own reinsurance capital pool, OAF believes it can address market failures, enabling higher and more timely payouts. This in turn will reduce farmer risks and encourage investments in their farms, thereby promoting climate resilience.
- With initial funding for One Acre Fund Re in place, 1AF is now establishing and operationalising the fund's legal, regulatory, and governance structures.
- Howden Group and Global Parametrics have also partnered with 1AF to expand its parametric scheme in Rwanda. Howden has provided premium subsidy to help expand the scheme, allowing 1AF to purchase more coverage for smallholder farmers vulnerable to extreme weather risks in a landlocked country where agriculture is a mainstay of the economy. The scheme is now targeting protection for 800,000 people in Rwanda.
- 1AF stands out as a strong partner for delivery of parametric coverage because of its distributional scale and the trust built with farming communities across multiple African markets. Today, the organization serves 4 million farmers directly and through partnerships (see map and chart below), with a target of 10 million by 2030.



Source: One Acre Fund, 'Empowering farm families to fight poverty & climate change at scale' (2023)





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<sup>xv</sup> Uptake in Asia is higher in relative terms but remains low in absolute terms. Evidence on uptake of insurance in 126 developing countries of Asia and Africa showed that only 16.30% of sample households (both farming and non-farming) were insured with any formal insurance. See Panda, A. (et al). 'Insurance and financial services across developing countries: An empirical study of coverage and demand.' Centre for Climate Change Economics and Policy Working Paper 367 & Grantham Research Institute on Climate Change and the Environment Working Paper 336. London School of Economics and Political Science. (2020)

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<sup>iii</sup> Kilimo Salama was co-funded by the Global Index Insurance Facility (GIIF).

<sup>iiii</sup> As per summary provided in: IFC. 'Working with Smallholders: A Handbook for Firms Building Sustainable Supply Chains (Third Edition)'. (2023)

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<sup>lxi</sup> See: kshema.co/about-us/



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