POLICY PAPER

# De-risking climate-smart agriculture: a spotlight on credit guarantees and insurance

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# INTRODUCTION

## Why de-risking matters for climate

Agriculture forms the economic backbone of many low- and middle-income countries, accounting for 20% to 35% of GDP (The Global Economy, n.d). Around 50% to 70% of the population in these countries depends on farming as their main source of income (Roser, 2023).

Despite its importance, the agrifood sector remains highly exposed to climate hazards. These growing risks threaten food security, disrupt rural incomes, and cause losses and damages that place a heavy strain on national economies. According to the IPCC Sixth Assessment Report, climate-related hazards, such as droughts, have led to yield losses in about 75% of global harvested areas, with combined heat and drought reducing the average yields of key crops like maize, soybeans, and wheat by 9-12%. The IPCC highlights that the impact of climate change is particularly severe for small-scale food producers in sub-Saharan Africa, Asia, Small Island States, and Central and South America (UNDP Climate Change Adaptation, 2022).

At the same time, the sector is responsible for roughly one-third of global greenhouse gas emissions, stemming from deforestation, methane from livestock, fertiliser use, land degradation and other sources (Crippa et al., 2021).

Building climate-resilient and low-emission agrifood systems in low- and middle-income countries is estimated to require over USD 4 trillion between 2024 and 2030, or USD 680 billion annually with USD 425 billion needed for direct investments and USD 255 billion for social safety nets to support vulnerable populations (High-Level Political Forum on Sustainable Development, 2023; Laborde & Torero, 2023). Yet these regions received around USD 15 billion in agrifood climate finance in 2021–2022, equivalent to 1% of global climate finance.

**This stark funding gap highlights the urgent need for effective de-risking strategies.** While different financial instruments are available, they share a common objective: to reduce financial, climate, and market uncertainties. By doing so, they can help mobilise more private and climate finance to enable these countries to adapt to climate impacts and transition to sustainable, low-emission food systems.

With lower financial risks, more capital can support adaptation measures such as improved water management, climate-resilient crop varieties, agroforestry, and other climate-smart agriculture practices. These interventions not only protect production from shocks but also strengthen rural resilience and sustainable development in vulnerable communities. Adaptation efforts in food-exporting countries also generate global benefits. By stabilising food supplies and maintaining international trade, they help shield food-importing countries from the impacts of climate shocks.

De-risking investments in sustainable and climate-smart agriculture also enables the uptake of mitigation technologies and practices that reduce emissions, such as conservation agriculture, agroforestry, improved livestock management, and precision farming. These interventions can increase productivity while lowering emissions and resource use, creating a triple win of feeding growing populations sustainably, reducing emissions, and improving resilience to climate change.

**This paper provides an overview of the current limitations with climate financial flows to agriculture and food systems and reviews how two financial mechanisms – credit guarantees and climate insurance – provide cost-effective de-risking strategies in this sector. When combined, these two mechanisms can help unlock greater climate financial flows while fostering long-term resilience in agriculture communities.**

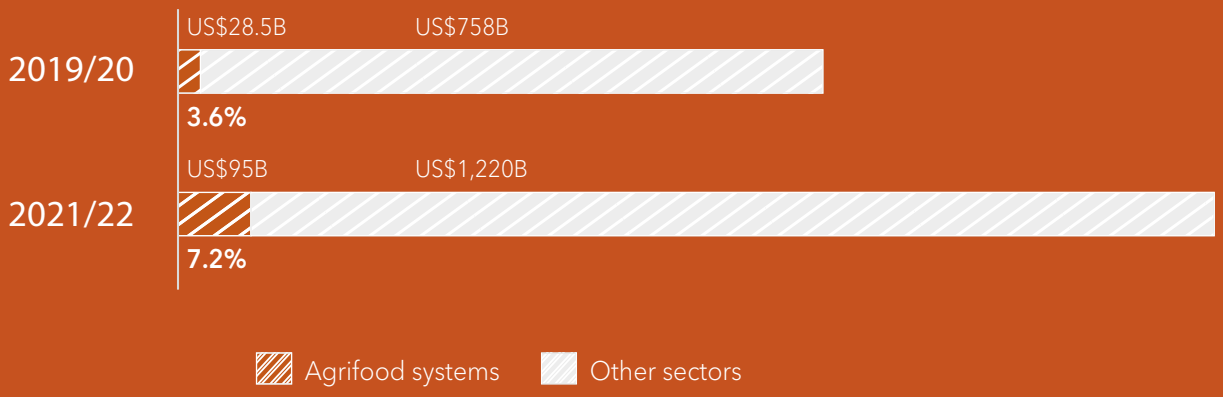
# CHAPTER 1

# Current climate finance flows to agrifood systems

Finance for climate has increased significantly, going from USD 786.5 billion in 2019-2020 to USD 1,315 billion in 2021-2022. Looking specifically at agrifood systems, climate finance increased from USD 28.5 billion in 2019-2020 to USD 95 billion in 2021-2022, doubling its share of global climate finance from 3.6% to 7.2% (see Figure 1).

> The share of global climate finance for agrifood systems doubled from 3.6% to 7.2% between 2019-2020

Figure 1: The growth of climate finance flows to agrifood systems over the period 2019-2020 to 2021-2022.



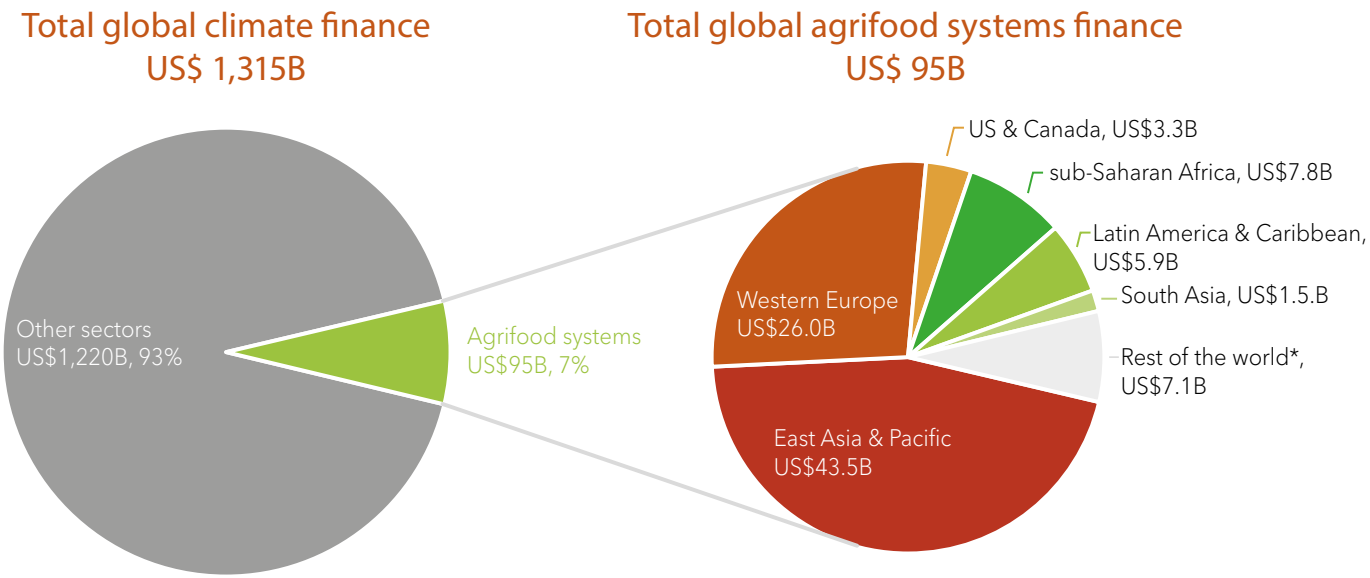

Source: *Vishnumolakala et al., 2025*


**Despite this growth, most investment is concentrated in East Asia and the Pacific—particularly China—and Western Europe.** Altogether, these countries account for 73% of total climate finance for agrifood systems (see Figure 2). Much of this financing comes from domestic resources (see Figure 3), reflecting strong government budgets, the capacity to mobilise internal funds at scale, and policies that prioritise both climate mitigation and adaptation. For example, in China, the 14th Five-Year National Agricultural Green Development Plan (2021-2025) introduced rural reforms that increased public spending in low-carbon, climate-resilient, and sustainable agricultural

investments. The subsequent 2027 Rural Revitalization Plan is expected to build on this momentum and further increase climate finance in the sector. Concurrently, in Western Europe, fiscal incentives under the Green Deal and COVID-19 recovery strategy were introduced to advance climate-smart agriculture and accelerate the transition to a green, resilient sector aligned with the EU's 2050 carbon neutrality goal (Vishnumolakala et al., 2025).

## Only 1% of total climate finance was allocated to agrifood systems in sub-Saharan Africa, South Asia, Latin America and the Caribbean

**Figure 2:** Total climate finance including for agrifood systems with regional breakdown, 2021-2022




*Rest of the world includes Central Asia and Eastern Europe, Middle East and North Africa, other Oceania and Transregional.

Source: *Vishnumolakala et al., 2025*

**Key agrarian regions – sub-Saharan Africa, Latin America and the Caribbean, and South Asia – collectively received around USD 15 billion, representing 16% of climate finance for agrifood systems and 1% of total climate finance** (see Figure 2). Most of this financing came from international sources (see Figure 3), primarily in the form of concessional debt from DFIs followed by donor grants. This is not surprising given that these regions have higher climate vulnerability but relatively underdeveloped domestic financial markets and limited government fiscal space.

## Compared with Western Europe, Brazil and China, sub-Saharan Africa and South Asia have limited capacity to mobilise domestic resources for agrifood climate projects

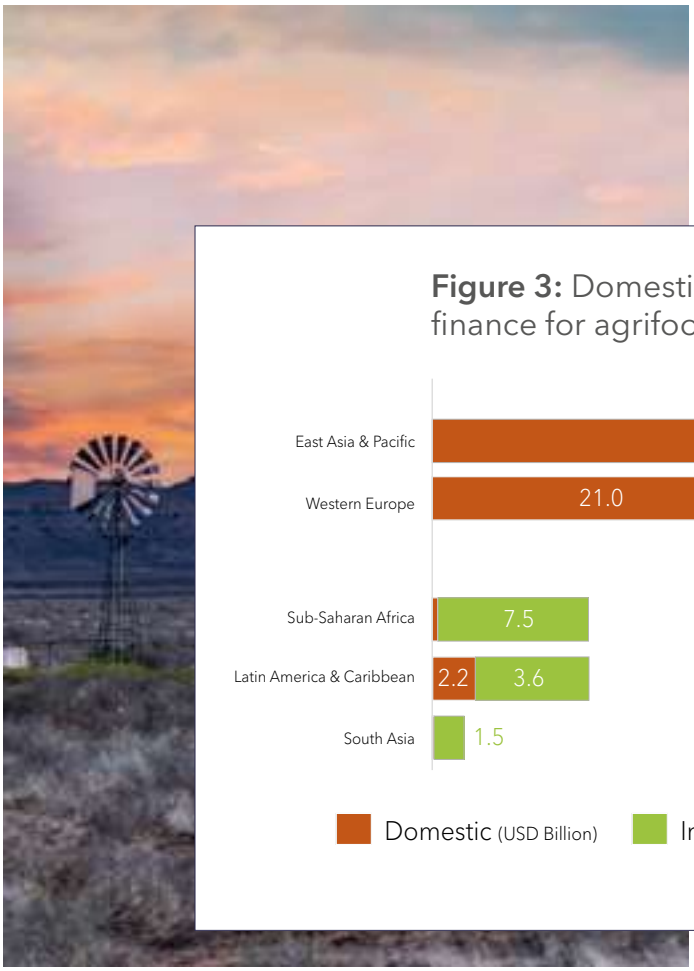
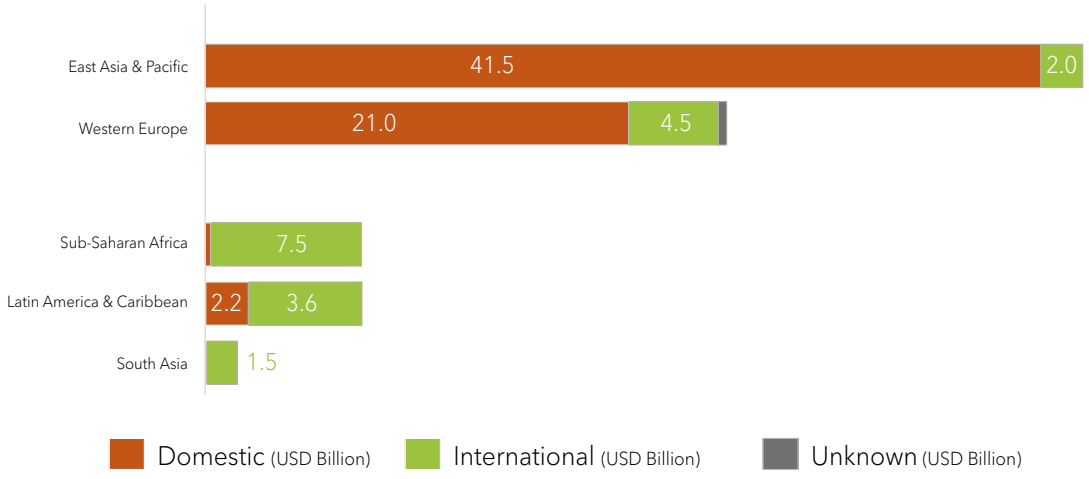


**Figure 3:** Domestic and international sources of climate finance for agrifood systems across regions




Source: *Vishnumolakala et al., 2025*

In contrast, Brazil stands out in Latin America with most of its climate finance for agriculture mobilised from domestic private and public sources (Vishnumolakala et al., 2025) (see Box 1).

## Box 1

**Brazil rural credit policy and agriculture insurance scheme**

Brazil stands out in Latin America with 97% of its climate finance for land use—including agriculture, forestry, conservation, and resilience coming from domestic sources of which 72% is from private actors over the period 2020-2023. An estimated 74% of Brazil climate finance was directed toward crops, largely driven by priority sector lending and agriculture insurance under the federal agricultural plan. This policy requires financial institutions to allocate resources toward rural credit covering both production costs and investments in sustainable agricultural practices in rural areas. The plan is announced annually by the federal government and sets the framework for rural credit resources and financing lines.

Some credit lines under this plan offer special conditions and incentives for low-carbon crops and sustainable farming methods, such as no-till farming or programmes like RENOVAGRO. The Agricultural Plan also regulates interest rates and credit conditions, often providing government-subsidised loans with lower interest rates to encourage credit use in agriculture.

This blended and concessional rural credit is further de-risked by government insurance programmes. Agriculture insurance is critical component for mitigating climate risks, preventing loan defaults and channelling climate finance. The Rural Insurance Premium Subsidy Program provides USD 1.1 billion per year to help farmers manage climate risks and protect their livelihoods.

Sources: *Chiavari et al., 2024; World Bank, n.d.; Central Bank of Brazil, n.d.; BNDES, 2021*

As official development assistance (ODA) continues to decline, having already fallen by 9% in 2024, finance needs to be mobilised from domestic private and public sources (OECD, 2025). The Shamba Centre for Food & Climate, in cooperation with the Global Donor Platform for Rural Development, undertook an enquiry on sustainable finance in 2023 which called on donors to increase their ODA allocations toward blending and de-risking investments in the agrifood sector (Perera et al., 2024). Implementing the most effective de-risking strategies to lower investment barriers and accelerate the flow of private and climate capital toward climate-smart agriculture offers the opportunity to increase both financial and development additionality for each donor dollar deployed.

This report discusses the value of credit guarantees and climate insurance as cost effective de-risking strategies in food and agriculture. These two strategies stand out among de-risking instruments because they directly tackle the two most critical barriers in the food and agriculture sector – restricted access to finance and high vulnerability to climate shocks – while leveraging, rather than replacing, private financial markets. Credit guarantees reduce lenders' risk exposure ex-ante, enabling financial institutions to extend credit to underserved farmers and agribusinesses. Climate insurance, particularly parametric products, provides rapid post-shock liquidity that stabilises incomes and reduces default risk, while also improving ex-ante investment incentives and borrower creditworthiness. Importantly, their combined use creates a complementary de-risking framework, linking ex-ante risk-sharing with post-shock protection. This makes them well-suited to mobilise private investment in agrifood systems exposed to climate risks.

# CHAPTER 2
# Spotlight on credit guarantees

**Credit guarantees are essential de-risking mechanisms for mobilising domestic private capital toward climate-smart agriculture.**

During the preliminary years of transitioning to climate-smart agriculture, expenditures are high, and revenues are typically low. This is especially true when farmers invest in agroforestry, soil conservation, or ecosystem restoration – all of which require high upfront costs and delayed returns. As a result, farmers, landowners, and agri-entrepreneurs need patient financing that allows them to start servicing debt once income streams stabilise. However, access to such financing is often limited, as the agricultural landscape is dominated by smallholder farmers who lack formal land titles or sufficient assets to secure loans (Hara, 2025). Credit guarantees help overcome these barriers by lowering collateral requirements, extending loan durations, and reducing risk for financial institutions, enabling them to mobilise larger volumes of local currency financing.

**Credit guarantees serve as a partial substitute for collateral, typically covering a portion (e.g., 50-70%) of the loan value.** As such, they complement collateral in reducing the lender's risk by absorbing part of potential losses in case of borrower default. This makes financial institutions more willing to lend, especially to those lacking sufficient collateral. For example, Kenya's Credit Guarantee Scheme covers up to 25% of loan losses. This allows domestic banks to reduce their collateral requirements for farmers and small- and medium-sized enterprises (SMEs) in the agri-food sector. About 70% of the 4,158 farmers and SMEs were new borrowers, demonstrating the guarantee's additionality in expanding credit access for marginalised groups (see Box 2).

While guarantees improve access to financing, its limited coverage means many farmer cooperatives still face challenges securing adequate funds for climate-smart investments. Addressing this collateral gap remains critical to scaling sustainable agricultural practices and building resilience to climate risks.

## Box 2

**Kenya's Credit Guarantee Scheme**

The Kenyan government has recognised the challenges faced by SMEs in accessing credit, including stringent collateral requirements, short repayment periods, and high interest rates, reflecting the high-risk profile assigned to SMEs by financial institutions.

In December 2021, the Government of Kenya, via the National Treasury, established the MSME Credit Guarantee Scheme to share some of the credit risk and increase commercial banks' lending to MSMEs. The scheme is structured so that the government covers up to 25% of losses if borrowers fail to repay their loans. With an initial capital injection of KSh 3 billion (USD 23 million) into the scheme, the Treasury expected this to achieve a leverage ratio of four, mobilising KSh 12 billion in lending by participating banks.

Under this programme, individual borrowers can access loans of up to KSh5 million, repayable over a period of three years, with a grace period of up to five months. The loans are offered at discounted interest rates based on the businesses' risk profile.

As of June 2025, the guarantee scheme has mobilised KSh 6.6 billion in loans to 4,315 MSMEs. Of this amount, KSh 5.3 billion has already been fully repaid, freeing up a guarantee value of KSh 1.3 billion. This recovered amount can now be reused to mobilise new loans for additional MSMEs. In this way, as loans are repaid, funds are recycled and reallocated to more beneficiaries, expanding the overall economic impact of the scheme. As a result, the Credit Guarantee Scheme has achieved a leverage ratio of 2.4, meaning that for every one shilling committed by the government, KSh 2.4 in private sector credit has been unlocked for MSMEs.

By June 2025, the MSME Credit Guarantee Scheme had supported 4,315 MSMEs, of which 68% - or 2,912 - were first-time borrowers. Enterprises owned by women, youth, and persons with disabilities have received 20% of all guaranteed loans that have been disbursed. Beneficiaries of the guarantee scheme have so far supported over 27,800 jobs. This indicates strong additionality by expanding access to formal credit for marginalised groups that were previously excluded from bank lending.

Despite these achievements, uptake has been slower than expected. Only seven of the country's 39 commercial banks have participated, and banks continue to assign high-risk profiles to MSMEs, resulting in higher interest rates.

The government and National Treasury are now transitioning the pilot CGS into a permanent entity, the Kenya Credit Guarantee Company (KCGC), to ensure sustained support for MSMEs. KCGC is projected to scale gradually and become fully operational by 2028.

Sources: *Mumbi, 2025; RKFinFA, 2025; RKFinFA, n.d*

**Credit guarantees also extend loan tenors to match longer repayment cycles of sustainable agriculture projects.** Sustainable agriculture requires patient, flexible financing that can extend up to ten years. However, the large upfront investments and delayed cashflows in these projects deter financial institutions from providing loans with long tenors.

By reducing risk exposure, credit guarantees enable lenders to extend long-term financing that matches the slow revenue generation of sustainable agriculture projects. For example, a Brazilian producer specialising in vegetables, soybean, and maize, along with trading soy and maize seeds, needed a USD 13 million loan over ten years to convert 8,000 hectares of degraded pas-

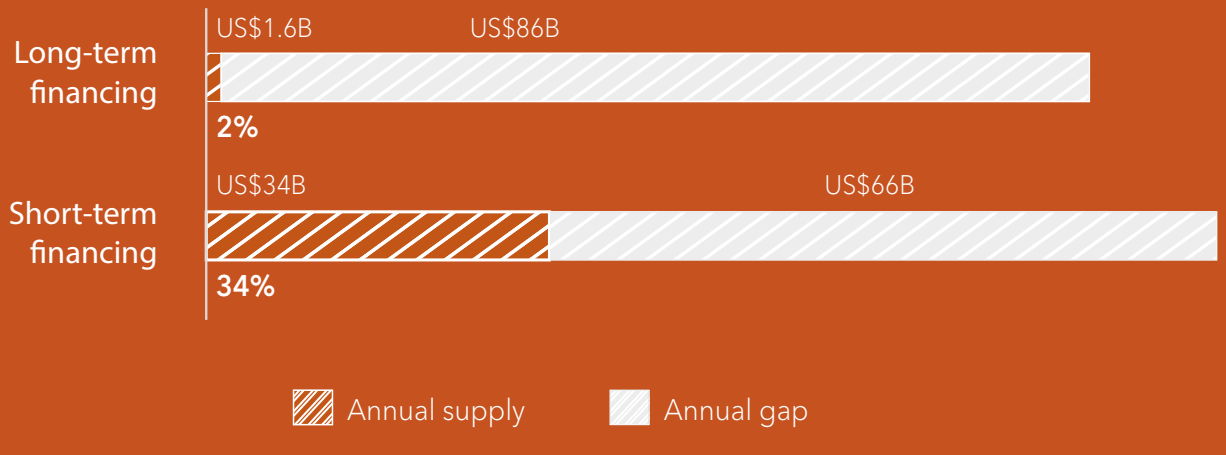
tureland in Goiás into a sustainable production site with native vegetation restoration. The project involved significant investment in land preparation, restoration, inputs, machinery, infrastructure, and irrigation, targeting land preservation and research. The company committed to protecting and restoring one hectare of native vegetation for every hectare used for crops, resulting in 50% reserve coverage—more than twice the legally required 20%.

Local commercial banks, including Rabobank Brazil, generally offer loans with shorter tenors (three to five years) and often shy away from such agricultural projects due to significant upfront costs and high risks. The AGRI3 Fund stepped in with a credit guarantee covering 50% of Rabobank's loan exposure for the first seven years, increasing to 100% coverage starting from year seven. By lowering the bank's risk, the guarantees enabled Rabobank to provide long-term financing for this climate-smart agricultural project.

**Beyond lowering collateral requirement and extending loan tenors, credit guarantees can mobilise larger volumes of domestic private capital needed to scale sustainable agriculture practices.** The volume of long-term financing needed for transitioning to sustainable farming practices in developing economies is limited. Smallholder farmers across sub-Saharan Africa, Latin America and South and Southeast Asia receive less than USD 2 billion annually for long terms financing needs. This results in a financing gap of USD 86 billion annually—or 98% of the total demand. In comparison, the financing gap for short-term agricultural needs is smaller, at USD 66 billion annually, or 67% of total demand (see Figure 4).

## Smallholder farmers receive only 2% of total long-term financing demand

**Figure 4:** Annual supply and demand of short-term and long-term financing for smallholder farmers




Source: *Shakhovskoy et al., 2019*

Credit guarantees can help close this gap by mobilising large volumes of domestic private and long-term financing that would otherwise be withheld. The AGRI3 Fund provides a clear example. Using USD 100 million of its own capital, the fund provides USD 300 million in guarantees which, in turn, is expected to unlock USD 1 billion in private finance for climate-smart agricultural projects. (see Box 3).

## Box 3

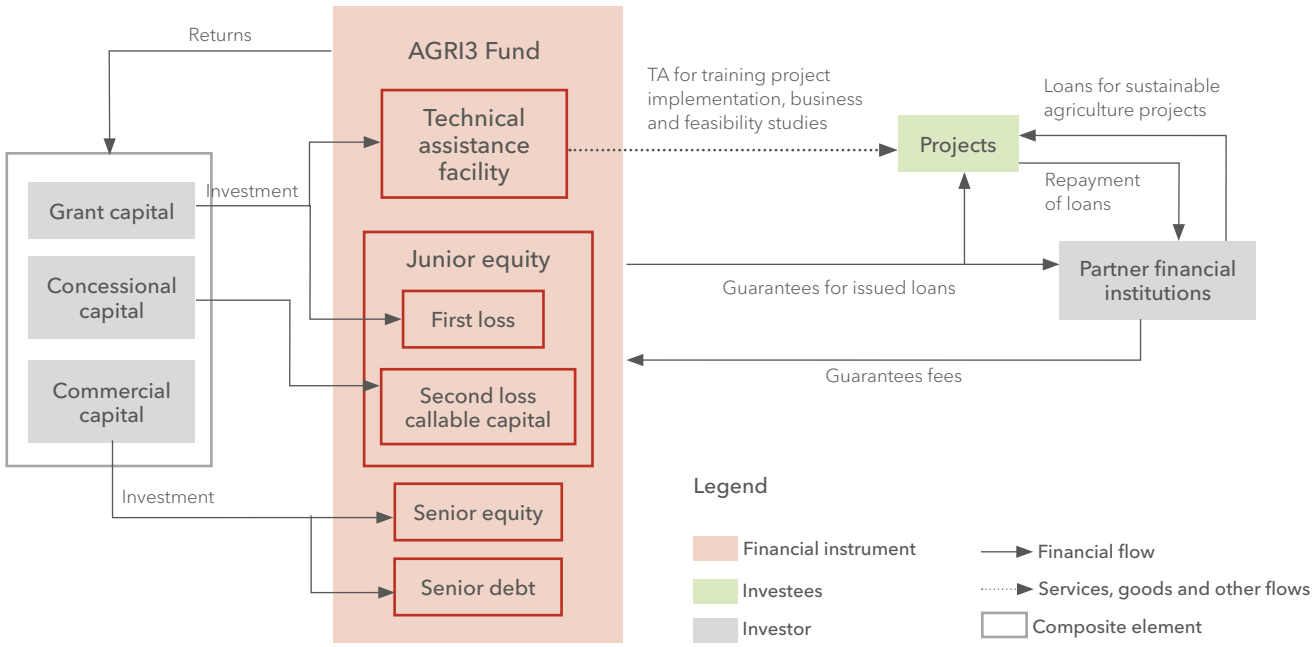
**AGRI3 Fund**

Launched in 2020, AGRI3 is a blended fund that provides guarantees and technical assistance to partner financial institutions, enabling them to on-lend to deforestation-free, sustainable agriculture and land use projects that would otherwise be deemed too risky. Using USD 100 million of its own capital to provide USD 300 million in guarantees, the fund aims to unlock USD 1 billion in private finance, achieving a leverage ratio of ten times its internal funding.

These guarantees cover 30–50% of loans between USD 2–15 million to large agribusinesses for deforestation-free, sustainable agriculture and land use projects. Provided in both US dollars and local currencies, the guarantees mitigate depreciation risk and allow banks to extend loan tenors to match longer repayment cycles of up to ten years or compensate for non-cash-generating activities.

In addition to issuing guarantees, the AGRI3 Fund further reduces risk by offering technical assistance to borrowers to develop viable sustainable business models.

**Figure 5:** AGRI3 Fund structure




Sources: *Manen et al., 2024; Oomes et al., 2019; Global Environment Facility, 2020; Kiernan-Stone, 2023*

**Credit guarantees need complementary de-risking measures to enhance their effectiveness.** Credit guarantees act as a safety net for banks and lenders. When a borrower defaults on a loan, the guarantor covers a portion of the loss. However, these guarantees do not address the underlying challenges that make agrifood sector inherently risky—such as poor farming practices, volatile crop prices, or extreme weather events. While they make lending relatively safer for banks, they do not reduce the actual risk of farming itself.

Even with credit guarantees in place, natural disasters and the inherent risks of the agriculture sector can lead to significant defaults. When guarantee claims become too frequent or too large, these schemes are bound to become unsustainable and eventually fail (World Bank Group, 2019). This explains why banks remain hesitant to expand lending to the agrifood sector despite the availability of guarantees, as was the case with the Credit Guarantee Scheme in Kenya.

Evidence from Tanzania suggests that agricultural loan default rates under credit guarantee schemes regularly exceeded 10%, compared to 5–10% in other SME sectors (World Bank Group, 2019). In addition, guarantees that cover a high proportion of the loan default increase moral hazard risks. As lenders bear less risk, they tend to be less diligent in evaluating borrowers, leading to riskier loans.

These challenges illustrate that credit guarantees alone are not effective in increasing local currency lending to the agrifood sector. Complementary measures, such as technical assistance and climate insurance, are needed to address the underlying factors that makes the sector inherently risky. Technical assistance helps reduce the likelihood of loan defaults by providing training on improved farming practices, better supply chain management, access to market information and other forms of support, while climate insurance protects both farmers and lenders from weather-induced losses and further strengthens the resilience of agricultural finance.

# CHAPTER 3
# Spotlight on climate insurance

## Scaling up climate insurance protects farmers against climate shocks and attract private capital toward climate-smart agriculture

Climate shocks, such as droughts and floods, are becoming more frequent and severe, disproportionately affecting small-scale farmers in developing economies. Most of these farmers depend on rainfed agriculture, making their income and food security highly vulnerable to erratic rainfall and temperature changes. A single season of extreme weather can destroy crops, reduce livestock productivity, and erase years of savings. Without safety nets in place, these events not only disrupt livelihoods but also trap farming communities in a cycle of poverty and vulnerability.

**Recent climate trends illustrate the scale of the threat.** From 2020 to 2023, repeated droughts and floods disrupted rainfed agriculture across the Horn of Africa, leading to multiple failed cropping seasons and widespread food insecurity (UNDRR, 2024). In Southeast Asia, climate variability has intensified in the Mekong River Basin, causing both droughts and flooding. These events have led to reduced rice yields, declining fish catches, and saltwater intrusion in the Mekong Delta (Mekong River Commission, n.d.). Similarly, in May 2025, southern Brazil faced unprecedented flooding that affected 48,000 producers and nearly 3.2 million hectares of land, causing over USD 600 million in losses across the agriculture and livestock sectors (Colussi et al., 2024).

**These increasingly common climate risks directly threaten agricultural productivity and financial stability.** Extreme events can cause sudden and severe declines in crop yields and livestock output. At the same time, unpredictable rainfall and shifting seasonal patterns result in irregular harvests and unstable incomes. This uncertainty makes it difficult for smallholder farmers to repay loans and discourages lenders from offering credit, especially in the absence of collateral or insurance to mitigate weather-related losses.

**Climate risk insurance offers a pathway to resilience.** By providing timely financial compensation after adverse weather events, insurance helps farmers sustain their income and recover more quickly. This not only protects farmers' livelihoods but also improves their capacity to repay loans, reducing the overall risk to financial institutions.

Climate insurance can also help promote sustainable farming practices. By providing farmers with financial protection against climate-related risks, climate insurance encourages farmers to try new crops and farming methods that are better suited to changing weather patterns. They are more likely to invest in their businesses if they feel protected. This ensures that farmers are better prepared for future climate change and continue to produce healthy food for their communities.

**Over the past two decades, index insurance has increasingly been proposed as a mechanism to help smallholder farmers manage climate-related risks** that affect agricultural productivity and livelihoods. It provides an alternative to traditional indemnity insurance, overcoming many of its limitations in low-income agricultural settings.

Unlike conventional indemnity insurance, where compensation depends on the assessed losses at an individual farm level, index insurance uses an external indicator, such as rainfall amount, wind speed, or regional average yields, to trigger payouts when the index crosses a predetermined threshold. Because payouts are automatically calculated based on objective data, index insurance eliminates the need for farm-level loss verification, which is costly and logistically difficult in regions with dispersed, small-scale farms and limited infrastructure.

**Index insurance also eliminates moral hazard and adverse selection.** These challenges are common in traditional indemnity insurance, where compensation is based on actual losses at the individual farm level. Moral hazard arises because farmers who know they will be paid for any damage may take fewer precautions to protect their crops or livestock, increasing the likelihood or severity of losses. Adverse selection occurs when higher-risk farmers are more likely to purchase insurance, while lower-risk farmers opt out, leaving insurers with a disproportionately risky pool. Both issues drive up costs and reduce the sustainability of indemnity insurance.

Index insurance mitigates these issues by basing payouts on objective measurements unrelated to individual behaviour. Because farmers cannot influence the index directly, there is no incentive to reduce protective efforts, which minimises moral hazard. Similarly, insurance uptake is less affected by individual risk levels, reducing adverse selection, since high- and low-risk farmers are treated equally with respect to payouts. In Mongolia, for instance, the Index-Based Livestock Insurance Project (IBLIP) relies on livestock mortality rates at the district level, ensuring payouts are tied to transparent, aggregate data rather than individual claims, thereby reducing both costs and opportunities for manipulation (Mahul & Skees, 2007).

Lower premiums and administrative expenses, combined with reduced moral hazard and adverse selection, help make index insurance financially sustainable and scalable for smallholder farmers.

**Beyond reducing administrative expenses and moral hazard, index insurance enables access to credit and encourages more investment.** Evidence from the Agriculture and Climate Risk Enterprise (ACRE) in East Africa shows that in 2013, 97% of insured farmers received loans linked to their insurance coverage (Sopov, 2018). This suggests that insurance increased the willingness of financial institutions to provide agricultural loans, since it reduced weather-related default risk and improved farmers' repayment capacity. In addition, farmers with insurance coverage are more likely to invest in improved seeds or fertilisers, anticipating protection against climate shocks. ACRE-insured farmers reported 16% higher earnings and 19% more investment compared to uninsured peers, in part because insurance facilitated their access to credit (Sopov, 2018).

**Challenges hinder wide scale adoption, but innovative solutions are emerging.** One of the fundamental challenges of index insurance is the presence of basis risk – the possibility that the index does not accurately reflect a particular farmer's losses. This risk often stems from limited or unreliable data. Many low-income countries lack reliable weather or yield records, and ground weather stations are scarce, providing limited coverage. As a result, regional or weather-based indicators often fail to match actual losses, leaving some farmers compensated without suffering losses, while others may face severe damage but receive no payment. High levels of basis risk erode confidence and suppress demand.

Innovative insurance programmes have tackled this challenge by improving data and refining index design. In Ethiopia and Senegal, smallholder farmers frequently faced devastating crop losses due to droughts and erratic rainfall, which threatened their livelihoods and ability to recover each season. Weather stations, which record local rainfall and temperature, were scarce and provided limited coverage. The R4 Rural Resilience Initiative therefore relied on satellite rainfall estimates combined with satellite vegetation indices to improve the accuracy and validation of drought risk at village scale. This dual weather station and satellite approach helped identify the timing of drought hazards better, particularly focusing on the end of the rainy season when vegetation indices correlate well with rainfall deficits, thus reducing basis risk caused by inaccurate rainfall measurement or localised drought variation. To further refine the index, R4 employed a verification and validation approach that included expert ground-truthing of selected sites, and farmer recall/yield data feedback to identify where basis risk was highest and where index payouts did not correspond to farmers' experienced losses. This allowed targeted improvements of the insurance product in problematic areas (Stanimirova et al., 2013).

Mongolia's Index-Based Livestock Insurance Program (IBLIP) also addressed basis risk through the careful choice of index and data source. Extremely harsh winters caused mass livestock deaths, yet weather indicators were poorly correlated with these losses. The insurance programme therefore relied on a dataset with 33 years of livestock mortality, disaggregated by species and local region. These data more accurately reflected herd losses, reducing the mismatch between compensation and real impacts (Mahul & Skees, 2007).

In Kenya, frequent and severe droughts caused massive livestock mortality in pastoralist communities, particularly in arid and semi-arid lands. The pastoralists' livestock are critical assets that provide milk, meat, and income; their loss due to drought has devastating economic and food security impacts. This creates a cycle of asset loss and slow recovery for pastoral households, intensifying poverty and vulnerability (The Star, 2023). To protect pastoralists against these drought-induced livestock losses, the International Livestock Research Institute (ILRI) developed the Index-Based Livestock Insurance (IBLI) in Kenya as a climate risk mitigation tool.

The IBLI insurance used NDVI (Normalized Difference Vegetation Index) data collected by satellites to estimate the amount of vegetation, or forage, available for livestock. NDVI has been shown to correlate strongly with forage availability in the project area, and since livestock in pastoral systems rely almost entirely on grazing for nutrition, it serves as an effective indicator of the animals' food supply and potential risk of mortality from insufficient forage. This strong linkage helped ensure that payouts correspond closely to actual drought-induced livestock losses (Chantarat et al., 2013).

**A further challenge lies in ensuring that farmers not only have access to index insurance but also understand how it works.** The abstraction of payouts from visible losses makes the product difficult to comprehend. Without clear communication, uptake may remain limited or driven by misconceptions. To address this, several insurance programmes have invested heavily in farmer education. The R4 Rural Resilience Initiative in Ethiopia and Senegal introduced a participatory process known as the Social Network for Index Insurance Design. Through this process, community leaders and farmers helped define payout triggers and timing and participated in learning sessions and games to understand how the system works. This approach made the insurance more transparent, trusted, and better suited to local realities (Stanimirova et al., 2013). Similarly, the Index-Based Livestock Insurance (IBLI) in Kenya used videos, radio dramas, and interactive games to explain the product (Jensen, Barrett, & Mude, 2015).

**To increase effectiveness and scale, some programmes bundle index insurance with credit guarantees and/or inputs.** In East Africa, ACRE integrated insurance with microfinance loans, seed sales, and livestock purchases, enabling farmers to access improved technologies alongside risk protection (Szebini et al., 2021). The R4 Rural Resilience Initiative also combined insurance with savings and credit opportunities, resulting in measurable increases in household savings and asset accumulation among insured farmers (Greatrex et al., 2015). Similarly, evidence from a randomised trial in Odisha, India showed that bundling insurance with agricultural loans increased farmers' financial literacy and uptake, especially among women. By improving access to credit through insurance, farmers were able to invest in more productive technologies and inputs, which in turn increased farm profitability, improved rice yields, and expanded cultivated areas. The results also showed a decrease in informal borrowing, with its higher interest rates and limited regulatory oversight, and an increase in formal lending. Farmers also reported easier loan repayment terms because of low interest rates. This rate was possible because the bundling with crop insurance reduced the borrower's risk of default, making formal loans more accessible and affordable (Kramer et al., 2023; Rice Today, 2025).

Nigeria offers a successful example of integrating credit guarantees with climate insurance, technical assistance and incentive mechanisms to systematically tackle the multiple challenges in agricultural financing in its Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) programme (see Box 4).

## Box 4

**Nigeria Incentive-Based Risk Sharing System for Agricultural Lending**

Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) Plc. is a non-bank financial institution (NBFI) wholly owned by the Central Bank of Nigeria and with funds of USD 500 million from public resources. Established in 2013 by the Central Bank of Nigeria, the Nigerian Bankers' Committee and the Federal Ministry of Agricultural & Rural Development, NIRSAL aims to de-risk agricultural lending, build long-term capacity of value chain actors and financial service providers and institutionalise incentives for agricultural finance.

To enhance the effectiveness of agricultural financing, NIRSAL pairs guarantees with complementary tools including insurance, technical assistance, banks rating and incentives. Together, these instruments systematically tackle multiple challenges in agriculture sector.

**NIRSAL Partial Credit Guarantee Facility of USD 300 million** covers 30 to 75% of banks' losses on individual loans based on the risk profile of the value chain segment. Banks pay a small upfront fee of 1% of the loan value plus an annual fee, reducing their exposure to potential losses. This guarantee encourages banks and other lenders to extend financing more aggressively, unlocking billions of local currency lending that might otherwise be withheld.

It unlocked N152 billion to farmers between 2016 to 2022 and less than 1% of the guaranteed credit amount resulted in loss claims paid out by NIRSAL. This default rate is notably low compared to the financial industry average ratio of 7.9% in Nigeria. Recent figures indicate that in just over a decade, NIRSAL has successfully mobilised over N235.7 billion in commercial financing to the agriculture sector.

**Insurance Facility of USD 30 million** offers three parametric, index-based insurance products, that go beyond traditional indemnity coverage, to mitigate various risks faced by smallholder farmers and agribusinesses, such as crop failure, weather events, pests, and other shocks. As a result, farmers and agribusinesses are able to withstand shocks without defaulting on loans, making lending less risky and more attractive to financial institutions. Over 1.9 million farmers subscribed to NIRSAL agriculture insurance products, indicating strong demand and value.

**Technical Assistance Facility (TAF) of USD 60 million** offers training and capacity building to farmers, extension agents and agri SMEs cross the value chain. It supports the development of cooperatives and clusters along the value chain, assists farmers in adopting good agricultural practices and helps SMEs strengthen their business operations. This support makes smallholder farmers and agribusinesses more bankable and enhances the overall effectiveness of lending and borrower performance. The TAF also provides capacity building to financial institutions to help them better understand agricultural risks and lending opportunities. To date, about 300,000 farmers and 8,300 financial institutions' staff have received training.

**Agriculture Bank Rating Scheme of USD 10 million** rates participating financial service providers and state governments on the effectiveness and outreach of their agricultural lending and social and environmental performance.

**Bank Incentives Mechanism of USD 100 million** provides cash and non-cash rewards to performing participating financial service providers to incentivise their continued outreach and build their long-term capabilities to lend in the agriculture sector.

The incentive programme also rewards farmers and agribusiness borrowers for their timely loan repayment via interest rate reductions of 20-40%, effectively lowering the cost of credit. Borrowers are also rewarded for their value addition and sustainable practices. As a result, timely repayments increased, and borrowers saved about USD 11 million in reduced interest expenses. The incentives have also helped to maintain borrower's creditworthiness and build trust between lenders and borrowers.

NIRSAL's scalable and systematic approach has become a benchmark across Africa, inspiring replication in other countries. The Ghana Incentive-Based Risk Sharing System for Agricultural Lending (GIRSAL), modelled after NIRSAL, was launched by the Bank of Ghana in partnership with the Ministry of Food and Agriculture and other stakeholders to de-risk agricultural financing through a similar structure and strategy.

Sources: *Emejo, 2022; Nwachukwu, 2020; Szebini et al., 2021; NIRSAL, n.d.; NIRSAL, 2020*

**Despite growing interest, evidence on the scalability and long-term impact of index insurance remains mixed.** While large-scale programmes, such as India's NAIS/WBCIS and Mongolia's IBLIP have reached millions and thousands of farmers respectively (Greatrex et al., 2015), many pilots remain dependent on subsidies or donor support. Sustainability without external funding remains uncertain, and uptake is highly context specific. Furthermore, index insurance addresses only certain risks, primarily climate-related and spatially correlated hazards. Other threats, such as pests, market shocks, or political instability, remain outside of its scope.

However, index insurance offers a promising approach to improve smallholder farmers' resilience to climate risks, particularly where traditional indemnity insurance is impractical. Evidence from India, Ethiopia, Mongolia, and Kenya demonstrates that carefully designed products can lower costs, expand access to credit, and provide meaningful protection. Yet the challenges of basis risk, data gaps, farmer comprehension, and sustainability require cautious consideration. Successful initiatives invest in robust index design, farmer education, integration with complementary services, and strong institutional partnerships. Policymakers and practitioners should therefore avoid treating index insurance as a panacea and instead situate it within broader rural development and risk management strategies.

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# CONCLUSION

## Integrating climate insurance and guarantee schemes

Despite its importance, the agrifood sector remains highly exposed to climate hazards. These growing risks threaten food security, disrupt rural incomes, and cause losses and damages that place a heavy strain on national economies.

Building climate-resilient and low-emission agrifood systems in low- and middle-income countries is estimated to require over USD 4 trillion between 2024 and 2030 (High-Level Political Forum on Sustainable Development, 2023; Laborde & Torero, 2023). Yet these regions received the equivalent to 1% of total global climate finance in 2021-2022. This stark funding gap highlights the urgent need for effective de-risking strategies. Doing so can help mobilise more private and climate finance to enable these countries to adapt to climate impacts and transition to sustainable, low-emission food systems.

Climate insurance provides short-term financial protection by transferring the risk of losses caused by extreme weather events or climate shocks. However, because climate insurance mainly covers financial losses from climate shocks rather than preventing or reducing vulnerabilities or increasing adaptive capacities, it cannot singlehandedly build long-term resilience. The structural changes and adaptive investments required to build systemic resilience must come from complementary measures such as climate-smart agriculture techniques, infrastructure improvements, capacity building, and sustainable resource management. Integrating guarantees with insurance strengthens agricultural risk management and channels climate finance to climate-smart agriculture.

Combining guarantees and insurance enhances risk coverage and helps mobilise climate finance for climate-smart agriculture. Climate insurance is well-suited for specific, weather-related risks, such as droughts or floods, while credit guarantees address broader lending risks. When these two instruments are used together, they provide stronger protection for lenders and farmers alike. Adding technical assistance further strengthens this framework by tackling underlying risks, building farmers' long-term resilience, and reducing reliance on guarantees and insurance claims. Together, these tools create a comprehensive risk management system that supports both financial institutions and agricultural communities in managing climate-related shocks.

By integrating climate insurance with credit guarantees and supportive services, agriculture financing can be de-risked more effectively, unlocking greater climate financial flows while fostering long-term resilience in farming communities.

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