

FEASIBILITY STUDY

**DISASTER RISK FINANCE AND
INSURANCE (DRFI) SOLUTIONS
FOR FAMILY FARMERS IN
EL SALVADOR, GUATEMALA,
AND HONDURAS**

JANUARY 2024



WORLD BANK GROUP

**Disaster Risk Financing
& Insurance Program**



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Abbreviations

ADRiFi	Africa Disaster Risk Financing Program
ARC	African Risk Capacity
ARV	Africa RiskView
ATM	automatic teller machine
AYII	area yield index insurance
BANADESA	National Bank for Agricultural Development (Banco Nacional de Desarrollo Agrícola) [Honduras]
BANRURAL	Rural Development Bank (Banco de Desarrollo Rural) [Guatemala]
BFA	Banco de Fomento Agropecuario
CADENA	Component for the Attention of Natural Disasters (Componente de Atención a Desastres Naturales) [Mexico]
CARICOM	Caribbean Community
CAT-DDO	Catastrophe Deferred Drawdown Option
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CHIRPS	Climate Hazard Group Infrared Precipitation with Station
CHN	Crédito Hipotecario Nacional [Guatemala]
CIVA	Agricultural Vegetation Index Coefficient (Coeficiente de Índice de Vegetación Agrícola) [Paraguay]
CNAF	National Committee for Family Agriculture (Comité Nacional de Agricultura Familiar) [Honduras]
COAST	Caribbean Ocean and Aquaculture Sustainability Facility
CONAF	National Council of Family Farming [El Salvador]
COSEFIN	Council of Finance Ministers of Central America, Panama, and the Dominican Republic
CSA	Agricultural Insurance Committee (Comité de Seguros Agrícolas) [Honduras]
DIRISHA	Drought Index Insurance–Insurance for Resilience in the Sahel and Horn of Africa
DRF	Disaster Recovery Framework [El Salvador]
DRFI	disaster risk finance and insurance
DRIFCA	Disaster Risk Insurance and Finance in Central America Consortium
DRIVE	De-risking, Inclusion and Value Enhancement of Pastoral Economies in the Horn of Africa
DRM	disaster risk management
ENAF	Family Agriculture National Strategy in Honduras (Estrategia Nacional de Agricultura Familiar)
ENSO	El Niño–Southern Oscillation
EVI	Enhanced Vegetation Index
FAO	Food and Agriculture Organization of the United Nations
FCIP	Federal Crop Insurance Program [United States]
FEC	Fund for Emergencies in Coffee [El Salvador]

FERRE	Emergency, Recovery and Economic Reconstruction Fund (Fondo de Emergencia y Recuperación y Reconstrucción Económica) [El Salvador]
FONAPRE	National Preparedness and Response Fund [Honduras]
FONCC	National Climate Change Fund (Fondo Nacional de Cambio Climático) [Guatemala]
FOPROMID	Disaster Prevention and Mitigation Fund (Fondo de Protección Civil, Prevención y Mitigación de Desastres) [El Salvador]
FRP	Financial Resilience Program
FUNDER	Foundation for Rural Business Development (Fundación para el Desarrollo Empresarial Rural) [Honduras]
GAFSP	Global Agriculture and Food Security Program
GoES	Government of El Salvador
GoG	Government of Guatemala
GoH	Government of Honduras
GoK	Government of Kenya
GoM	Government of Mongolia
GDP	gross domestic product
ha	hectare
IBLI	index-based livestock insurance
IBLIP	Index-Based Livestock Insurance Project [Mongolia]
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
IRI	International Research Institute for Climate and Security
ISAC	composite agricultural drought index (Índice de Sequía Agrícola Compuesto)
KLIP	Kenya Livestock Insurance Program
LAC	Latin America and the Caribbean
LPP	Livelihood Protection Policy
MAG	Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería) [El Salvador]
MAGA	Ministry of Agriculture, Livestock and Food (Ministerio de Agricultura, Ganadería y Alimentación) [Guatemala]
MCII	Munich Climate Insurance Initiative
M&E	monitoring and evaluation
MFI	microfinance institution
MiCRO	Microinsurance Catastrophe Risk Organisation
MSMEs	micro, small, and medium enterprises
NASA	National Aeronautics and Space Administration [United States]
NCA	North Central America
NDVI	Normalized Difference Vegetation Index
NGO	nongovernmental organization
PAF	Family Agriculture Plan [El Salvador]
PAFCIA	Peasant, Indigenous and Afro-descendant Family Farming Policy

PCA	Partnership for Central America
PCRAFI	Pacific Catastrophe Risk Assessment and Financing Initiative
PIU	Project Implementation Unit
PMFBY	Pradhan Mantri Fasal Bima Yojana [India]
POS	point of service
PPP	public-private partnership
RUP	Single Registry of Participants (Registro Único de Participantes)
RUPA	Single Registry of Agricultural Food Producers (Registro Único de Productores Agroalimentarios)
SAG	Ministry of Agriculture and Livestock (Secretaría de Agricultura y Ganadería) [Honduras]
SIB	Superintendency of Banks (Superintendencia de Bancos) [Guatemala]
SICA	Central American Integration System
SIPE	Satellite Index Insurance for Pastoralists in Ethiopia
SMEs	small and medium enterprises
SPI	Standardized Precipitation Index
SPSU	Universal Social Protection System [El Salvador]
TRMM	Tropical Rainfall Measuring Mission
TLU	tropical livestock unit
UAI	unit area of insurance
UNDP	United Nations Development Programme
VfM	value for money
WFP	World Food Programme
WII	weather index insurance

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Executive Summary

The objective of this feasibility study is to identify disaster risk finance and insurance (DRFI) solutions for up to 1.9 million family farmers in El Salvador, Guatemala, and Honduras. This study is motivated by an emerging consensus on the need to design and implement large-scale DRFI solutions to improve the financial resilience of family farmers (agricultores familiares) in North Central America (NCA) and reduce their vulnerability to extreme weather events and climate risks. This consensus was endorsed by participants in a September 2022 workshop convened by the Partnership for Central America (PCA), the UN World Food Programme (WFP), and the World Bank. The workshop included public sector authorities, private sector institutions, and international organizations. As an outcome of these discussions, the World Bank, with funding from the United States Agency for International Development (USAID), agreed to undertake an initial study to assess the policy, institutional, financial, and technical feasibility of DRFI solutions for family farmers in NCA. In November 2022, PCA, WFP, and World Bank launched the Disaster Risk Insurance and Finance in Central America Consortium (DRIFCA) to guide the study and subsequent phases of a potential DRFI initiative.

1. The 1.9 million family farmers in NCA are among the subregion’s most vulnerable populations and are highly exposed to extreme weather events and climate risks.

The estimated 1.9 million family farmers in NCA play a critical role in local food production. Agricultural production represents an average of 8.4% of gross domestic product (GDP) across NCA. The definition of “family farmer” varies across the three countries but generally refers to farmers who cultivate staple crops (e.g., corn, beans) on less than 2 ha of land, generate low yields due to use of rain-based irrigation and limited use of seed and fertilizer technology, and also rely on off-farm income and remittances. Among the total 2.3 million farmers in the subregion, approximately 1.9 million are family farmers; this is 82% of all individuals engaged in farming activities and 9% of the working age population. These family farmers account for approximately 50% of total food production and 70–80% of food produced and consumed within the subregion.¹

Family farmers in NCA are among the subregion’s most vulnerable populations. Approximately 70% of family farmers in the subregion live below the poverty line, and 30% are classified as extremely poor.² Many family farmers in NCA reside in the Dry Corridor, an area spanning the three NCA countries that is highly exposed to extreme climate events, including long periods of drought. However, significant data gaps (arising from limited national survey and census data) impede a comprehensive and up-to-date assessment of the geographic and socioeconomic characteristics of family farmers in NCA.

Family farmers in NCA are highly exposed to extreme weather events and climate risks. According to Global Climate Risk Index 2021, Guatemala is the 16th most exposed country globally to extreme weather events; El Salvador is the 28th and Honduras the 44th most exposed (Eckstein, Künzel,

¹ Source: Programa de Dialogo Regional Rural (DPRR). 2017. Política de Agricultura Familiar Campesina, Indígena y Afrodescendiente Regional PAFCIA 2018 – 2030. https://rimisp.org/wp-content/files_mf/1539719229PAFCIAVersiónDigital.pdf

² Sources: <https://reliefweb.int/report/honduras/central-americas-dry-corridor-turning-emergency-opportunities#:~:text=%E2%80%9CMore%20than%20half%20of%20the,and%201.3%20million%20children%20under;> <https://www.wilsoncenter.org/sites/default/files/media/uploads/documents/Food%20Insecurity%20in%20the%20Northern%20Triangle-%20Leveraging%20Agricultural%20Policies%20and%20Programs%20for%20the%20Benefit%20of%20Smallholders%20by%20Carrie%20Seay-Fleming%2011.1.pdf>; and <https://www.fao.org/family-farming/regions/latin-america/en/>

and Schäfer 2021). Among all hazards, hydrometeorological hazards (excessive rainfall, floods, droughts) have caused the most human and material losses in NCA. Family farmers residing in the Dry Corridor are particularly vulnerable to severe El Niño–Southern Oscillation (ENSO) drought-related crop production and yield losses every three to five years. The production systems of family farmers are further exposed to seasonal excess rains and flooding, often associated with tropical cyclones. Losses in the agricultural sector are driven by severe loss years. For example, in 2018, drought resulted in the loss of 280,000 ha of beans and maize across NCA.³ Hurricanes Eta and Iota in November 2020 caused severe wind- and flood-related losses to the crop and livestock sectors: in Guatemala more than 16 departments had high levels of damage in coffee, bananas, plantains, and sugar cane.⁴ Geophysical hazards (earthquakes, volcanic activity) have generated significant infrastructure and property damage but relatively fewer direct losses in agriculture. Due to climate change, disaster events in NCA have been increasing in frequency and severity over the past 20 years.

Various strategies and programs have been put in place by authorities in NCA countries to support family farmers. In 2009, Guatemala adopted the National Policy on Integrated Rural Development,⁵ which was followed by the Agricultural Policy (2011–2015). El Salvador developed the Family Agriculture Plan (PAF) in 2010 and a five-year institutional strategic plan in 2015 to support smallholder farmers.⁶ In 2021, the Government of El Salvador enacted the Family Farming Law, which mandates development of the Single Registry of Family Farmers and provision of financial services to family farmers through the creation of a special fund. In 2014, the Government of Honduras established the National Committee for Family Farming (CNAF);⁷ it subsequently adopted the National Family Farming Strategy (ENAF) 2017–2030 to improve the productivity, competitiveness, and sustainability of the family farming sector, in part by facilitating access to productive goods and services.

2. Family farmers in NCA lack access to DRFI solutions that could improve their financial resilience and food security.

National authorities in NCA have adopted disaster risk finance strategies and instruments in recent years, but there remains a significant protection gap in the agricultural sector. Effective disaster risk finance involves prearranging a combination of instruments to ensure predictable and timely funding for response to and recovery from events of varying frequency and severity. El Salvador, Guatemala, and Honduras have all adopted disaster risk finance strategies in the past five years and have put in place a range of DRFI instruments, including products from the Caribbean Catastrophe Risk Insurance Facility (CCRIF) and World Bank Development Policy Loans with a Catastrophe Deferred Drawdown Option (CAT-DDO). However, total prearranged funding is less than 2% of GDP in each country, and given that most DRFI instruments in place are not oriented toward agricultural losses, a significant protection gap exists in the agricultural sector. In Guatemala, for example, 87% of total agriculture losses in 2018 were left unfunded, and public expenditure for drought accounted for less than 3% of total disaster expenditures.⁸

3 FAO, 2018. <https://www.fao.org/americas/noticias/ver/en/c/1150344/#:~:text=Drought%20has%20led%20to%20the,affected%20crops%20by%20the%20drought.>

4 Reliefweb. 2022. <https://reliefweb.int/report/guatemala/central-america-hurricanes-eta-iota-final-report-mdr43007>

5 This was done through Government Agreement 196-2009.

6 For the PAF, see Feed the Future, “Honduras,” <https://www.feedthefuture.gov/country/honduras/>.

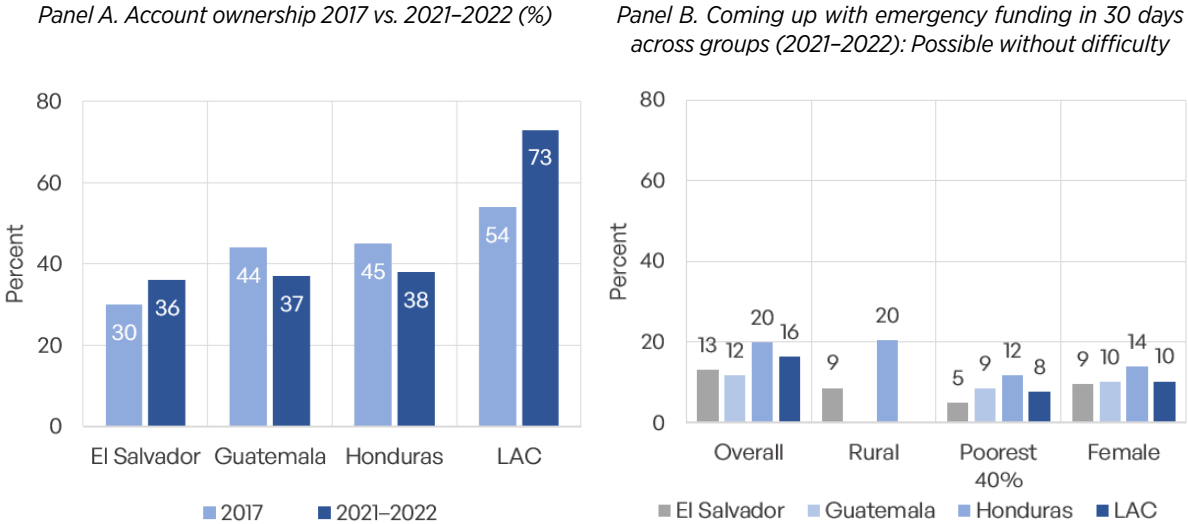
7 The committee is chaired by the Union of Rural Women of Honduras and consists of the Ministry of Agriculture and Livestock (SAG), the Investigation Board, the Food and Agriculture Organization of the United Nations (FAO), the Inter-American Institute for Cooperation on Agriculture (IICA), and the University of Agriculture in Catacamas.

8 World Bank staff estimates based on disaster-related public expenditure data from BOOST and losses from Estrategia Nacional de Sequia para Guatemala 2022-2030 cited in Informe de perdidas y danos por efectos del Cambio Climatico en Guatemala https://portal.segeplan.gob.gt/segeplan/wp-content/uploads/2023/08/Informe_Guatemala2021_CC.pdf

Most existing DRFI instruments in NCA do not directly benefit family farmers; there is a substantial humanitarian funding gap, and social protection systems are underfunded and not focused on long-term livelihood protection.

The majority of the existing DRFI instruments adopted by national authorities in NCA are oriented towards a broad spectrum of physical damages and losses (e.g., CCRIF) and provide general budget support (e.g., World Bank CAT-DDOs). These instruments do not transfer funds directly to affected populations. The humanitarian assistance funding gap for disaster response is 81% in Guatemala, 47% in Honduras, and 35% in El Salvador.⁹ Social protection systems in NCA are underfunded in comparison with peer economies and have limited coverage, though the reach and delivery systems of COVID-19 response programs suggest that a more ambitious coverage is possible. Efforts to put in place building blocks for shock-responsive social protection (social registry, targeting, objective triggers, and prearranged funds) are nascent and could be complemented by sector-specific DRFI instruments. Overall, both humanitarian assistance and social protection systems are oriented toward short-term relief as well as education and employment access rather than long-term livelihood protection.

Figure ES.1. Financial inclusion in NCA countries



Source: World Bank, Global Findex Database 2021, <https://www.worldbank.org/en/publication/globalfindex>.
 Note: Data for Guatemala are as of 2022. Rural data are not available for Guatemala or LAC. LAC = Latin America and the Caribbean (excluding high income).

Efforts to accelerate financial inclusion have been uneven in NCA. Since 2017, account ownership has been stagnant in Honduras and Guatemala, and it has increased only marginally in El Salvador. Guatemala adopted a National Financial Inclusion Strategy in 2019 and is currently in the process of updating it; but key reforms, including a regulatory framework for e-money and strengthened supervision of financial cooperatives, have been stalled. El Salvador adopted its National Policy for Financial Inclusion in 2022 and has taken a more proactive approach to fostering a digital financial services ecosystem, in part through Transferencia 365, a fast and interoperable digital payments infrastructure launched by the central bank in 2021. Honduras is in the process of developing a National Financial Inclusion Strategy.

Low levels of financial inclusion can complicate efforts to disburse payments from DRFI instruments and social protection programs, but alternative delivery approaches have been successfully deployed in some countries. Quick and reliable disbursement of payouts from index-

⁹ World Bank staff estimates based on data from IPC (<https://www.ipcinfo.org/ipc-country-analysis/population-tracking-tool/en/>) on emergency acute food insecurity (IPC3+) and humanitarian aid contributions through the UN OCHA Financial Tracking Service (FTS); <https://fts.unocha.org/home/2023/donors/view>

based insurance products is critical to building trust in these products and can increase their cost-effectiveness and impact on household welfare. Authorities in NCA have worked around recipients' limited financial inclusion and have successfully deployed “second-best” options to deliver payments; for example, the COVID-19 response program Bono Familia in Guatemala leveraged token-based payments to deliver financial assistance to 2.7 million beneficiaries.¹⁰ Such approaches can be adapted for large-scale DRFI programs.

Insurance markets in NCA are underdeveloped with extremely limited penetration of agricultural insurance. Insurance can be a critical risk transfer instrument for disaster risk management. In all three countries, overall insurance market penetration is low, varying from 1.9% of GDP in Guatemala to 2.9% of GDP in El Salvador.¹¹ Traditional indemnity-based crop and livestock insurance have been offered in each market since the early 2000s, often with government-funded premium subsidies, but uptake is very low, and the available products are oriented toward commercial farmers. For example, only 37 agricultural insurance policies were issued in Honduras in 2021. Limited uptake of the most basic financial products (e.g., transaction accounts) indicates significant challenges for demand-driven adoption of more complex products like insurance.

3. Governments and international organizations have promoted index-based agricultural insurance in NCA over the past decade, but meaningful scale has been achieved only in Guatemala.

International experience has shown that index-based disaster risk insurance can be an effective central component of a livelihood protection approach for family farmers. Index-based insurance pays out upon the occurrence of a triggering event (e.g., a certain volume of rainfall as measured by a satellite), rather than indemnifying actual loss incurred. Compared to traditional indemnity-based agricultural insurance, index-based insurance is more suitable to the profiles and risk-transfer needs of family farmers: it reduces adverse selection and moral hazard, and it lowers operating costs as pre-inspections and in-field loss adjustment are not required. Index-based insurance can be offered as a micro-level retail cover to individual farmers, as a meso-level cover to protect the financial exposure of banks or other risk aggregators, or as a macro-level product purchased by national governments. Minimizing basis risk—the risk that the loss as measured by the index will differ from the actual loss incurred by the insured farmer—is a key consideration in the design of index-based insurance products.

In agriculture, two types of index insurance products are commonly used: area yield index insurance (AYII) and weather index insurance (WII), which is also termed climate risk insurance. AYII can operate only in countries that have a history of formally measuring and officially reporting crop area production and yields at local level (village, county, municipality). Crop production data are not formally recorded in either Guatemala or Honduras, meaning that AYII cannot operate in these countries. WII, however, can be operated using national ground-based weather station networks and/or widely available remote sensing (satellite) data on climatic risk: such data are widely available in NCA countries and permit the design of climatic risk indexes.

Governments and international organizations have sought to foster the development of index-based disaster risk insurance in NCA over the past decade. Between 2010 and 2013, the World Bank Group and national authorities in Guatemala and Honduras aimed to conduct basic agricultural risk analysis and assessments for the major food and cash crops and to build domestic risk management capacity. In 2013, the Ministry of Agriculture and Livestock (Secretaría

¹⁰ Source: Gobierno de Guatemala, Presentan lecciones aprendidas del Bono Familia para la protección social (21 de octubre de 2022).

¹¹ Source: AXCO 2023 reports on non-life insurance in El Salvador, Guatemala, and Honduras.

de Agricultura y Ganadería [SAG]) of Honduras, with technical assistance from the International Research Institute for Climate and Security (IRI), developed a prototype WII cover aimed at providing drought protection for food crops. In 2017, thanks in part to advances in satellite technology, micro-level index-based natural disaster (earthquake) and climate risk (excess rain and drought) insurance was launched in Guatemala by the Microinsurance Catastrophe Risk Organisation (MiCRO) in partnership with the Swiss Agency for Development and Cooperation (SDC), Swiss Reinsurance Company Ltd. (Swiss Re), and Mercy Corps. Similar index-based insurance cover was launched in El Salvador in 2020. Most recently, in 2021/22, MiCRO helped the Government of Guatemala (through the Ministry of Agriculture, Livestock and Food [MAGA]) launch a large-scale index-based disaster risk insurance product for family farmers.

There are currently five active index-based disaster risk products in NCA (three in Guatemala, two in El Salvador, and none in Honduras), with most programs operating at limited scale (see Table ES.1). All five products were designed by MiCRO and cover excess rainfall and drought based on satellite data; some of the products also include earthquake as an insured peril. Two products, Esfuerzo Seguro and Produce Seguro, are linked to bank credit (offered by the Rural Development Bank of Guatemala [BANRURAL] and Banco de Fomento Agropecuario in El Salvador, respectively); these products are targeted at semicommercial farmers and microentrepreneurs and in 2022 reached approximately 20,000 persons.¹² Two are index insurance programs supported by the WFP (premium subsidies are funded by WFP and its partners); these are targeted to members of producer associations of family farmers (with a focus on women producers) and reached about 12,000 persons as of 2022 (WFP 2022b; WFP 2022c; WFP 2023). These four programs offer micro-level products, in which the individual farmer is the insurance policyholder. The fifth and largest program, Seguro Colectivo Paramétrico, is implemented and fully subsidized by Guatemala's MAGA; as of 2023, it had 100,000 beneficiaries who were mainly family farmers (MAGA 2022; MAGA 2023; Banco CHN 2023). The sums insured on these small-farmer and microentrepreneur index insurance programs range from an average low of US\$287 per policy on the WFP *Emprende Seguro* program targeted at vulnerable poor households, to an average high of US\$1,335 per policy on the *Produce Seguro* credit-linked insurance scheme in El Salvador. Average premium rates range from a low of 4.2% for *Produce Seguro* to a high of 8.4% for Guatemala's MAGA program (Table ES.1). Despite the significant efforts by SAG in Honduras (as mentioned above), no index-based agricultural insurance products are currently offered in the Honduran market. Several new initiatives are in the design or pilot stages across the three countries, including in Honduras, and are due for launch in 2023.

¹² In Guatemala in 2022 *Esfuerzo Seguro* insured 11,369 credit linked index insurance policies (Biese et al 2022, *Aseguradora Rural* 2023 interview) and in El Salvador 8,763 policies were insured under the *Produce Seguro* scheme (BFA 2023)

Table ES.1. Key features of the disaster risk index insurance programs for farmers and SMEs in NCA countries

Program	El Salvador		Guatemala		
	1	2	1	2	3
	Produce Seguro	Emprende Seguro	Esfuerzo Seguro	Seguro Productivo	Seguro Colectivo Paramétrico
Main sponsor	Banco de Fomento Agropecuario (BFA)	WFP	BANRURAL	WFP	MAGA
Year launched	2020	2021	2017	2021	2021
Program level	Micro	Micro	Micro	Micro	Modified macro
Insurer	Seguros Futuro	Seguros Futuro	Aseguradora Rural	Aseguradora Rural	Insurance Dept. Crédito Hipotecario Nacional (CHN)
Reinsurer	Swiss Re	Swiss Re	Swiss Re	Swiss Re	Swiss Re + 1 other
Technology provider/ calculation agent	MICRO	MICRO	MICRO	MICRO	MICRO
Basis of cover					
Insured interest	Business interruption	Business interruption	Business interruption	Business interruption	Business interruption
Insured perils	Excess rain, drought, earthquake	Excess rain, drought	Excess rain, drought, earthquake	Excess rain, drought	Excess rain, drought
Basis of sum insured	Amount of credit	Agreed value	Amount of credit	Agreed value	Cost of replanting food crops
Average sum insured per client (US\$)	1.335	287	889	383	780
Average premium rate (%)	4.2%	6.2%	5.2%	7.2%	8.4%
Average premium per client (US\$)	56.5	17.7	46.5	27.8	65.7
Distribution					
Channel(s)	Banco de Fomento Agropecuario	WFP client groups	BANRURAL	WFP client groups	MAGA extensionists
Target clients	Bank loanee clients: farmers, SMEs	WFP clients: vulnerable farmers and micro-	Bank loanee clients: farmers, SMEs	WFP clients: vulnerable farmers and micro-	Small-scale farmers
Linkage with credit	Yes (voluntary)	No	Yes (voluntary)	No	No
Financial support					
Premium subsidies	Yes (Year 1)	Yes	No	Yes	Yes
Funding agency	Banco de Fomento Agropecuario	WFP & partners		WFP & partners	USAID/MAGA
Level of subsidy	None	100% initially, smart subsidies reducing over time	None	100% initially, smart subsidies reducing over time	100%

Source: Produce Seguro, BFA 2023; Emprende Seguro & Seguro Productivo, WFP 2022b, WFP 2022c, WFP 2023; Esfuerzo Rural, Biese et al 2022, Biese et al 2023; Seguro Colectivo Paramétrico (MAGA 2022, MAGA 2023, Dominguez 2021).

Note: MAGA = Ministry of Agriculture, Livestock and Food; SME = small and medium enterprises; USAID = United States Agency for International Development; WFP = World Food Programme.

The Seguro Colectivo Paramétrico program under implementation by Guatemala’s MAGA epitomizes a large-scale “modified macro-level” disaster risk insurance program that is designed to protect the livelihoods of family farmers. In contrast to the other four active index-based disaster risk insurance programs, this program does not feature a micro-level insurance product; under its modified macro-level approach, MAGA is the single policyholder and preregistered family farmers are beneficiaries. If the policy is triggered by a weather event, the preregistered family farmers receive direct, individual payouts from the insurer (in this case, the insurance arm of the state-owned Banco CHN [Crédito Hipotecario Nacional]). MAGA subsidizes and pays 100% of the premium on behalf of the family farmers. In 2022, the pilot program covered 40,000 family farmers, and MAGA planned to scale up to at least 100,000 beneficiaries in 2023. Such a modified macro-level approach offers significant benefits in terms of cost-effectiveness, potential scale, and reductions in basis risk.

A longer operational period is needed to evaluate the underwriting performance of most of the active disaster risk index insurance programs in the subregion. The longest-running product is the Esfuerzo Seguro program in Guatemala (six years), which had a premium-to-claims ratio (also known as the loss ratio) of 60% at end 2022. Under Esfuerzo Seguro a total of 47,890 policies were issued between 2017 and 2022; total payouts numbered 92,000, or an average of 1.93 payouts per policy per year, with an average size of payout of US\$14.4 (Biese et al 2022; Biese et al 2023). The long-term loss ratio at end 2022 for the other index insurance programs varies from a low of just 3% for the Empeñe Seguro program in El Salvador to a high of 105% for the Produce Seguro program in El Salvador; the latter incurred major excess rain losses associated with tropical cyclones in 2020. In its first full year of implementation, 2022/23, the Seguro Colectivo Paramétrico in Guatemala paid 10,000 claims due to excess rain events, with an average payout of US\$68 per beneficiary and loss ratio of 26% (Banco CHN 2023): final underwriting results are pending for this program, and the final loss ratio is expected to be higher. It is notable that for all five programs, most payouts have been due to excess rain and few to drought.

Further monitoring, evaluation, and technical assessments are needed to determine the impacts of existing programs on the income and consumption patterns of family farmers, as well as to evaluate residual basis risk. Many of the existing programs have been operational for less than three years, and it is not yet clear how effective they have been in stabilizing the consumption, incomes, and farming systems of family farmers in NCA. Further, the programs have not been evaluated for potential basis risk, which could arise from the limited spatial resolution of the remote sensing data used to design the indexes and triggers. The mountainous topography of the NCA countries and challenges in using excess rain as a proxy for flooding are also likely contributors to residual basis risk. Earlier World Bank analysis of MiCRO products in Guatemala¹³ highlighted concerns about low correlations between maize yields and the ERA5 data-based drought and excess rain indexes, as well as concerns about limited spatial granularity. WFP's forthcoming evaluation of two index-based disaster risk insurance programs in Guatemala (Seguro Productivo and Seguro Colectivo Paramétrico) will be a key input to the design of any large-scale initiatives under DRIFCA.

Opportunities to improve the technical design of index-based disaster risk insurance products in NCA should be considered. For instance, the ERA5 rainfall data source used as an underlying index for the Seguro Colectivo Paramétrico under implementation by Guatemala's MAGA may lead to inconsistent observations. The ERA5 tends to underestimate or misrepresent rainfall values in regions with complex topography. A different data source, the Climate Hazard Group Infrared Precipitation with Station (CHIRPS) data set, has been adopted in parts of NCA as well as Mexico and Paraguay for a series of applications; and CHIRPS could potentially serve as an adequate alternative to ERA5 for assessing weather risks, generating climatic perspectives, characterizing rainfall patterns, designing and implementing drought monitors, and determining agricultural areas under water stress conditions. In general, it could be a source of data for the operation of a macro-level index-based insurance instrument.

Adopting a composite agricultural drought index and a reduced insurance cover period could improve the design of index-based disaster risk insurance in the region. Given the complexity of characterizing drought events and assessing and valuating this risk properly, Phase II of this study could validate the performance of a composite index whose deviation correlates with losses over an area due to the effects of drought and potentially excess rain. Phase II could also further explore limiting the insurance cover period to months when an event is likely to hurt the rural economy. MAGA's Seguro Colectivo Paramétrico has year-round coverage for excess rainfall, even though the

¹³ MiCRO and World Bank undated, Summary of the technical exchange between the Microinsurance Catastrophe Risk Organization and the World Bank.

Pacific Basin of Central America has a seasonal dry period (November to early May). In addition, as opposed to most of the agricultural productive areas in the NCA countries, some areas have only one crop season, thus making it unnecessary for governments to pay premiums for 12-month coverage.

4. Traditional indemnity insurance, micro-level index-based disaster risk insurance products, and existing macro-level DRFI solutions are not considered viable approaches to achieve the envisioned scale in NCA.

Traditional indemnity-based insurance products are not well-suited to the socioeconomic profiles and risk transfer needs of family farmers. Traditional indemnity-based agricultural insurance has not generated significant demand among NCA farmers over the past 20 years, despite significant investment by local insurers and support from governments and international organizations. It is not cost-effective to offer these products to family farmers growing 1–2 ha of mainly subsistence food crops, given the costs of field-based crop inspections and loss assessment. Further, such products do not protect family farmers' total income from the impacts of extreme weather events and climate risks, given their dependence on off-farm labor income.

Micro-level insurance solutions are unlikely to achieve the scale envisioned under the DRIFCA-led initiative in the near term. Micro-level index-based disaster risk insurance, in which farmers have individual insurance policies, is not considered a viable solution to achieve the scale envisioned under a DRIFCA-led initiative. The four micro-level index-based disaster risk insurance programs being implemented in El Salvador and Guatemala have achieved limited scale since their inception. This is partly because it is challenging to educate family farmers about the features and benefits of a complex financial product, and partly because demand for purely voluntary micro-level index insurance requires interest and trust on the part of farmers—and these take time to develop. Micro-level programs tend to carry high levels of administration and operating costs compared to the very small premium generated per policy. Basis risk is also a major concern of micro-level programs.

Existing sovereign disaster risk financing instruments are not currently well suited to providing direct financial protection to family farmers in NCA. CCRIF is the most relevant of the regional sovereign DRFI programs, as it currently operates in four Central American countries, including Guatemala (since 2020) and Honduras (since 2023). Existing CCRIF products provide liquidity financing support to national authorities for urgent expenditures immediately following a triggering disaster (Earthquake, tropical cyclone and excess rainfall). CCRIF policy pay-outs are intended to be correlated with a broad spectrum of physical damages and losses (e.g., buildings and infrastructure) but do not mimic indemnity coverage for any specific assets or sectors. In response to Central American countries' demand, CCRIF is now developing a macro-level drought product, calibrated to a few cash crops for which exposure data exist. This may better address family farmers' liquidity needs. However, CCRIF products do not require the transfer funds directly to affected populations. (An exception is the Caribbean Ocean and Aquaculture Sustainability Facility [COAST] product, which offers livelihood protection for fisherfolk in the Caribbean.) CCRIF has neither the mandate nor operational capacity in the short term to build a last-mile distribution channel that directly reaches family farmers in NCA. However, given that CCRIF already operates as a not-for-profit regional insurance entity, opportunities to leverage it for risk pooling should be considered.

Meso-level index insurance or credit-linked insurance is not considered a suitable approach to providing disaster risk protection for family farmers in NCA countries. Meso-level index insurance cover is usually targeted at protecting the financial portfolios of financial institutions that make seasonal loans to farmers, and at protecting traders and/or input dealers who provide inputs to farmers on credit. Most family farmers in NCA are not borrowing from banks or purchasing inputs on credit from dealers, so a meso-level approach would not directly benefit them. However, given the policy priorities of NCA governments with respect to family farming laws and strategies, and

given ongoing investments by the domestic financial market in a small but growing credit-linked insurance portfolio, further analysis of the impact of this product and the potential market size of semicommercial family farmers could be considered.

5. Going forward, a livelihoods protection approach underpinned by a modified macro-level index-based disaster risk insurance program—as epitomized by the Guatemala MAGA program—offers the greatest potential to reach the scale envisioned by the DRIFCA initiative.

This study finds that the most viable approach for a centerpiece DRFI program to support the financial resilience of family farmers is a modified macro-level index-based disaster risk insurance program, modeled on the MAGA Seguro Colectivo Paramétrico program. In contrast to voluntary micro-level programs, which may take many years to achieve scale and financial sustainability, modified macro-level index insurance products offer the potential for rapid and large-scale coverage of family farmers. Key features of such a model include (i) issuance of a single policy to a government entity that pays the premium (with possible financial support from development partners); (ii) identification and preregistration of family farmers as beneficiaries of the policy; and (iii) quick and reliable delivery of payouts directly to accounts owned by family farmers or via alternative approaches (e.g., token-based payments). The MAGA Seguro Colectivo Paramétrico program contains many of these core features. A livelihoods protection approach is appropriate given the target population’s significant reliance on off-farm income and the challenges of attaining high correlations between crop yields and indexes based on remote sensing data.

Beyond Guatemala, international experience also suggests that a modified macro-level model can be effective for covering large numbers of beneficiaries. The model’s ability to offer index insurance as a livelihoods protection cover to large numbers of vulnerable farmers and livestock producers has been tested over the past decade—in Mexico as part of the CADENA program, in Kenya under the World Bank–sponsored Kenya Livestock Insurance Program (KLIP), and in Ethiopia under the WFP-promoted Satellite Index Insurance Program for Pastoralists (SIPE); and this model is now proposed for implementation in Paraguay. These programs have demonstrated the ability of index insurance to protect large numbers of vulnerable farmers against severe climatic events that could destroy their livelihoods.

A public-private partnership (PPP) approach is recommended for each country. International experience shows that PPPs are the most effective approach for scaling family farmer insurance programs. The roles of the public and private partners should be clearly established, with the insurance sector leading in product design and rating, risk selection and underwriting, and claims settlement; and the public sector providing a suitable legal and regulatory framework, financing in the form of premium subsidies, strengthened data and information infrastructures, and support for financial inclusion and literacy of family farmers. In this context, Guatemala’s MAGA has already taken major strides toward establishing a framework for implementing a large-scale index insurance program for family farmers; further scale-up could be achieved by crowding in the private commercial insurance sector to coinsure the program.

In order to reach up to 1.9 million family farmers, a modified macro-level large-scale disaster risk insurance program in NCA will require major long-term financial commitments from donors and national governments. Indicative uptake scenarios and fiscal costings have been modeled over a five-year period for (i) a low-uptake scenario, in which 35% of total family farmers, or 0.66 million people, are beneficiaries by Year 5; (ii) a medium-uptake scenario of 60%, or 1.14 million beneficiaries, by Year 5; and (iii) a high-uptake scenario of 95%, or 1.80 million beneficiaries, by Year 5. The medium-uptake scenario is perhaps the most realistic level of coverage of family farmers that could be achieved in a five-year period.

Significant premium financing will be required to scale such DRFI solutions; under the medium-uptake scenario, this could reach approximately US\$114 million annually by Year 5. Experiences within the subregion demonstrate that, without significant premium subsidies, a large-scale DRFI solution for family farmers is unlikely to achieve rapid scale-up and adoption; small farmers lack the financial ability to fund premiums in the order of 7.5–10% of the sum insured. In Guatemala, a 100% premium subsidy funded by MAGA has enabled the rapid scaling and significant coverage of its Seguro Colectivo Paramétrico program. For the purposes of the indicative financial costings exercise, an average sum insured of US\$1,000 per year has been assumed per family farmer; this falls between the MAGA sum insured of US\$780 per farmer and the Produce Seguro sum insured of US\$1,335 per credit recipient. Three pricing scenarios are considered: low payout frequency/low target premium rate of 5%; medium payout frequency/medium premium rate of 10%; and high payout frequency/high premium rate of 15%. Under the modelled scenarios, it is assumed that NCA governments with the support of donors will fully fund the premiums of the targeted family farmers over the five years of the first phase of such a large-scale livelihoods protection program. Indicative medium-uptake and costing projections in this report suggest that the annual cost of premium financing could reach US\$114 million in Year 5 of the program (full implementation) to protect about 1.14 million family farmers and their families (or an average annual premium cost to government of US\$100 per beneficiary) (Table ES.2).

Ideally, over time, such premium subsidies could be reduced somewhat, but it is unlikely that subsidies could be removed entirely given the socioeconomic condition of the target beneficiaries. In the Phase II planning and design of any large-scale subsidized index insurance program for family farmers in NCA countries, it will be important for governments, development partners, and other stakeholders to establish a clear policy on the provision of premium subsidies. There appears to be a clear need under a modified macro-level program to offer all benefiting households fully funded or free insurance for an agreed number of years while they gain confidence in and experience with the insurance cover; however, public and private sector stakeholders will need to consider very carefully the long-term sustainability of 100% premium subsidies. The WFP's smart premium subsidy strategy, in which farmers pay a gradually increasing share of the premium, is valid under a relatively small voluntary program, but for a large-scale program covering up to 1.9 million family farms, this approach may be difficult to implement in practice.

Table ES.2. Illustrative medium-uptake scenario and costs of premium subsidies and other supports for large-scale index-based disaster risk insurance for family farmers in NCA countries (US\$)

Total NCA countries	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Uptake rate (percentage of farmers)	10%	30%	40%	50%	60%	
Number of insured farmers	189.5	568.5	758	947.5	1,137,000	
Total sum insured (US\$)	189,500,000	568,500,000	758,000,000	947,500,000	1,137,000,000	3,600,500,000
Indicative commercial premium (US\$)	18,950,000	56,850,000	75,800,000	94,750,000	113,700,000	360,050,000
Costs of government support						
Premium financing (subsidies)	18,950,000	56,850,000	75,800,000	94,750,000	113,700,000	360,050,000
Other support costs (US\$)	3,221,500	6,822,000	4,358,500	4,737,500	5,116,500	24,256,000
Total costs of government support (US\$)	22,171,500	63,672,000	80,158,500	99,487,500	118,816,500	384,306,000

Source: World Bank estimation.

Note: Estimates are based on a medium-uptake scenario and average premium rate of 10%. NCA = North Central America.

Insurance pooling in each NCA country represents an option to maximize private sector participation and capital. Given the small numbers of index insurers in each country that are willing to underwrite this class of business for family farmers, and given the lack of capacity among individual local companies to retain risk, opportunities for crowding in the non-life insurance market under some form of coinsurance pooling arrangements should be explored further in each NCA market. The insurance associations in both Guatemala and Honduras have expressed their enthusiasm for some form of risk pooling by non-life private sector insurers in their respective countries: indeed, there are major potential economies of scale to be enjoyed under some form of pooling arrangement.

While many elements of the proposed approach will need to be developed on a country-by-country basis, opportunities for regional cooperation do exist. Currently, there does not appear to be any appetite by either local governments or local insurers to create a new regional risk pool facility, but regional cooperation in several areas—such as index insurance product design and rating, design of farmer registration, design of insurance awareness and training modules and materials, and the appointment of a single calculation agent to monitor contract performance during the cover period— could lead to major economies of scale in the cost of scheme design and implementation. Given the need for significant reinsurance capacity, international reinsurers should be involved in contract design and rating as well as in identifying potential options for risk pooling across NCA countries at a reinsurance level.

Future large-scale DRFI initiatives for family farmers in NCA should be carefully designed to avoid crowding out existing micro-level index insurance products and programs, and in fact should support the continued development of these markets. The insurance markets in the three NCA countries are at different stages in their development of disaster risk index-based insurance programs; Honduras has no such products under commercial implementation, while Guatemala has nearly a decade of relevant research and development experience and three existing commercial programs. Local insurers and their partners are keen that any large-scale DRFI solutions developed for NCA should complement rather than replace existing products; this concern is also aligned with long-term policy objectives of sustainably developing local insurance markets in the subregion.

6. Significant reforms and investments are needed to improve the operational readiness of the NCA countries for large-scale disaster risk insurance programs and to boost the financial resilience of family farmers.

A preliminary assessment of the key underlying and operational elements for implementing a successful large-scale index-based disaster risk insurance program shows mixed levels of readiness across the three NCA countries (Table ES.3). More specifically:

- **Government commitment to PPPs, including financing for premium subsidies.** A clear, long-term government commitment to a public-private partnership is a necessary precondition to develop and scale a modified macro-level index-based disaster risk insurance program. Such a commitment will also require financing for premium subsidies, which may also be available from donors—e.g., via the Global Shield Financing Facility, a partnership with the V20 (Vulnerable Twenty Group), of which Guatemala and Honduras are members. Guatemala has already demonstrated such a commitment, although the 2023 general elections imply that such a commitment will need to be reaffirmed by the new government.
- **In El Salvador and Guatemala, the insurance sectors now have considerable experience in the design and implementation of commercial index-based disaster risk insurance solutions, especially at the micro-retail level.** Honduras has not yet offered index-based insurance, however. From a technical viewpoint, all three countries could benefit from unrestricted access to high-resolution remote sensing climate risk data for index design; the main challenge is to construct an index that offers vulnerable farmers a high degree of protection against extreme excess rain and drought events, but at an affordable price. The evidence that climate change is increasing the frequency and severity of natural disasters in NCA countries will have implications for risk modeling and rating in Phase II and may imply a need for higher premium rates going forward.
- **Basis risk will remain a factor for the proposed large-scale DRFI solution. However, a modified macro-level approach is able to mitigate this risk better than other approaches (e.g., micro-level insurance).** This study does not recommend the option proposed (though not yet operational) under Guatemala’s MAGA drought and excess rain index insurance program—that is, creating a basis risk fund to compensate farmers if the index fails to trigger. The rationale for a basis risk fund is limited, as the proposed disaster risk index insurance solution does not intend to indemnify agricultural losses at the individual-farmer level, but rather to provide catastrophic livelihood protection against extreme weather events.
- **Farmer registries for targeting eligible family farmers are needed.** All three NCA countries lack up-to-date farmer registries, which are critical for program targeting and enrollment. Guatemala’s MAGA has been able to rely on its network of agricultural extension workers and some existing partial registries in the initial phases of its Seguro Colectivo Paramétrico program, but this approach may not be sufficient to achieve the scale envisioned. Honduras lacks both a farmer registry and an agricultural extension system, but it is planning to undertake a farmer census in 2023–2024. In El Salvador, the Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería [MAG]) has built a registry for family farmer beneficiaries of the Programa de Entrega de Paquetes Agrícolas, which could provide the basis of a family farmer register for insurance purposes. Bundling insurance with inputs under this program could also be considered.
- **Nontraditional distribution channels should be leveraged to enroll family farmers and to implement the insurance program.** Given low levels of financial inclusion and financial sector development, it will be necessary to leverage nontraditional distribution channels (e.g., non-broker, sales agent, or agent) to enroll family farmers as beneficiaries in a large-scale DRFI

program, to provide insurance awareness and education, and to set up payment systems. For example, countries could leverage distribution programs for subsidized farm inputs (e.g., Programa de Entrega de Paquetes Agrícolas in El Salvador) and semiformal financial institutions (e.g., cajas rurales in Honduras).

- **Farmers’ limited financial inclusion will require digital payment distribution strategies for the unbanked.** Quick and reliable disbursement of payouts is critical to building trust in an index-based insurance product. This requires that beneficiaries have their own bank accounts or alternative measures are in place to digitally deliver the payments (e.g., ATM or tokens sent via SMS to beneficiaries). Broader financial inclusion efforts are needed in all three countries to increase account ownership and foster the development of digital payment ecosystems.

Table ES.3. Operational readiness for a large-scale disaster risk index-based insurance program

Item/measure	El Salvador	Guatemala	Honduras
Interest of authorities in disaster risk insurance for family farmers	●	●	●
Legal and regulatory frameworks for insurance	●	●	●
Market development for index-based disaster risk insurance	●	●	●
Interest among insurers to further develop index-based disaster risk insurance	●	●	●
Technical feasibility: availability/quality of remote sensing data for index design	●	●	●
Existence of family farmer registers for targeting/enrollment	●	●	●
Effective distribution systems for reaching family farmers	●	●	●
Ability of family farmers to finance premiums (affordability/willingness to pay)	●	●	●
Availability of government financing for premium subsidies	●	●	●
Farmer account ownership or digital payment distribution strategies	●	●	●
Financial/insurance literacy of family farmers	●	●	●

KEY: ● LOW ● MEDIUM ● HIGH

Source: World Bank.

- **Disaster risk insurance alone is not sufficient to provide comprehensive financial protection to family farmers and should be complemented by initiatives to boost farmers’ risk management, financial inclusion, and productivity.** Insurance is only one of many needed elements for a comprehensive risk management framework. This study proposes a livelihoods protection approach underpinned by a modified macro-level disaster risk insurance program, but complementary strategies, reforms, and investments are also needed. These include agricultural sector risk management strategies that feature investments in risk information (e.g., probabilistic drought risk assessments), risk reduction (e.g., improved natural resource management practices), and preparedness building. Broader financial inclusion efforts to widen the availability and suitability of payments, savings, and credit products are also critical to strengthening the financial resilience of family farmers. Efforts to foster digital payment ecosystems also facilitate quick and cost-effective delivery of payouts from disaster risk insurance products.

7. This report recommends advancing to a Phase II planning and design stage, conditional on buy-in and financial support from key stakeholders.

This report recommends advancing to a Phase II planning and design stage. Key preconditions for advancing to this stage include (i) securing buy-in from NCA governments and the relevant public and private sector stakeholders in each country on the broad parameters of the program proposal as articulated in this study; (ii) determining availability of program financing from national authorities and/or donors and development partners; and (iii) establishing a steering committee and technical working group within each country to guide Phase II efforts.

The key design and planning tasks and activities in Phase II are summarized below and may take up to 12 months or more to prepare. The possible exception is in Guatemala, where the MAGA program infrastructure is already in place and could be extended and strengthened using existing program infrastructure.

- **Planning and budget.** Prepare a five-year business plan and budget. Prepare an operating budget and secure funds for Phase II program planning and design.
- **Policy, institutional, legal/regulatory, and operational frameworks.** Establish government policy for agricultural insurance and confirm government support roles and sources of funding (e.g., for premium subsidies, farmer registration, awareness creation and education, payment systems). Confirm the adequacy of legal/regulatory frameworks to support the program. Define roles and functions of PPP stakeholders and consider need for legislation to back this initiative. Review options to form an agricultural insurance consortium or simple coinsurance agreement to underwrite and implement the program in each country.
- **Strategy to improve operational readiness along key dimensions.** These dimensions include farmer registries, distribution channels, payout mechanisms, farmer awareness and education, etc. (see Table ES.3). Define operational procedures, including the appointment of a calculation agent, and monitoring and evaluation approach.
- **In-depth focus group discussions with family farmers.** Conduct discussions to understand farmers' risk transfer needs, demand for insurance, and ability over time to contribute toward the costs of their premiums. These analyses will be critical to guide a robust design of the index cover and the technical and commercial pricing. They will also test some of the preliminary conclusions in the current study, including those on the relevance of geophysical hazards to the livelihoods of family farmers and quantification of drought-related losses.
- **Technical product design and rating.** Undertake technical studies, including assessment of risk versus poverty, livelihoods, and economic activity in the target regions and populations, as well as enhanced risk modeling to assess the impacts of climate change on the underlying technical premium rates that will need to be charged on the large-scale disaster risk insurance program.
- **Financial, insurance, and reinsurance.** Assign a government entity responsibility for premium subsidy management and disbursements and other support funding. Assess insurance and reinsurance structuring and capacity needs for each country.
- **Assessment of potential risk layering options, including the potential roles of CCRIF.** Take advantage of CCRIF's unique position as a not-for-profit mutual risk pool that is legally tied to Central American regional institutions—e.g., SICA-COSEFIN (Central American Integration System–Council of Finance Ministers of Central America, Panama, and the Dominican Republic).
- **Development of complementary strategies and reforms.** Identify specific opportunities to support complementary strategies, reforms, and programs for financial inclusion and agricultural sector risk management and mitigation.

The Phase III launch of a large-scale disaster risk index insurance program may need to be staggered in each NCA country according to Phase II implementation; the rollout and build up of the program will need to be gradual and to learn from experience over time. Given the need to develop farmer registries and payment systems in each NCA country, to provide insurance awareness and education to farmers, and to provide capacity building and training for delivery channels, the program should be launched with relatively fewer family farmers and then scaled up over the five years (or some other period) of the project.

1

Introduction

1.1. Economic, sectoral, and climate context of North Central America

The three countries in North Central America (NCA), Guatemala, Honduras, and El Salvador occupy an important geopolitical position for regional trade between North and South America and face significant development challenges. These middle-income countries exhibit high rates of poverty and inequality, low productivity, limited public and social services, and frequent disasters continue to constrain development in the subregion. Over the past 20 years, GDP per capita across the region has risen at a steady but modest rate; but it remains far below the average in Latin America and the Caribbean (LAC). Approximately half of the populations in Guatemala and Honduras live below the upper-middle-income poverty line of US\$6.85 per day (2017 purchasing power parities); in El Salvador, the share is approximately 30%. Guatemala is the largest economy among the three, representing 60% of the subregion’s GDP and 51% of its total population.¹⁴ Further background information on El Salvador, Guatemala, and Honduras— is provided in Figure 1 (showing the countries’ location), Figure 2 (showing their gross domestic products [GDPs]), and Figure 3 (showing their GDP per capita).

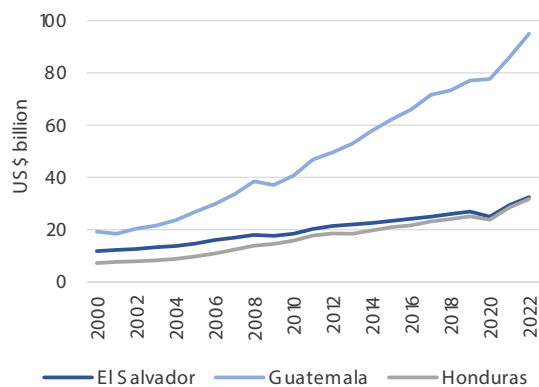
Figure 1. Map of North Central America



Source: Map: FAO, 2021. https://www.fao.org/fileadmin/user_upload/rlc/docs/DryCorridor.pdf; Population: World Bank Indicators: <https://data.worldbank.org/indicator/SP.POP.TOTL>

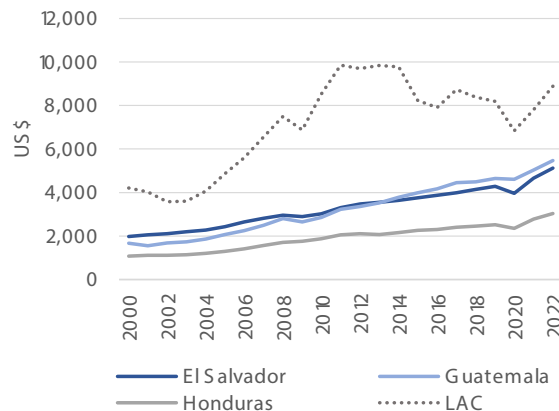
14 DataBank, World Development Indicators <https://databank.worldbank.org/source/world-development-indicators>

Figure 2. GDP in NCA, 2001–2021



Source: World Bank, “GDP (current US\$),” <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>.
 Note: GDP = gross domestic product; NCA = North Central America.

Figure 3. GDP per capita in NCA, 2000–2022



Source: World Bank, “GDP per Capita (current US\$),” <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>.
 Note: GDP = gross domestic product; LAC = Latin American and the Caribbean; NCA = North Central America.

The agricultural sector is a key source of income and food security for poor and vulnerable populations in North Central America. Agriculture accounts for an average of 25% of total employment across the three countries, higher than the regional average of 14%. Agriculture is also an important source of exports in North Central America, representing around 43% of exports (not including the industrial transformation of agricultural products via agro-processing). Family farmers are an engine of rural development and food security: according to estimates from the Central American Integration System (SICA), they represent 80–90% of corn and bean producers, and supply 70–80% of the food consumed in the subregion.¹⁵

The subregion is highly exposed to extreme weather events and climate risks. Due to its geographic location between the Atlantic and Pacific Oceans, its diverse terrain, and two underlying tectonic plates, the region is highly exposed to atmospheric, hydrometeorological, and geophysical perils. The 2021 Global Climate Risk Index ranked Guatemala, El Salvador, and Honduras as the 16th, 28th, and 44th countries most vulnerable to extreme weather events for the 2000–2019 period (Eckstein, Künzel, and Schäfer 2021).¹⁶ Family farmers in North Central America are the most significantly affected by such events, which have severe implications for their financial and food security.

Climate change is accelerating the variability, frequency, and intensity of extreme weather events in North Central America. According to EM-DAT’s International Disaster Database, the number of disasters (including droughts, floods, storms, wildfires, etc.) affecting NCA countries has more than doubled, from an average of 23 country-level disasters per decade during 1980–1999 to 57 during 2000–2019.¹⁷

¹⁵ This report primarily uses the term “family farmers” in line with local terminology in the subregion (agricultores familiares).

¹⁶ The index is based on (i) fatalities due to climate-related loss events, both in absolute number and as a share of the population; (ii) the absolute value of economic losses and their share of GDP; and (iii) the number of major events to which the countries have been exposed.

¹⁷ EM-DAT: The International Disaster Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain, Brussels, <https://www.emdat.be/>.

1.2. The Disaster Risk Insurance and Finance in Central America Consortium (DRIFCA)

National authorities and international development partners are increasingly prioritizing the development of disaster risk finance and insurance (DRFI) solutions to mitigate the impacts of extreme weather events and climate risks on the agricultural sector. New agriculture-oriented DRFI programs have emerged across the LAC region in recent years, including large-scale index-based insurance programs in Mexico and Peru as well as pilot programs in Guatemala and Dominica. There have also been efforts to adapt existing DRFI instruments to the particular needs of small-scale producers—for example, the Caribbean Ocean and Aquaculture Sustainability Facility (COAST) of the Caribbean Catastrophe Risk Insurance Facility (CCRIF). Such efforts are cross-sectoral and have strong linkages to each country’s policies and strategies for disaster risk finance, agricultural development, climate change adaptation, social protection, and financial inclusion.

In 2022, the Partnership for Central America (PCA), the United Nations World Food Programme (WFP), and the World Bank Group led initial discussions on developing large-scale disaster risk finance solutions to improve the financial resilience of family farmers in NCA.¹⁸ A convening and brainstorming workshop among national authorities, private sector entities, and other development partners was held on September 22, 2022, to share relevant regional and global experiences and discuss the feasibility and potential parameters of large-scale disaster risk financing solutions to benefit family farmers. The workshop participants endorsed the need to advance and further develop the initiative.

On November 16, 2022, PCA, WFP, and the World Bank Group launched the Disaster Risk Insurance and Finance in Central America Consortium (DRIFCA) during the United Nations Climate Change Conference (COP27) (WFP 2022b). The objective of the consortium is to identify and support climate-related agricultural insurance solutions that increase the food security and financial resilience of up to 2 million family farmers in Guatemala, El Salvador, and Honduras. DRIFCA envisions working hand in hand with the governments of the three countries and the private sector to identify and support sustainable market-relevant disaster risk finance models that are accessible to the most vulnerable and that can be integrated into broader financial inclusion efforts to foster financial resilience. As a first action, and with financial support from the United States Agency for International Development (USAID), the World Bank agreed to undertake a feasibility study to inform the DRIFCA’s work program and its engagement with national authorities.

1.3. Objectives and scope of diagnostic and feasibility study

The objective of this feasibility study is to guide stakeholders toward developing large-scale DRFI solutions that improve the financial resilience of family farmers in NCA. The feasibility study provides an initial assessment of the technical, operational, financial, and policy considerations for developing and implementing DRFI solutions. In doing so, it aims to identify the NCA target populations; quantify the frequency and severity of natural and climatic hazards faced by the target populations and thus the key insured perils; identify the potential insurable interests of the target populations, using data sources and indexes that are best suited to underpin a DRFI solution; and assess the policy, institutional, and legal/regulatory environment for supporting large-scale DRFI solutions. The feasibility study considers lessons learned from existing large-scale DRFI solutions in peer countries as well as ongoing programs and pilots in NCA. The scope of the feasibility study extends beyond conventional agricultural insurance (e.g., indemnity-based insurance against unexpected losses) and considers index-based disaster risk insurance

18 PCA serves as the coordinating entity for US vice president Kamala Harris’s Call to Action for Northern Central America.

approaches that could provide responsive and efficient livelihood protection for family farmers who may be engaged in both on-farm and off-farm productive activities.

The feasibility study represents the first phase of an envisaged three-phase approach.

If governments, development partners, and the private sector sufficiently embrace the recommendations of the feasibility study, the DRIFCA would consider a Phase II covering (i) determination of legal and institutional framework (public, private, or public-private partnership [PPP]), (ii) technical DRFI solution design; (iii) operational systems and procedures, including farmer/beneficiary targeting and selection, registration, insurance awareness creation, claims management, and payouts (subject to the approach selected in Phase I); and finally (iv) financial considerations, including the costs of premium financing over a five-year time horizon, allowing for possible donor financing through structures such as the Global Shield (formerly Global Risk Financing Facility), and insurance and reinsurance structuring options. This would then be followed by Phase III implementation, starting with proof-of-concept testing and refinement of the product and then scale-up targeting up to 1.9 million vulnerable family farmers over a five-year period.

1.4. Research methods and data collection

The feasibility study was carried out through data and information gathering, comparative analyses, and extensive discussions with a range of public sector, private sector, and civil society stakeholders. The study team conducted country visits to Guatemala (February 20–24, 2023; in-person mission), Honduras (February 27–March 3, 2023; in-person mission), and El Salvador (April 10–14, 2023; hybrid virtual/in-person mission). In preparation for and during these visits, the study team conducted meetings and interviews with a wide range of stakeholders, including but not limited to ministries of finance, agriculture, environment/climate, and disaster response and recovery; financial sector regulators, state-owned banks, and private financial institutions; insurance associations and individual companies; associations of agricultural producers; research entities; and development partners. A full list of entities with which the study team met is included in Annex 1. Subsequent to the country visits, the team engaged in desk research, data analysis, and report drafting between April and August 2023.

1.5. Organization of this report

This report presents findings and recommendations across nine chapters. Chapter 2 presents an analysis of agricultural production systems in NCA countries along with an assessment of the climatic and natural risks faced by family farmers. Chapter 3 assesses the DRFI policies and programs being implemented in NCA and analyzes the gaps in disaster-related funding in the agricultural sector. Chapter 4 assesses the degree of financial inclusion of family farmers in NCA and the demand for and supply of agricultural finance and agricultural insurance; this chapter also highlights features of the recently introduced index-based disaster risk insurance programs in Guatemala and El Salvador. Chapter 5 presents an overview of the international experience with index insurance at micro, meso, and macro levels, including the regional sovereign risk index-based insurance programs that are currently available in NCA and the Caribbean, Africa, and Asia; it also assesses the suitability of a modified macro-level regional approach to meeting the risk management needs of family farmers in NCA. Chapter 6 deals with the technical options for and challenges of designing a suitable index-based insurance program to protect family farmers in NCA against excess rain and drought. Chapter 7 covers the legal, institutional, and operational options and challenges for large-scale index-based disaster risk insurance programs for family farmers in NCA. Chapter 8 presents illustrative physical uptake and financial projections for a large-scale index-based disaster risk insurance project over a five-year period under different uptake scenarios. Finally, Chapter 9 presents conclusions and recommendations.

2

Agricultural Production Systems in NCA and Risk Assessment

Box 1. Key takeaways from Chapter 2

- Of the roughly 2.3 million farmers in the three countries comprising North Central America, 1.9 million (82%) are family farmers.
- Family farmers are generally considered as those who primarily produce staple food crops such as maize and beans on 1–2 ha of land to meet their family consumption needs. Many family farmers depend on off-farm employment to supplement their consumption and income and work mainly as migrant agricultural laborers for the coffee and sugar cane sectors. Many are tenant farmers and thus lack security of tenure.
- Family farmers predominantly depend on rainfed cropping to meet their subsistence needs: they have limited access to finance and use low levels of improved seed and fertilizer technology, and the average yields of their staple crops tend to be low.
- Family farmers are very vulnerable to climatic, biological, and natural risks. Many live in the Dry Corridor that runs through NCA countries, and they experience severe El Niño–Southern Oscillation (ENSO) drought-related crop production and yield losses every three to five years. Their production systems are also exposed to seasonal excess rain and flooding, often associated with tropical cyclones. NCA countries are exposed to frequent earthquakes; though this peril results in severe damage to property and infrastructure, direct losses in agriculture are low.
- Family farmers are among the poorest segments of the population in NCA: roughly 80% of them are below the poverty line, and 30% are extremely poor.
- Women farmers tend to be more severely affected by climatic shocks and have less capacity to cope and adapt than men, partly because they have less access to savings and credit, but also because they bear more responsibility for unpaid care and domestic work and because they are often left to tend to the farm as males migrate to urban areas.
- Various strategies and programs have been put in place by authorities in NCA countries to support family farmers, including El Salvador’s 2021 Family Farming Law and Honduras’s National Family Farming Strategy.

2.1. Importance of agriculture and family farming sector

2.1.1. Overview of agriculture in NCA

Agriculture represents between 5% and 13% of GDP in each NCA country and a significant proportion of land use, with basic grains the most important product for consumption in the region. Since 1980, agriculture’s contribution to GDP has shrunk by nearly tenfold in El Salvador, by threefold in Guatemala, and by half in Honduras. This is despite nearly 60% of El Salvador’s land being arable, compared to about half for its regional peers. See Table 1 for a summary of agriculture in the NCA countries and Figure 4 for information on agriculture’s share in GDP.

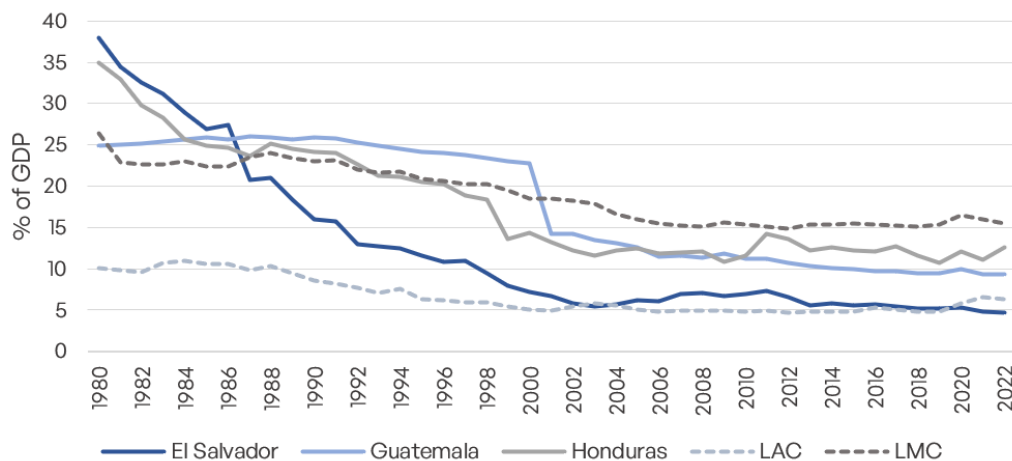
Table 1. Summary of agriculture in the NCA

	El Salvador	Guatemala	Honduras
Agriculture, forestry, and fishing—value added (% of GDP): 2022	4.7%	9.3%	12.6%
Employment in agriculture (% of total employment): 2021	15%	29%	25%
% male employment	23.5%	37.1%	34.8%
% female employment	3.4%	12.1%	9.5%
% of family farmers in all farmers	87%	82%	70%
% of family farms headed by men	88% ^a	85%	60% (Western Honduras) ^b
Agricultural land ^c (% of land area): 2020	57.7%	36%	31.4%
Arable ^d	34.8%	8%	9.1%
Irrigated	2.3%	6.3% ^e	2.6% ^f
% total agricultural value produced (tonnes)	7%	4%	1.6%
Corn/maize	0.76%	0.3%	0.3%
Beans	3.2%	1.1%	1.6%
Milk	0.27%	0.46%	0.9%
Coffee	60%	56.4%	11.2%
Sugar cane	n.a.	6.1%	5.0%
Palm oil	0.08%	8.6%	0.85%
Bananas	11%	11.7%	2.1%

Sources: World Bank, “Agriculture, Forestry, and Fishing, Value added (% of GDP),” <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>; World Bank, “Employment in Agriculture (% of total employment) (modeled ILO estimate),” <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS>; World Bank, “Agricultural Land (% of land area),” <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS>; FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>. n.a. refers to not available.

- a. Lastarria-Cornhiel 2018; FAO, Gender and Land Rights Database, https://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=982.
- b. Borgen Project 2016.
- c. Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, rubber, fruit trees, nut trees, and vines, excluding land under trees grown for wood or timber.
- d. Arable land includes land defined by the Food and Agriculture Organization of the United Nations (FAO) as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow.
- e. In 2003.
- f. In 2005.

Figure 4. Agriculture, forestry, and fishing, 1980–2022: Value added (% of GDP)

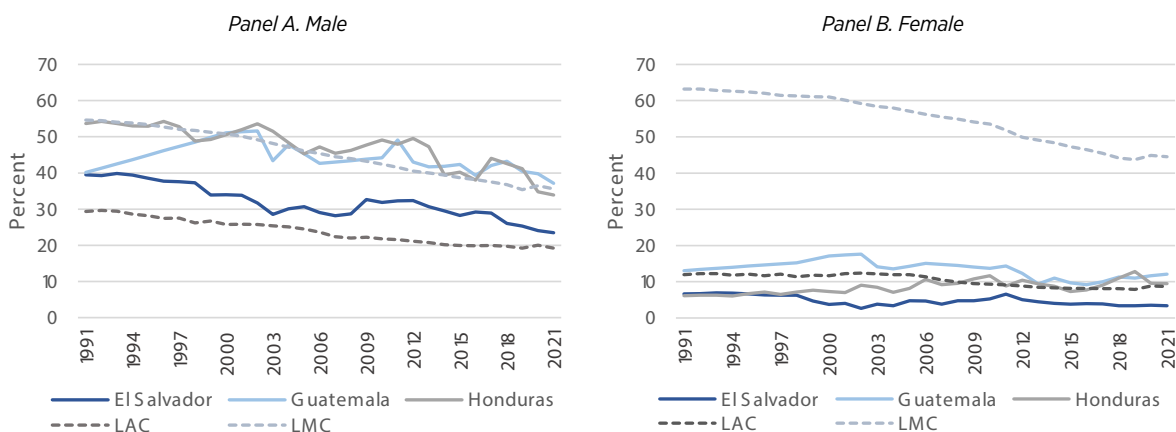


Source: World Bank, “Agriculture, Forestry, and Fishing, Value Added (% of GDP),” <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>.

Note: LAC = Latin America and the Caribbean; LMC = lower-middle-income country.

Agriculture is a source of employment and livelihood for a significant proportion of the population and is male-dominated; the vast majority of farms are small family farms headed by men. The percentage of males employed in the sector has been decreasing across NCA and now ranges between 25% in El Salvador and 37% in Guatemala. Meanwhile, the proportion of women employed in agriculture has increased in Honduras, remained flat in Guatemala, and decreased in El Salvador. Compared to the average in LAC, relatively more men and relatively fewer women in NCA are employed in agriculture (Figure 5).

Figure 5. Employment in agriculture as a share of all employment (%)



Source: World Bank, “Employment in Agriculture, Male (% of male employment) (modeled ILO estimate),” <https://data.worldbank.org/indicator/SL.AGR.EMPL.MA.ZS>; World Bank, “Employment in Agriculture, Female (% of female employment) (modeled ILO estimate),” <https://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS>.

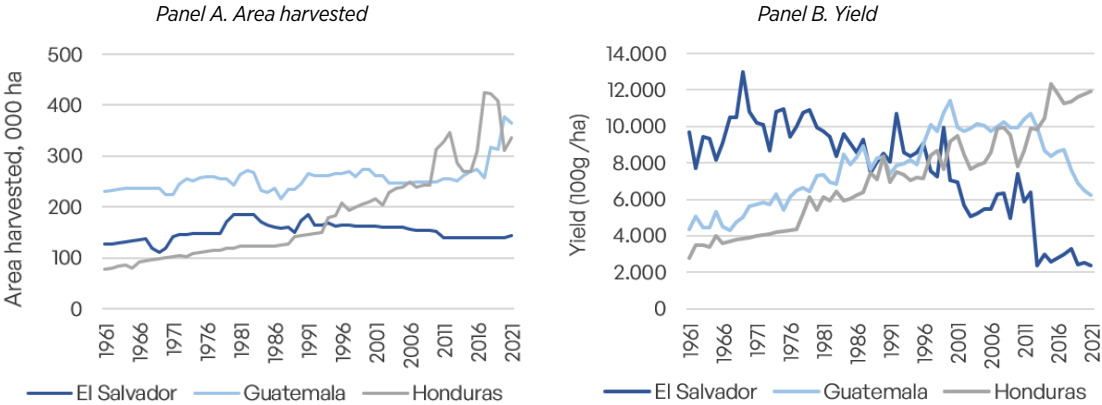
Note: Modeled International Labour Organization (ILO) estimate. LAC = Latin America and the Caribbean; LMC = lower-middle income countries.

2.1.2. Trends in production and yields

In Central America, national agricultural censuses indicate the following as the most important cash and subsistence crops in terms of cultivated area: maize (34%), coffee (16%), beans (14%), sugar cane (8.4%), rice (5.8%), sorghum (4.9%), plantain (1.1%), cassava (0.9%), and cocoa (0.5%) (Bouroncle et al. 2016; cited in Lee et al. 2017). This regional picture masks some national-level variation; for example, in Guatemala, 12% of agricultural land is dedicated to the production of annual crops such as maize, beans, rice, and vegetables, and 14% is for sugar cane, coffee, rubber, oil palm,

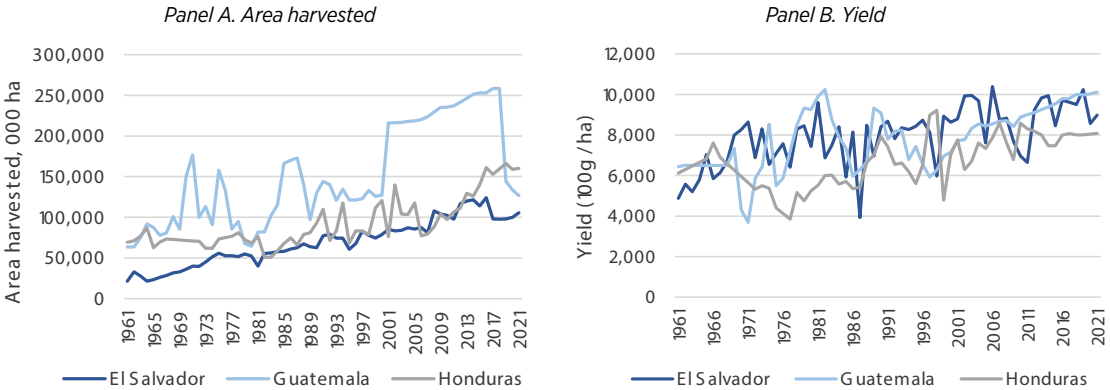
and cardamom. Across NCA, corn is the most important crop. It is grown by 48.8% of households and reaches average yields of 9.2 quintals per manzana, almost a third of the national average of 26.8 quintals per manzana. Beans is grown by 30.9% of households and the second most important crop. The average production is 5.4 quintals per manzana, which is half of the regional average of 11 quintals per manzana, but in most cases this crop produces surpluses for trade. More information on coffee, beans, sorghum, and rice is in Figure 6, Figure 7, Figure 8, and Figure 9, respectively.

Figure 6. Coffee area harvested and productivity (yields), 1961–2021



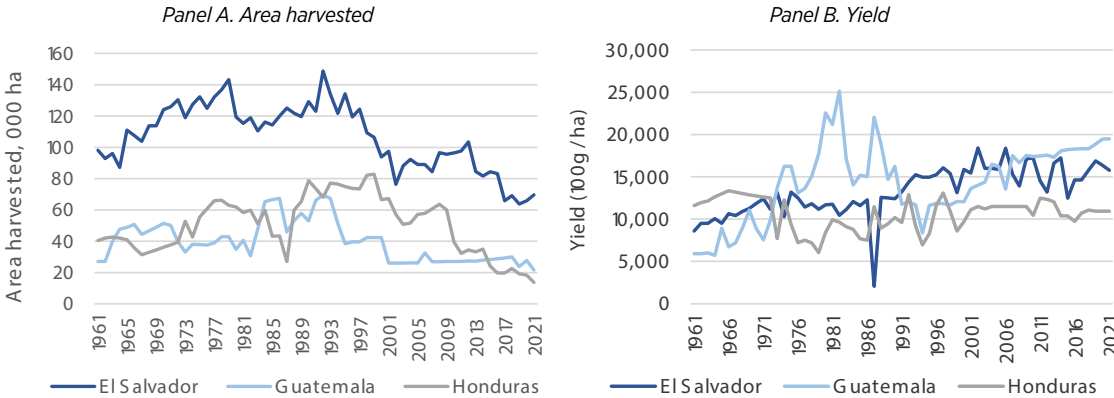
Source: FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>.
 Note: hg refers to hectogram per hectare.

Figure 7. Beans area harvested and productivity (yields), 1961–2021



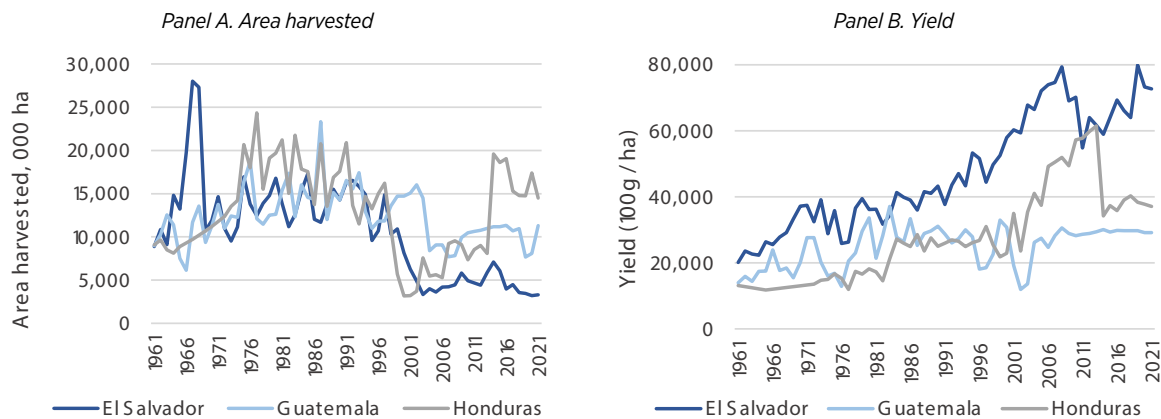
Source: FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>.

Figure 8. Sorghum area harvested and productivity (yields), 1961–2021



Source: FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>.
 Note: hg refers to hectogram per hectare.

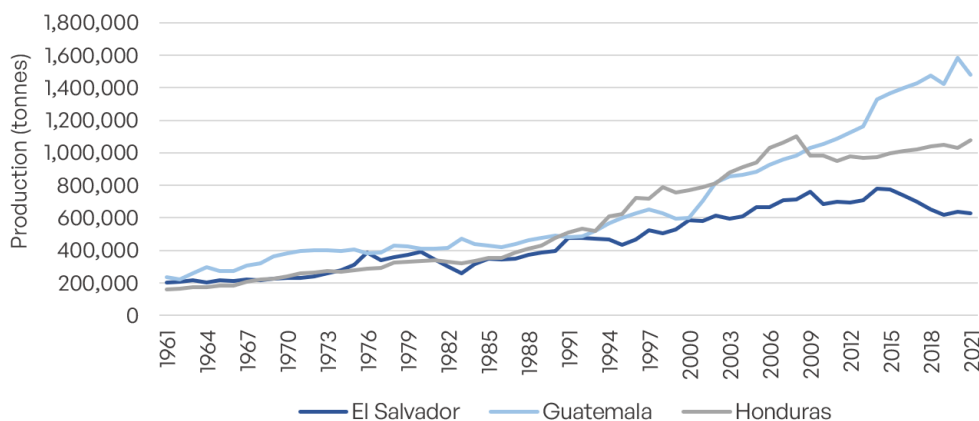
Figure 9. Rice area harvested and productivity (yields), 1961–2021



Source: FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>.

Livestock accounts for a significant share of agricultural production in NCA, totaling approximately 3.2 tonnes (Figure 10). Across the wider Latin America region, the livestock sector has been growing at a higher rate than the average GDP growth rate (3.7% vs 3.4% annually) and now accounts for 46% of the agricultural GDP (FAO 2017; World Bank 2019). About 94% of production is for domestic consumption. Cattle are dominant in areas with good pasture, poultry and pork where pasture resources are scarce, while sheep are found in temperate areas (Williams and Anderson 2019). Indigenous groups, small farmers, and subsistence and landless farmers are the most dependent on livestock for at least a part of their livelihoods (García-Winder and Chavarría 2017). Livestock production in Central America was severely affected in 2018 by drought along the Dry Corridor following sluggish recovery from a severe drought in 2014 and the strongest El Niño phenomenon registered in recent history in 2015 (FAO 2019).

Figure 10. Production of primary livestock, 1961–2021



Source: FAOSTAT, “Crops and Livestock Products,” <https://www.fao.org/faostat/en/#data/QCL>.
Note: Primary livestock excludes processed products.

2.1.3. Description and distribution of family farmers

There are an estimated 2.3 million farmers in the NCA countries, 1.3 million of them (57% of total) in Guatemala, 600,000 (26%) in Honduras, and nearly 400,000 (17%) in El Salvador. The figures over the past 40 to 50 years suggest a doubling of the number of farmers in NCA, with the smallest increase in El Salvador (46%) and the largest in Guatemala (144%) (Table 2). The increase in number of farmers is thought to be driven by overall population increases and farm fragmentation through inheritance over time. These estimates must be treated with caution, however, because the data are outdated.

Table 2. Number of farmers in NCA countries

Country	Period	Previous estimation	Latest estimation	Increase (%)	Share of all farmers (%)
El Salvador	1971–2007	270.869	395.588	46%	17%
Guatemala	1979–2011	531.623	1,299,377	144%	57%
Honduras	1993–2008	325.75	600.3	84%	26%
Total NCA		1,128,242	2,295,265	103%	100%

Source: Catholic Relief Services 2015.

Note: The data for Guatemala are derived from the 2003 National Census of Agriculture and are based on the number of farms with less than 5 manzanas, expressed as a percentage of the total number of farms. In El Salvador, the figures relate to the 2007 census and underestimate the actual number of farmers: in this case the Ministry of Agriculture and Livestock (MAG) in 2003 was targeting up to 500,000 small maize farmers alone, under its free certified seed and fertilizer program. Finally in Honduras, the National Federation of Crop and Livestock Producers of Honduras (Federación Nacional de Agricultores y Ganaderos de Honduras [FENAGH]) estimates that there may be between 0.5 million and 1.0 million farmers as at 2023; of these, there may be 0.45 million family producers of rice, maize, and beans alone. Thus there may be 2.0–2.25 million (or even more) smallholder family farmers in the three NCA countries today.

The majority of farmers in the NCA—between 1.8 million and 2 million—are family farmers (*agricultores familiares*) (Table 3) who are the potential target for a large-scale climate risk index insurance program.¹⁹

Table 3. Estimated number of family farmers in NCA countries

	El Salvador	Guatemala	Honduras	Total
Total number of farmers	395.588	1,299,377	600.3	2,295,265
Family farmers as share of all farmers	86.7%	86.5%	70.6%	82.6%
Number of family farmers ^a	345	1,125,000	425	1,895,000

Source: Total number of farmers: Catholic Relief Services 2015.

Note: a. Figures are rounded by the World Bank to the nearest 5,000.

The definition of family farmer varies by country: El Salvador and Honduras use a livelihood-based definition, and Guatemala uses a definition based on quantitative land ownership or tenancy (Table 4). The regional Peasant, Indigenous and Afro-descendant Family Farming Policy 2018–2030 (PAFCIA) defines family farming as a model of production of agriculture, livestock, agroforestry, aquaculture, fishing, and ecosystem services that depends on labor from family members under the administration of the head of the household.²⁰ This definition also includes artisanal, processing, and both urban and rural activities and combines economic, environmental, social, and cultural functions. It was adopted by the Government of El Salvador (GoES) in its Family Farming Law and the Government of Honduras (GoH) in its National Family Farming Strategy (2017–2030).²¹ In Guatemala, the Ministry of Agriculture, Livestock and Food (MAGA) defines family farmers as owners or tenants farming less than 4 manzanas (2.8 ha) of land and practicing rainfed agriculture, and it further distinguishes infra-subsistence farmers cultivating less than 1 manzana (0.7 ha) and subsistence farmers cultivating 1 (0.7 ha) to 4 manzanas (2.8 ha).

¹⁹ The 1.8–2 million estimate is derived from the fact that most of the 2.3 million farmers in NCA are family farmers—an estimated 87% of all farmers in El Salvador and Guatemala and an estimated 70% in Honduras.

²⁰ PAFCIA was developed through the Regional Rural Dialogue Program, a consultative platform that included the Technical Secretariat of the Council of Ministers of Agriculture (SECAC), as well as 22 family farming organizations from Central America and the Dominican Republic, with support from the Fund for Agricultural Development (IFAD), Food and Agriculture Organization of the United Nations (FAO), Regional Program of Research on Development and the Environment (PRISMA), OXFAM, and the Latin American Center for Rural Development (RIMISP). See PDRR (2017).

²¹ The El Salvadoran law is Ley de Agricultura Familiar 2021, Decreto No.814 (text available at <https://faolex.fao.org/docs/pdf/els205409.pdf>). Article 7 of the law states that “the beneficiaries will be the farmers belonging to the different types of family farming. Which must be duly registered as farmers having agriculture as an economic activity, according to the registration mechanism determined by the governing body.” For the Honduran law, see <https://faolex.fao.org/docs/pdf/hon178713.pdf>.

Table 4. Definition of family farms in NCA countries

Main definition		
El Salvador	Guatemala	Honduras
Family agriculture is defined as “a way of life, characterized by carrying out various agricultural activities: basic grains, fruit, horticultural, fishing, livestock, aquaculture, beekeeping, poultry, minor species, agroforestry, agro-industrial, craft, gastronomic, exchange of goods and services, seed exchange, provision of services, tourism and trade; family work predominating both in the family plots and in the associative forms of production. The administration of the plot belongs to the family.”	Family farms are defined as those with no more than 4 manzanas (2.8 ha) of land available for multi-cropping of basic grains, some vegetables, legumes, fruit trees, and backyard livestock activities.	The Official Gazette (La Gaceta) No. 33,998, under Ministerial Agreement 286-2016, establishes that “family farming is a way of life based on agricultural and related activities, carried out by families as their main economic occupation, primarily using their own labor in production and administration, transferring values, practices and knowledge to the following generations and in the protection of traditions and family and territorial idiosyncrasy.” The National Committee for Family Agriculture (Comité Nacional de Agricultura Familiar, CNAF), recognizes that family farmers may hire labor temporarily, but “the number of permanent employees must be equal to or less than the number of members who work the family farm unit.”
Further details		
El Salvador	Guatemala	Honduras
Article 7 of the Family Farming Law states that “the beneficiaries will be the farmers belonging to the different types of family farming. Which must be duly registered as farmers having agriculture as an economic activity, according to the registration mechanism determined by the governing body.”	Family farmers are divided into (i) infra-subsistence agricultural producers , who own or lease 1 manzana (0.70 ha) of land or less; and (ii) subsistence-level producers , who own or lease 1–4 manzanas. The average number of family members participating in family farming is four or five.	Family farming is divided into three groups: (i) family farming for self-consumption: generally, this segment requires supplementing their income through salaried work and includes family producers in minimal spaces (backyard) in urban or peripheral areas; (ii) family farming in transition: this segment is oriented toward self-consumption and sales, but has difficulties generating surpluses and access to markets; and (iii) consolidated family farming: this segment generates surpluses and has greater productive potential, access to markets, technology, and capital for the development of the productive unit.

Sources: For El Salvador: Family Farming Law, <https://faolex.fao.org/docs/pdf/els205409.pdf>. For Guatemala: https://www.congreso.gob.gt/assets/uploads/info_legislativo/iniciativas/Registro4947.pdf. For Honduras: National Family Farming Strategy (2017–2030, <https://faolex.fao.org/docs/pdf/hon178713.pdf> developed by a legally constituted committee in Ministerial Agreement 286-2016 in Official Gazette (La Gaceta) No. 33,998; Comité Nacional de Agricultura Familiar (CNAF).

Family farmers are a diverse group that includes subsistence producers as well as commercially oriented producers who are organized and connected to local, national, and even international export markets. However, as shown in Table 5, the majority cultivate on less than 2 manzanas of land and have limited access to capital and inputs. Family farming accounts for 50% of agricultural employment and around 50% of total agricultural production, which constitutes 70% to 80% of the food consumed in Central America (PDRR 2017).

Table 5. Summary of family farmers by size, income, and capital

	El Salvador	Guatemala	Honduras	
Farm size	More than 5 manzanas (% of total)	1%	13%	5.1%
	Between 2 and 5 manzanas (% of total)	16%	19%	11.3%
	Between 1 and 2 manzanas (% of total)	82%	22%	27.7%
	Less than 1 manzanas (% of total)		45%	55.9%
	Average family farm size (manzanas)	1.73	1.00	—
Income	Gross annual income (US\$ 2022 values)	8.394	11.562	—
	% from crop production	—	21%	—
	% from on-farm income	—	24%	—
	% from agricultural wage labor	14%	18%	—
	% from nonagricultural wages	30.2%	40%	22.4%
	% from public and private transfers	30.6%	18%	36%
Capital and inputs	Livestock (TLU; pastoral households only)	—	1.9	—
	% using motorized equipment	—	43	—
	% using fertilizer	—	76.4	—
	% with access to credit	8	8	—
	Average credit amount (US\$ 2022 values)	—	4.494	—

Sources: Align, “Honduras,” <https://align-tool.com/source-map/honduras>; FAO, “El Salvador,” [https://www.econstor.eu/bitstream/10419/173794/1/869815253.pdf](https://www.fao.org/world-agriculture-watch/our-program/slv/en/#:~:text=Differences%20between%20Salvadoran%20farm%20types&text=This%20has%20a%20direct%20correlation,780%20000%20for%20corporate%20farms; IICA 2012; Berdegúe and Fuentealba 2014. <a href=)
Note: TLU = tropical livestock unit

The bulk of family farmers are low-income subsistence farmers who cultivate staple crops with limited use of inputs under rainfed conditions on their own or rented plots to cover part of their diet, and who complement this with informal labor generally linked to agriculture. This group is typically defined by the World Bank as crop or livestock producers cultivating 2 ha or less, or about 1 to 5 manzanas in NCA. Often their plots are located in hillside areas, within forestry ecosystems or fragile or drought-prone areas. These farmers generally lack irrigation systems or equipment for production and have a few heads of livestock. As family farmers belong to the informal economy—between 95% and 98% of agricultural work in this subregion is informal²²—their access to credit is very limited. In Guatemala and El Salvador only 8% of family farmers have access to credit, mainly through credit schemes (FAO 2018).

Family farmers’ share of income from nonagricultural wages or off-farm self-employment, mainly in commerce and services, is significant, accounting for around 30% to 40% of total income (ECLAC 2014). The high share of income from nonagricultural wages reflects increasing diversification, commercialization, and reliance on remittances in rural areas. In Guatemala, public and private transfers provide 18% of income, which is well above the average of other Latin American countries. Guatemala is one of the top remittance-receiving countries in the world (FAO 2018).

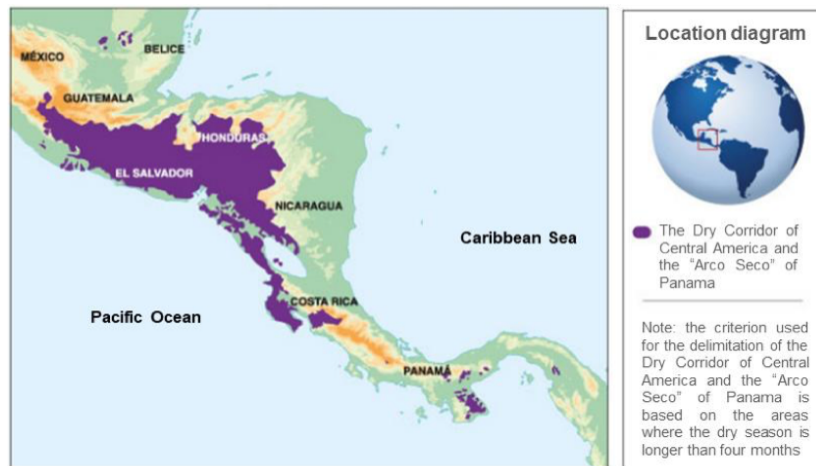
A high proportion of the rural farming population, estimated at more than 1 million, lives in the Central American Dry Corridor (CDC), which is classified as a dry tropical forest. As shown in Figure 11, about 80% of the Dry Corridor lies in NCA countries, covering 25 municipalities in El Salvador, 54 in Guatemala, and 33 in Honduras.²³ This region has a dual rainfall pattern with dry and rainfall seasons magnified by El Niño–Southern Oscillation (ENSO), leading to periods of intense drought followed by torrential rainfall and floods. The recurring droughts affect the first harvest, while intense rains with their accompanying floods and mudslides affect the last harvest in the second half of the year

22 FAO, “Land of Opportunities: Dry Corridor in El Salvador, Guatemala and Honduras,” https://www.fao.org/fileadmin/user_upload/rlc/docs/DryCorridor.pdf.

23 Ibid.

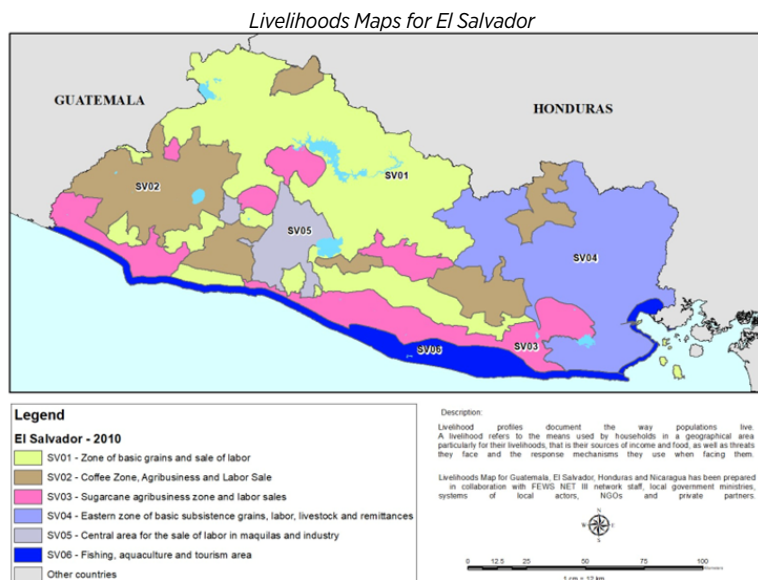
(Habitat for Humanity 2022). The population is among the most vulnerable to climate change and to increasingly frequent extreme droughts and floods that severely impact livelihoods. Food insecurity, insufficient income, decrease in local food production, lack of employment, and forced migration are some of the negative consequences for the rural population, which is already vulnerable due to its precarious socioeconomic situation—one that disproportionately affects women, indigenous peoples, and children (Fraga 2020). Prolonged dry periods have been more frequent in the last 10 years. The existing high climatic variability and forecasts of significant changes in rainfall patterns are likely to exacerbate vulnerability. Figure 12 shows the livelihood zones for Central America.²⁴

Figure 11. Geographical delimitation of the Central American Dry Corridor



Source: Fraga 2020 based on FAO 2015.

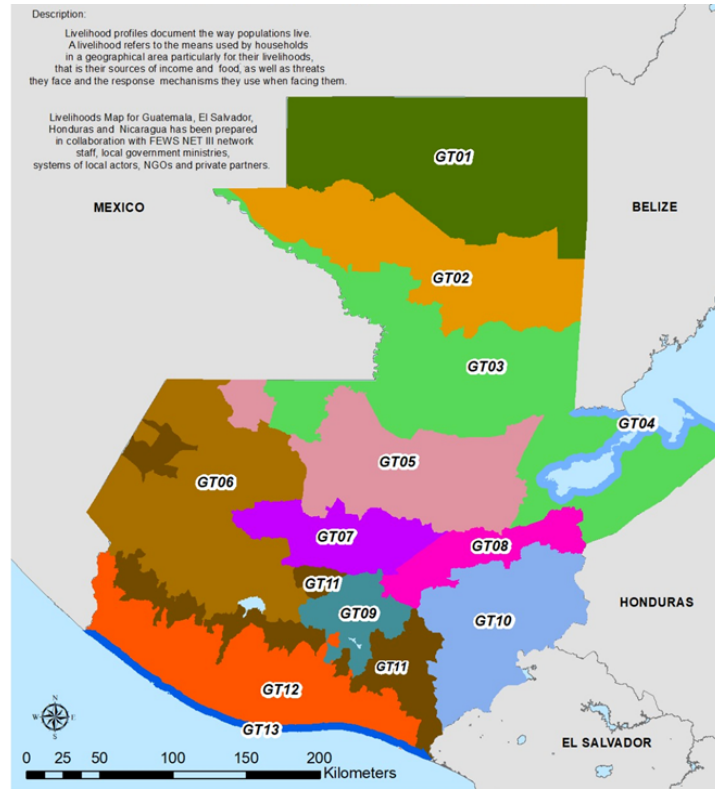
Figure 12. Livelihoods map for Guatemala, El Salvador, and Honduras



Source: FEWSNET 2023. <https://fewsn.net/latin-america-and-caribbean/el-salvador/livelihood-zone-map/january-2018>

²⁴ A livelihood zone is an area within which people generally share the same livelihood pattern, including food and income options and market opportunities.

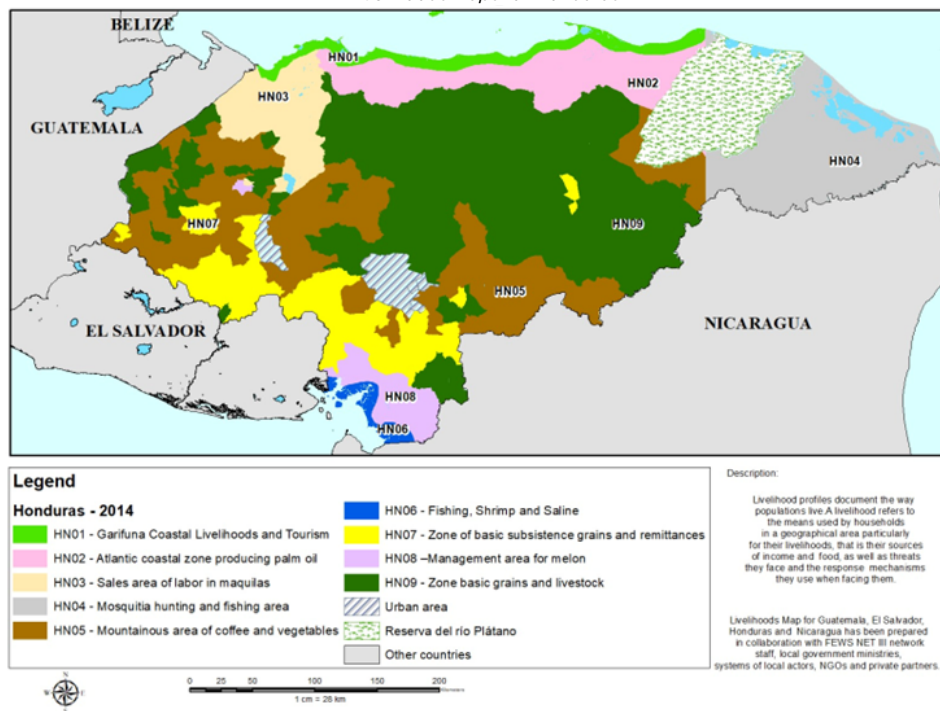
Livelihoods Maps for Guatemala



North Petén forestry and eco-tourism	Motagua Valley, Fruit Agri-business Labor and Mining Labor
Central Petén staple foods and cattle farming labor	Industrial, Agri-business Labor, Commerce and Services of Central Area
South Petén, Northern Transversal Strip (FTN) and Izabal Agro-industry and Food Crops	Eastern Subsistence Food Crops and Agricultural Labor (Coffee, Fruit and Vegetables)
Caribbean Artisanal Fishing and Tourism	Coffee Production
Coffee, Cardamom, Forestry and Vegetable Production	Southern Agricultural Industry Labor, Food Crops and Milk
Western Highlands Labor, Staple Crops, Vegetables, Trade and Remittances	Pacific Ocean Artisanal Fishing, Trade and Services
Baja Verapaz and Quiché Staple food and Agricultural Labor	meso_poly

Source: FEWSNET 2023. <https://fewsn.net/latin-america-and-caribbean/guatemala/livelihood-zone-map/january-2017>

Livelihoods Maps for Honduras



Source: FEWSNET 2023. Available here

2.1.4. Constraints faced by family farmers

There are an estimated 2.3 million farmers in the NCA countries, 1.3 million of them (57% of total) in Guatemala, 600,000 (26%) in Honduras, and nearly 400,000 (17%) in El Salvador. The figures over the past 40 to 50 years suggest a doubling of the number of farmers in NCA, with the smallest increase in El Salvador (46%) and the largest in Guatemala (144%) (Table 2). The increase in number of farmers is thought to be driven by overall population increases and farm fragmentation through inheritance over time. These estimates must be treated with caution, however, because the data are outdated.

Stresses on crop production have significant effects on the economic well-being and food security of family farmers in NCA countries. Family farmers rely heavily on agriculture for both food and income, and because over 70% of agriculture is rainfed, family farmers' own production is highly affected by variations in precipitation and temperature. Changes in rainfall distribution patterns, as well as the increase in average temperatures, have reduced planting areas, while more frequent and severe climate events have reduced yields and food sovereignty. Production is also vulnerable to damage caused by climate-induced pest infestation. Even when the harvest season is over, low yields are compounded by post-harvest losses due to lack of adequate storage and road infrastructure.

Family farmers are reliant on the sale of local labor, which is often sensitive to the impacts of climatic variations. Family farmers provide labor to large-scale farmers in order to complement their basic income needs, but large-scale farmers are also affected by the same climatic events. Thus natural disasters affect not only family farmers' production, but also their supplementary sources of income. Family production typically covers the needs of households for between two and six months of the year, after which households rely on other income sources to meet their needs, such as agricultural work; this is particularly common among poor households without access to land. During the production period, family farmers are dedicated to cutting sugar cane and coffee, cultivating cardamom, and fertilizing African palm, banana, and plantain crops.

Women play an increasingly important role in agriculture due to male migration to urban areas, and various studies show that farms managed by women are less productive than farms managed by men; this is explained by women's more limited access to agricultural inputs, labor, and extension advice. These limitations are compounded by time and labor constraints, as women also have more responsibility for unpaid care and domestic work (Quisumbing et al. 2014).²⁵ Gendered social norms often result in women's lesser access to information and more restricted mobility. Women also tend to have lower levels of literacy and lower rates of land ownership, are less likely to own livestock, and have fewer legal rights; they also have less access to technology, training, and markets and more limited financial inclusion (including access to credit and insurance) (FAO 2023). These factors directly influence farmer response to climate shocks and climate change. Therefore, while men and women face the same climate variations and disasters, women often have less adaptive capacity.

2.1.5. Legal and policy framework for support to family farmers

El Salvador stands out for its commitment to family farming; strengthening this sector has been a government priority since 2010. The Ministry of Agriculture and Livestock (MAG) created and implemented the Family Agriculture Plan (PAF) in 2010 and a five-year institutional strategic plan in 2015 to support small-scale farmers.²⁶ In 2021, the GoES enacted a Family

²⁵ See also BMC, "Gender and Agriculture," <https://www.biomedcentral.com/collections/GA#:~:text=Various%20studies%20show%20farms%20managed,refor%20to%20protect%20their%20rights>

²⁶ For the PAF, see Feed the Future, "Honduras," <https://www.feedthefuture.gov/country/honduras/>.

Farming Law, which sets out the responsibilities of the state and the legal framework for a sustainable productive model of family, peasant, and indigenous agriculture that contributes to economic development, equity, social inclusion, and integrated management of landscapes. The law declares that family farming is of social interest and a public utility, due to its contribution to food and nutritional sovereignty, employment, income, territorial economic development, knowledge transfer, culture, and the preservation of ecosystems and natural resources. The MAG is the governing body of the Family Farming Law and is required to keep a national farmer registry. The institutional framework of the Family Farming Law includes a National Council of Family Farming (CONAF) whose role is to advise on and audit the implementation of the law.²⁷ The Single Registry of Family Farmers is to be fed with data from municipalities, civil society organizations, and other state entities. The registered farmers will have access to the different programs and projects and also become suppliers of public procurement.

Among others, the Family Farming Law mandates provision of financial services to family farmers and provides for the creation of a special fund to finance and encourage innovative projects. The law states that Banco de Fomento Agropecuario, Banco Hipotecario, and Banco de Desarrollo de El Salvador will provide lines of credit and agricultural insurance to meet the productive and commercial needs of family farming value chains. It further states that the special fund is to be managed by the MAG and that operational regulations are to be drawn up based on the strategic priorities of the family, peasant and indigenous agriculture policy.

Guatemalan public policy on agriculture prioritizes rural development and has historically been supportive of family farmers in terms of access to land, credit, and the supply of inputs at subsidized prices. In 2009 Guatemala adopted the National Policy on Integrated Rural Development.²⁸ This was followed by the Agricultural Policy (2011–2015), which aimed to enhance food and nutrition security as well as productive and commercial development. Implementation focused on helping rural communities become integrated into the market economy through strategic partnerships and development of lines of microcredit and guarantee funds, particularly for women. The 2012–2021 National Competitiveness Agenda aimed to stimulate investment and support for family farmers by promoting the creation of rural companies, boosting agribusiness, and attracting private investment (PRONACOM, 2012).

In 2012 plans to update the National Policy on Integrated Rural Development began alongside planned implementation of the Triangle of Dignity and Family Farming programs, which aimed at boosting the small farming economy through technical assistance, capacity building, funding, and credit.²⁹ The Triangle of Dignity program was expected to be implemented through the National Land Fund (FONTIERRAS) and overseen by MAGA. At project launch, MAGA had a budget of Q 225 million to benefit 67,515 farmers. The targeted farmers either owned or rented a plot of 1 manzana in the most food-insecure municipalities. In addition, GoG continued to distribute fertilizers to small farmers under its Safe Harvest program.

The GoH began to focus on family farming in 2014, with the constitution of the National Committee for Family Farming (CNAF) and subsequent adoption of the National Family Farming Strategy (Estrategia Nacional de Agricultura Familiar [ENAF]) 2017–2030 to improve

27 CONAF is made up of the Ministry of Agriculture and Livestock, the Ministry of the Environment and Natural Resources, the Ministry of Economy, the Ministry of Local Development, and the National Center for Agricultural Technology; it also includes four representatives of the producer organizations that are members of the National Committee of Family Farming (CNAF).

28 This was done through Government Agreement 196-2009.

29 As part of its Pact against Hunger, the government developed a series of integrated strategies, programs, and measures aimed at providing social protection to 166 of the country's most vulnerable municipalities (50% of its municipalities). The credit provided by Triangle of Dignity was an interest-free loan of Q 3,000 (US\$428.57) repayable at the end of the second harvest.

the productivity, competitiveness, and sustainability of the family farming sector.³⁰ ENAF has three priorities: (i) access to productive goods and services; (ii) access to markets and inclusion in value chains; and (iii) strengthening of institutional capacity for governance and support of the sector. The General Directorate of Family Agriculture under the Ministry of Agriculture and Livestock (SAG) is responsible for coordinating and following up on the actions and results of the ENAF. CNAF is responsible for measuring and evaluating the progress of the ENAF, providing periodic reports to the Cabinet of Economic Development, and ensuring that family farming remains on the public agenda.

The GoH is strengthening the regulatory and legal framework to enable implementation of the ENAF, which is aligned with the agricultural and rural development policy framework and lacks any financial inclusion or protection objectives.³¹ In 2012, the GoH created the Family Agriculture Support Program under the Directorate of Agricultural Science and Technology (DICTA) to build productive and technological capacity across the sector. A ministerial agreement in 2016 (Ministerial Agreement 286- 2016), which formalized and legalized the CNAF and the National Public Committee for Family Farming (CPNAF), instructs government institutions to incorporate the ENAF in national programs and projects. A school food law in 2016 strengthens access to markets for family farmers by linking family farming producers to public school feeding programs as suppliers.

2.2. Climate risk exposures in the agricultural sector

The dependence of rural communities on livestock and rainfed agriculture increases their vulnerability to climate variability and change. The impact of climate change is severe in dry regions and expected to worsen in historically humid areas where most subsistence agriculture is concentrated. The 2021 Global Climate Risk Index ranked Guatemala the 16th most exposed country in the world to extreme weather events; El Salvador is ranked 28th and Honduras 44th (Eckstein, Künzel, and Schäfer 2021). The temporal and spatial distribution of rainfall determines planting seasons, agricultural cycles, and expected yields. Furthermore, because subsistence crops are largely grown on mountainous terrain, extreme rainfall can trigger erosion and landslides that degrade soils and damage crops. Degraded lands and poor soil conditions further limit agricultural productivity and heighten sensitivity to extreme rainfall and landslides.

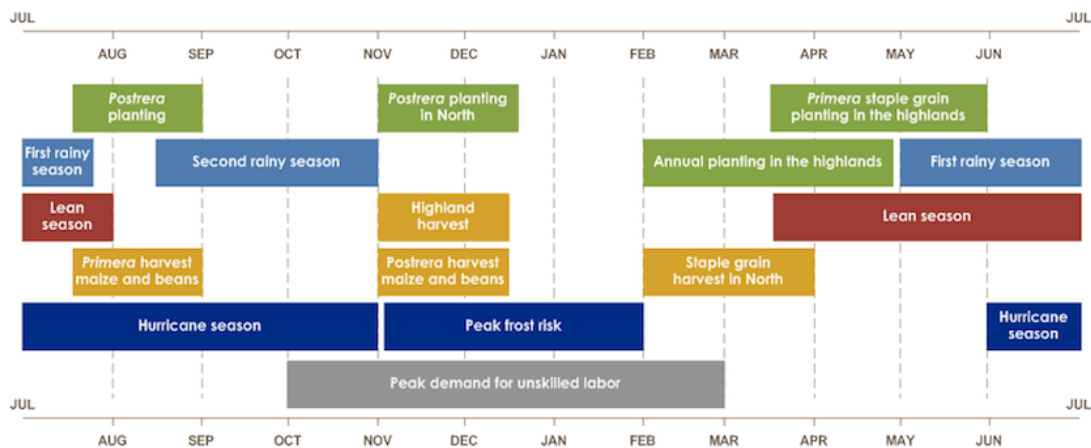
2.2.2. Rainfall patterns and cropping seasons

The rainy season begins in late April for the major areas of NCA and continues inland as rainfall increases in the Caribbean basin. Figure 13 shows the typical production calendar in NCA, characterized by two rainy seasons. The first is from May to August and the second from August to October; the dry spell usually occurs between July and August. The dry corridor is the most sensitive area for the dry spell; it receives an average of 1,000 mm of rainfall during the year. Any changes in the duration of the dry spell significantly affect overall production. Because of their geographic location, Guatemala and Honduras receive moisture input from both the Caribbean and Pacific basins, while El Salvador's rainfall regime is dominated by the Pacific basin.

30 CNAF is chaired by the Union of Rural Women of Honduras and consists of the Secretariat of Agriculture and Livestock (SAG), the Investigation Board, FAO, Inter-American Institute for Cooperation on Agriculture (IICA), and the University of Agriculture in Catacamas.

31 The agricultural and rural development policy framework includes the State Policy for the Agricultural and Rural Sector of Honduras 2004–2021 (PESA), the Central American Strategy for Territorial Rural Development 2010–2030 (ECADERT), and policies for technological innovation, competitiveness, and socioeconomic transformation of coffee growing.

Figure 13. Seasonal calendar for NCA



Source: FEWS NET, “Guatemala: Seasonal Calendar,” <https://fewsn.net/latin-america-and-caribbean/guatemala>.

2.2.3. Influence of ENSO phenomenon on rainfall patterns in NCA

There is a direct relationship between El Niño and La Niña events in Central America, which largely determines the distribution of rainfall in the region. ENSO, whose warm phase is El Niño (positive anomalies greater than 0.5°C) and whose cold phase is La Niña (negative anomalies less than -0.5°C), is an alteration of the ocean-atmosphere system in the tropical Pacific that has important consequences for climate around the planet. Table 6 shows the classification of events according to the anomalies observed. ENSO does not have a defined time interval; its appearance has been observed to vary between approximately two and seven years.

Table 6. El Niño and La Niña event intensities

Positive anomaly			Negative anomaly		
Value (°C)	Event	Intensity	Value (°C)	Event	Intensity
0.5 – -0.5	Neutral	n.a.	0.5 – -0.5	Neutral	n.a.
0.5 – 1.0	El Niño	Weak	-0.5 – -1.0	La Niña	Weak
1.0 – 1.5	El Niño	Moderated	-1.0 – -1.5	La Niña	Moderated
1.5 – 2.0	El Niño	Strong	-1.5 – -2.0	La Niña	Strong
> 2.0	El Niño	Extreme	< -2.0	La Niña	Extreme

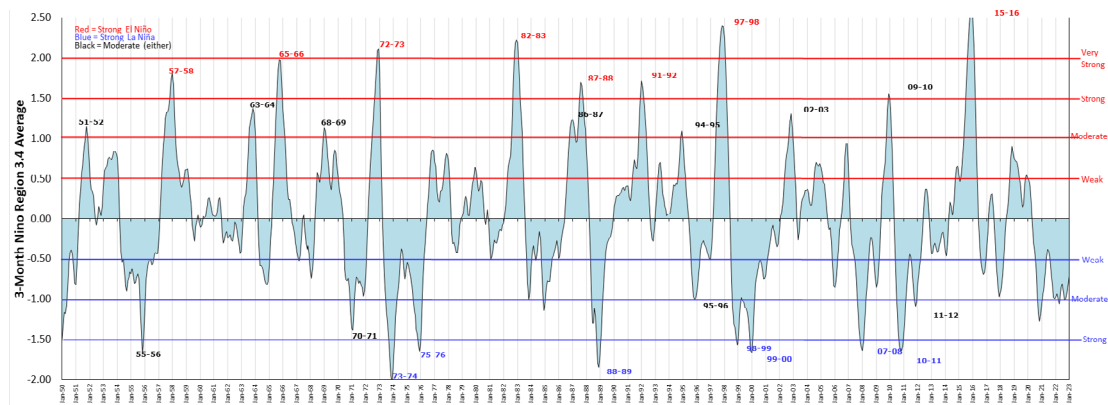
Source: Physical Sciences Laboratory. https://psl.noaa.gov/enso/enso_101.html

Note: n.a. = not applicable

El Niño or La Niña events are globally responsible for important changes in precipitation patterns; together with other oceanic-atmospheric conditions, they determine the intensity of the hurricane season. Usually, when there are El Niño conditions, there is a reduction in cyclonic events, a decrease in days with rain, and important changes in the duration of the canicular period in Central America. The canicular is a heat wave or period of regular rainfall decrease during the rainfall period; bimodal rainfall areas occur where the drop in rainfall is sufficiently significant. These areas are widespread across NCA and define agricultural cycles and the type of basic grain crops to be planted. Corn dominates in the first season (April–August) and beans in the second season (August–November), though in some areas corn and beans are planted in association.

El Niño and La Niña events tend to occur alternately, as shown in Figure 14. The events are classified according to their intensity, that is, the anomalies registered in each of them. Figure 14 shows the increase in strong and extreme events from the late 1980s, which also have a much longer duration. This change has affected seasonal rainfall patterns, changing the dates of sowing, which has a spatial and temporal distribution of rainfall that affects crops in different phenological phases. The strongest El Niño events have been recorded in the last 25 years, specifically 1997–1998 and 2015–2016.

Figure 14. Oceanic El Niño Index (ONI)



Source: Physical Sciences Laboratory. https://psl.noaa.gov/enso/enso_101.html

2.2.4. Tropical cyclones

Cyclonic events have increased in frequency and severity in recent years, with adverse impact on economic growth and poverty reduction. From 1992 to 2011, Central America was hit by nearly 70 hurricanes at an average of eight events per year. The 2021 Atlantic hurricane season had 21 named storms, the third highest number on record, including seven hurricanes, and was the sixth consecutive above-normal Atlantic hurricane season (WMO 2022). Studies on the socioeconomic impact of hurricanes in Central America found that in the short term, one standard deviation in hurricane intensity leads to a decrease in growth of GDP per capita of 0.9–1.6%, and decreases total and labor income by 3%, which in turn increases moderate and extreme poverty by 1.5 percentage points (Ishizawa and Miranda 2016). In addition, major hurricanes result in an average decrease in GDP growth of 2.6% to 3.9% up to 12 months after the hurricane strikes (Ishizawa, Miranda, and Zhang 2017).

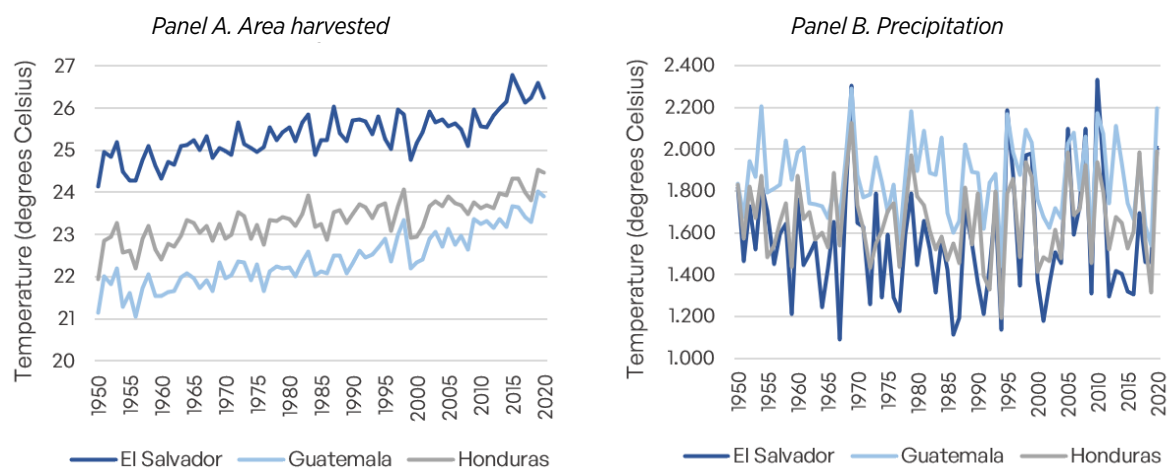
In Honduras and Guatemala, Hurricanes Eta and Iota have reduced productive capacity in the Caribbean basins. The recovery of production and employment will be gradual, as will the recovery of employment for small farmers who lost their production and main source of economic income. According to the Pan American Health Organization, Hurricanes Eta and Iota directly affected more than 6.5 million people, resulted in evacuation of 441,000 people, and generated total recovery costs of US\$9.9 million (PAHO 2020).

Even without being directly hit by a hurricane, countries can experience significant losses. Low pressure systems can cause important losses of basic grains. In October 2008, for example, Tropical Depression 16-E resulted in declaration of a state of public calamity for the Guatemalan departments of Petén, Izabal, Alta Verapaz, and Quiché. In total, 154 communities with more than 7,000 people were affected by the overflow of the La Pasión, Chixoy, and San Pablo Rivers (CERF, 2009). In October 2011, Tropical Depression 12-E resulted in damage amounting to nearly US\$1 billion in El Salvador and Guatemala (Ishizawa and Miranda 2017).

2.2.5. Drought

Areas with limited rainfall in the Central American region are continually affected by droughts. Losses occur mainly during the first (Primera) season, affecting corn crops in the phenological stages of flowering and grain filling. NCA is already facing increasing temperatures and decreasing rainfall (Figure 15). Annual rainfall decreased about 1 mm per day per 50 years from 1950 to 2008 and has become increasingly erratic since 1950, with a later onset of the rainy season (IPCC 2014). Humidity deficits affect farmers who depend solely on rain, as well as those who have irrigation systems (because the river levels decrease and the wells dry up). The potential evapotranspiration values increase in the area, and the residual humidity becomes insufficient for the normal development of crops.

Figure 15. Observed annual mean temperature and precipitation in NCA, 1950–2020



Source: Climate Change Knowledge Portal, <https://climateknowledgeportal.worldbank.org>.

2.2.6. Other perils affecting agriculture in NCA

Although rare, landslides following periods of extreme rainfall can affect production areas as well as irrigation systems in large farms, roads for transporting produce, and farmers' houses. These events tend to be localized and destructive to the livelihood of farmers. To date, only one landslide has been recorded in Honduras since 1973, three landslides have been recorded in El Salvador since 1988, and 10 landslides have been recorded in Guatemala since 1998.³²

Frost is a threat in elevated areas, especially in Guatemala between November and March. Studies show that colder-than-usual temperatures reduce crop yields even above the frost-event threshold, because plant growth depends on accumulated temperature exposure (Vogel et al. 2019). This decrease of temperatures affects leaf health and plant growth. In 2017, frost is estimated to have affected 25% of export plantations in Guatemala (Fresh Plaza 2017).

The risk of agricultural pest and disease outbreak, which is associated with high temperatures and humidity, is non-negligible. In three of the last 10 years, mancha de asfalto—a disease caused by three fungi that attack plants and reduce their nutrition and energy—has impacted maize crops in NCA. Another disease, coffee leaf rust, is one of the main factors limiting arabica coffee yield worldwide. Early and highly aggressive outbreaks of the disease have caused serious losses (up to 50–60% yield losses) in some Latin American countries. Globally, pests destroy up to 40% of crops and cost US\$220 billion in losses (FAO 2021). Climate-induced pest and disease outbreaks are expected to increase due to climate change.

2.3. Economic impact of disasters in NCA

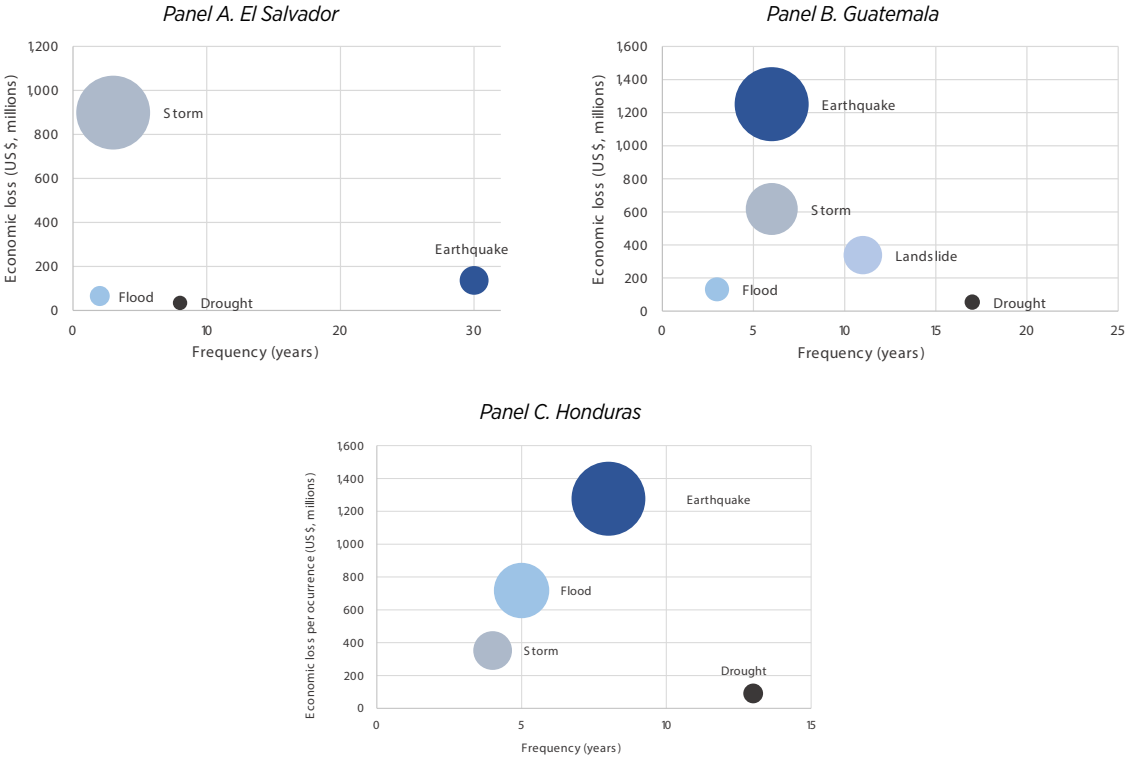
In NCA countries, disaster events have been increasing in frequency over the past 20 years, with economic losses largely uninsured and driven by infrequent but severe loss years. The compound impact of the COVID-19 pandemic and Hurricanes Eta and Iota in 2020 contributed to annual economic contractions of nearly 9.0% in Honduras, 8.2% in El Salvador, and 1.8% in Guatemala (CRS 2023). El Salvador has experienced a marginal increase in the number of disaster events, with average annual disaster losses equivalent to approximately 60% of average annual public investment spending.³³

32 EM-DAT: The International Disaster Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain, Brussels, <https://www.emdat.be/>.

33 Government of El Salvador. 2021. Disaster Risk Financial Management Strategy.

Earthquake, storm, and flood are the most serious perils in Guatemala and El Salvador, while storm is the most serious peril in Honduras (Figure 16). Although drought seems to be of low severity and frequency as measured solely by financial losses, its impact on the vulnerable population is significant: it affects a larger proportion of the population than all other perils in the region. It is worth noting that accurately estimating the economic impact of drought is difficult because of its slow onset. The three countries' diverse risk profiles in terms of magnitude and severity of losses may enable some risk diversification benefits through risk pooling arrangements.

Figure 16. Risk profiles for NCA countries: Economic loss per occurrence of each peril (US\$, millions)



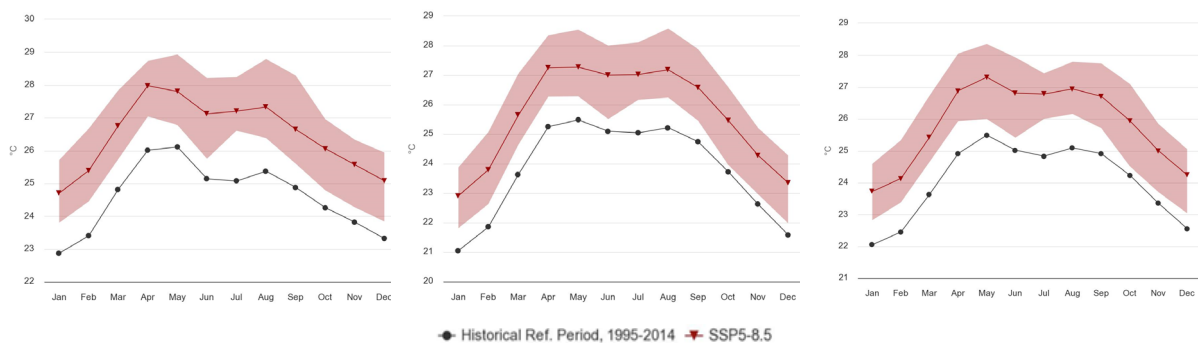
Sources: Calculations by World Bank staff based on EM-DAT: The International Disaster Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain, Brussels, <https://www.emdat.be/>; Government of El Salvador. 2021. Government of El Salvador 2022, Government of Guatemala 2019, Government of Guatemala 2018, Government of Guatemala 2017, Government of Honduras 2020, Hannah, L. et al. 2017, Inter American Development Bank 2021.

The region is exposed to geophysical hazards (earthquakes and volcanic activity), but cyclones and hydrometeorological hazards (flood, storm, extreme temperature, and drought) occur the most frequently and cause the most human and material losses. Losses in the agricultural sector are driven by excessive rainfall and drought coupled with socioeconomic vulnerability, particularly among the poor and rural populations. Over the last 30 years, losses associated with drought in the Central American Dry Corridor approached US\$10 billion, half of which were in the agricultural sector (Pons 2021). Droughts associated with the ENSO phenomenon caused agricultural losses estimated at US\$465 million in 2014 alone. In Guatemala, drought is estimated to have affected nearly 6 million people and resulted in losses of about US\$331 million between 1994 and 2018 (GoG 2021). In El Salvador, the agricultural sector and transportation sector have suffered the worst impacts from severe disaster events. The two sectors combined accounted for more than 50% of damage and losses over the period (GoES 2021). Between 2015 and 2020, El Salvador lost US\$22 million in basic grains, vegetables, and fruits, the bulk due to tropical storms in 2020. In Honduras, the 2019 drought led to a state of food emergency, with reported losses of 72% for corn and 75% for beans (Masters 2019). In 2001, Honduras suffered an El Niño-induced drought that led to agricultural losses of US\$30 million, and in 1998, it suffered economy-wide damage of over US\$3.7 billion, including over US\$2 billion in agriculture, from Hurricane Mitch (UNDP 2013).

2.4. Impact of climate change on agriculture

As climate change worsens, it is expected to have significant impacts on crop suitability and productivity and on the incidence of agricultural pests and diseases, which in turn will affect socioeconomic well-being. Temperatures in Central America have already increased between 0.2°C and 0.3°C per decade with a prolonged and hotter dry season. As temperatures rise between 2.1°C and 3.3°C, particularly daily maximum temperatures (see Figure 17), the NCA countries are expected to experience increased aridity and drought and more extreme weather events. With increasing heat, the likelihood of altered growing seasons also increases, as does the risk of heat stress for a range of crops and livestock and for dairy production throughout the year (Hannah et al. 2017).

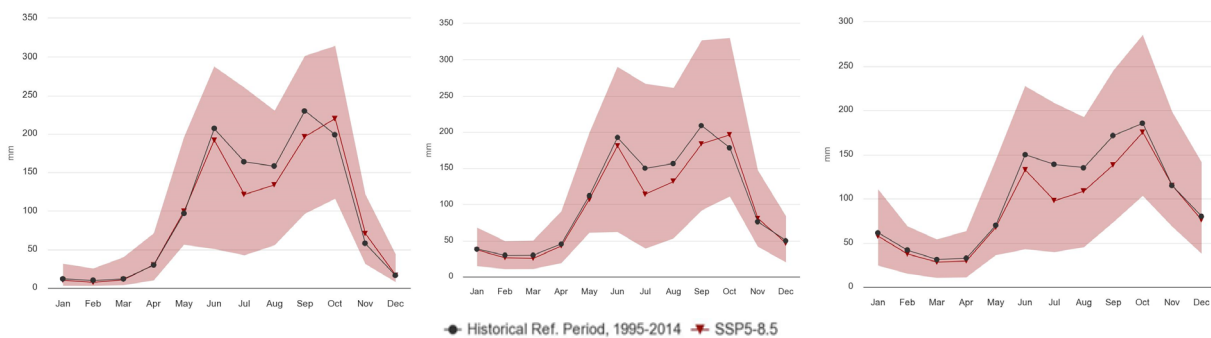
Figure 17. Projected change in average daily maximum temperature in NCA countries for 2040–2059 (RCP8.5, reference period 1995–2014, multi-model ensemble)



Source: Climate Change Knowledge Portal, <https://climateknowledgeportal.worldbank.org>.
Note: RCP = Representative Concentration Pathway; SSP = Shared Socioeconomic Pathway.

Precipitation trends in NCA countries show more interannual and spatial variability, but overall lower rainfall is expected between June and September (see Figure 18). Conditions are also susceptible to El Niño Southern Oscillation, which brings extremely hot and dry conditions to the Pacific. Alternatively, La Niña is associated with extreme rainfall.

Figure 18. Projected climatology of precipitation in NCA countries for 2040–2059 (RCP8.5, reference period 1995–2014, multi-model ensemble)



Source: Climate Change Knowledge Portal, <https://climateknowledgeportal.worldbank.org/country>.
Note: RCP = Representative Concentration Pathway; SSP = Shared Socioeconomic Pathway.

Altered rainfall patterns and rising temperatures will significantly impact the region's subsistence crops—rice, beans, and maize—as well as a key cash crop, coffee. Suitable areas for agricultural productivity will change, with some areas gaining productivity for certain crops and others losing productivity. Climate modelling studies suggest loss of yield and area suitable for coffee cultivation due to climate change. El Salvador faces a decrease in suitability of 40%

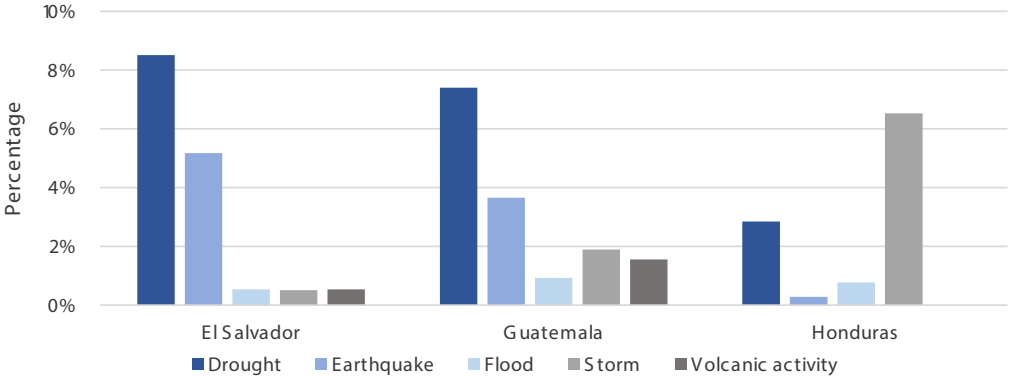
or more due to expected increases in temperature,³⁴ while Guatemala and Honduras face losses in suitability of 19% and 27%, respectively. Coffee yields across the NCA are estimated to have declined by 6.4% as of 2020, with a further decline of 38% by 2100 (Hannah, L., et al 2017).

Notable declines in suitability and yield of staple subsistence crops are projected across most parts of NCA based on regional and national models as well as the Intergovernmental Panel on Climate Change (IPCC). These modeling results are complemented by the strong perception among farmers in the region that climate change and variability are already reducing crop productivity, causing crop losses, and affecting water availability. For maize, suitability decline is widespread, with up to 34% in yield decline for El Salvador, Guatemala, Honduras, and Nicaragua (Schmidt et al. 2012). Beans yield projections vary; some studies project a 10% fall even after adjusting for the increased investment in productivity (Sanders et al 2019) , and one regional study shows a decrease in yield of up to 19.3% across Central America (CEPAL and CAC/SICA 2014a, 2014b). Rice yields are expected to decline by 15 to 25% without adaptation measures and by 5 to 15% with adaptation measures by 2050 (Confalonieri et al. 2012). For sorghum, decreases of up to 15% in suitable area are projected for the Pacific lowlands, and increases of up to 40% are expected in mountainous areas and on the Atlantic Coast (Ramírez-Villegas et al. 2013).

2.5. Impact of climate change on poverty and migration

Drought across the NCA and storm in Honduras are the hazards that have the most widespread impact on populations (Figure 19). Levels of food insecurity rose to 32% in the Dry Corridor of the NCA countries following drought in 2014 (WFP 2017). The COVID-19 pandemic and Hurricanes Eta and Iota in 2020 contributed to annual economic contractions of nearly 9% in Honduras, 8.2% in El Salvador, and 1.8% in Guatemala. Many rural families sold off land and migrated (CRS 2023). According to the World Food Programme, the number of food-insecure people in North Central America nearly tripled between 2019 and late 2021, from 2.2 million to about 6.4 million (WFP, 2020). A total of 7.7 million people in El Salvador, Guatemala and Honduras faced moderate to severe food insecurity in 2023.³⁵

Figure 19. Historical average population affected by select perils in NCA countries



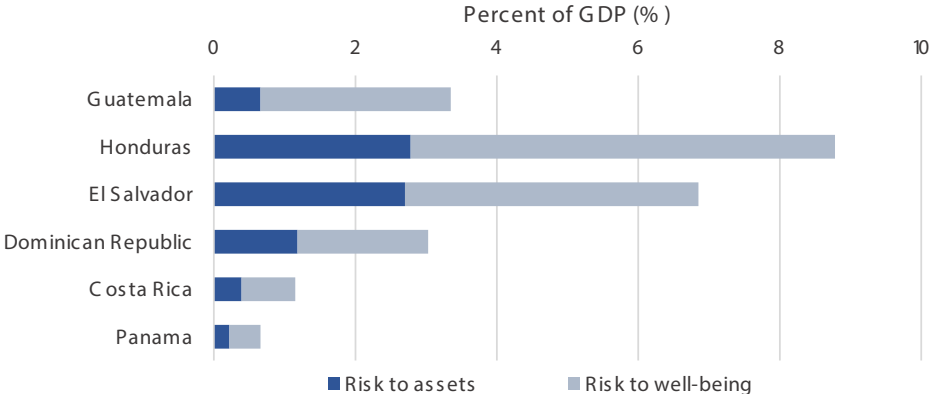
Sources: Calculations by World Bank staff based on EM-DAT: The International Disaster Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain, Brussels, <https://www.emdat.be/>; Government of El Salvador. 2021. Government of El Salvador 2022, Government of Guatemala 2019, Government of Guatemala 2018, Government of Guatemala 2017, Government of Honduras 2020, Hannah, L. et al. 2017, Inter American Development Bank 2021.

34 According to Ovalle-Rivera O., et al. (2015), temperature is the major driver of changes in suitability for coffee due to a relatively small thermal range compared to other crops.
 35 Humanitarian Action. 2023. Global Humanitarian Overview 2024. <https://humanitarianaction.info/document/global-humanitarian-overview-2024/article/latin-america-and-caribbean-1>

Rural households and women are the groups most severely affected by disasters and climate change. The UN estimates that 80% of people displaced by climate change are women, and women and girls make up around 50 % of any internally displaced population (UN 2022). A study of 141 countries found that more women die from disaster events than men (Neumayer and Plümpner 2007). Across NCA the poverty rate of women from 20 to 59 years of age is higher than that of men. The femnity index of poor households in Honduras (104.1), Guatemala (104.5) and El Salvador (111.3).³⁶ In Honduras and El Salvador, more than 62% of adult women are multidimensionally poor (UNDP 2023). Poverty is also considerably higher among rural and indigenous and Afro-descendant populations (IDB 2023). The situation is generally worse in Guatemala, where the poverty rate among indigenous is nearly 80 percent (Brookings 2022), nearly half the population and around 75% of family farmers live in rural areas (FAO 2018); Guatemala also has the fifth highest level of children suffering from undernutrition globally (USAID 2022). In Honduras the rate of poverty in rural areas (71% of rural population) is more than double the rate in urban areas (33%). Notably, urban poverty is on the rise as landless families migrate to cities to seek employment opportunities, consequently creating higher unemployment rates in urban areas than rural areas (World Bank 2023).

The correlation between disasters, food insecurity, and poverty in the region is significant; indeed, the risk to well-being losses is estimated to be at least 50% higher than the risk to assets (Figure 20). Low-income households are more adversely affected than higher-income peers. They tend to reside in more hazardous environments, such as low-lying areas prone to flooding or landslides; they tend to lose a higher percentage of their overall and productive wealth in the event of a disaster; and their limited asset base means they tend to pay a relatively higher cost for mitigating and coping with risk. This results in a diminished ability to cope with and recover from disasters (Hallegatte et al. 2017; UNDP 2008). It also leads households to use negative coping strategies, such as skipping meals or selling agricultural tools and farm animals to pay for food—and then waiting until the next planting season to work their farm, usually six or more months ahead.

Figure 20. Risk to assets and well-being in Central America



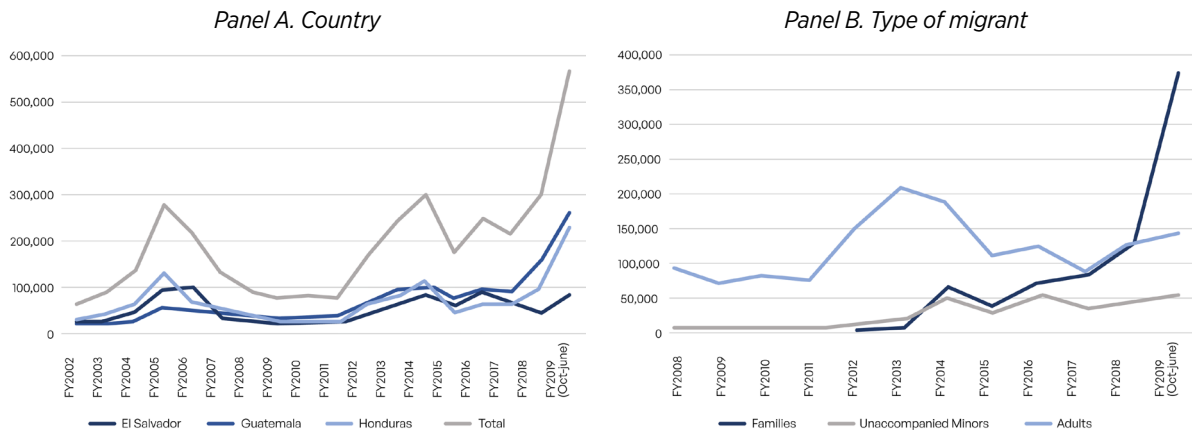
Sources: Hallegatte et al. 2017.

Migration in NCA is often characterized as mixed and complex, but the lack of economic opportunity, persistent security concerns, and food insecurity are dominant drivers. Migration to the United States from NCA spiked in 2012 and has been increasing rapidly since 2017, primarily driven by families and unaccompanied minors from Guatemala and Honduras. From October 2017 to June 2019, the number of migrants from Guatemala nearly doubled, while migrants from

³⁶ The femininity index compares the percentage of poor women and men from the age of 20 to 59 years. It shows how many times the incidence of poverty (indigence) is greater among women than among men. <https://oig.cepal.org/en/indicators/femininity-index-poor-households>

Honduras nearly tripled (Figure 21). In 2019, a total of 3.8 million people immigrated to the US from the seven Central American countries, 86% of them from NCA (Angelo 2021). A World Food Programme internet survey of the region found that individuals experiencing moderate or severe hunger were two to three times more likely to be making concrete preparations to migrate than those who were not. Other factors contributing to migration include government corruption, gang activity, and high homicide rates that affect parts of the region (Angelo 2021; CRS 2023).

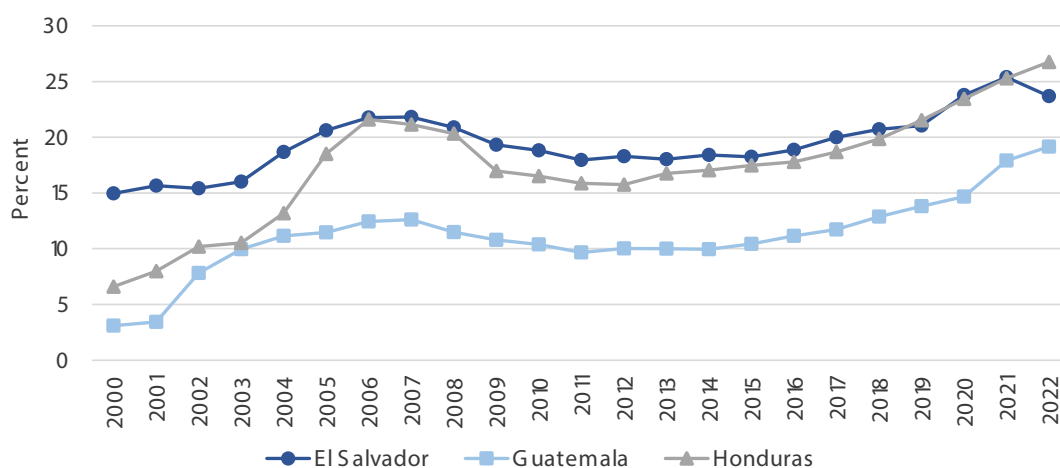
Figure 21. Migration from NCA to the US by country and type of migrant, 2002–2019



Sources: Sigelmann 2019.

Personal remittances from families who have migrated abroad to live and work make up a very significant share of the economies in NCA countries. In 2021 they contributed more than a quarter of GDP in El Salvador and Honduras and 18% in Guatemala. Up to 1990, the level of remittances from abroad was extremely low in NCA countries, but in the past 30 years, as huge numbers of people have migrated each year to seek employment and a better way of life, remittances have risen hugely. In 2021 they were equivalent to US\$7.5 billion, or 26.1% of GDP, in El Salvador, and to US\$7.2 billion, or 25.3% of GDP, in Honduras. In 2021 remittances in Guatemala amounted to US\$15.4 billion, or 17.9% of GDP (Figure 22).

Figure 22. Personal remittances received in NCA, 2000–2021 (% of GDP)



Sources: World Bank, World Development Indicators, <https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=GT-SV-HN>.

3

Disaster Risk Finance and Insurance Policies in NCA and Gap Analysis

Box 2. Key takeaways from Chapter 3

- Disaster risk finance contributes to sustainable and resilient development by ensuring that financial resources are prearranged, thus enabling predictable and timely response to disasters and in turn making disaster response more effective and less expensive.
- International experience shows that combining/layering different instruments to meet the costs of events of different frequency and severity is the most cost-efficient approach, as no single financial instrument can address the full range of risks.
- Guatemala, Honduras, and El Salvador all adopted DRFI strategies in the past five years, but implementation remains a challenge, often due to challenges with coordination. Total prearranged financing in 2022 was estimated at about US\$77.5 million (less than 0.09% of GDP) in Guatemala, US\$520 million (1.81% of GDP) in El Salvador, and US\$300 million (1.05% of GDP) in Honduras.
- Very few existing DRFI instruments directly benefit family farmers. Contingent credit—such as a World Bank Development Policy Loan with a Catastrophe Deferred Drawdown Option [CAT-DDO]—provides general budget support, and CCRIF provides liquidity to the central government for physical emergency relief. These instruments do not transfer funds directly to affected households.
- In Guatemala and El Salvador there are efforts to use credit-linked insurance and partial credit guarantees, or shock-responsive financial solutions to support farmers, e.g., debt relief programs in Honduras in response to the October 2018 floods. However, the scale and coverage of these solutions have been too small to meaningfully address the need. Further analysis of the impact and the potential of these solutions may be considered to better serve the needs of this segment of family farmers.
- There is a significant protection gap in the agriculture sector—for example, 87% of total agriculture losses in Guatemala were left unfunded, with public expenditure for drought accounting for less than 3% of total disaster expenditures (1994–2018).

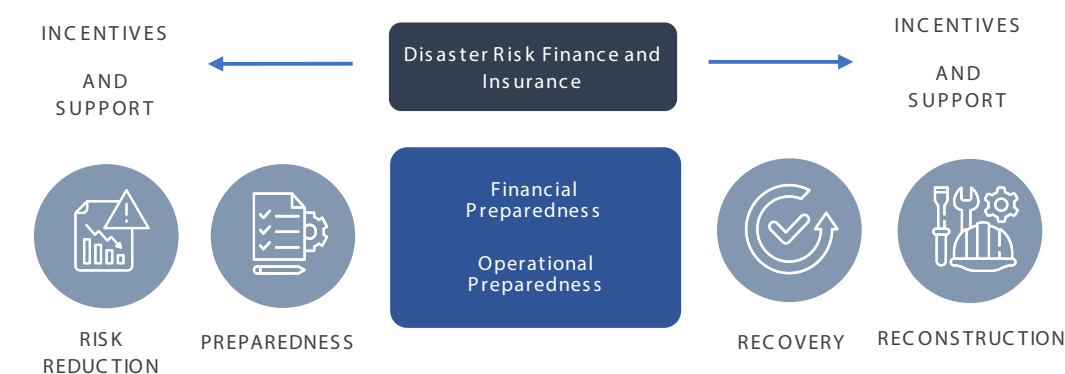
- Development assistance is a significant source of funding for disaster response in NCA. However, the humanitarian funding gap remains significant; it was estimated at 81% in Guatemala, 47% in Honduras, and 35% in El Salvador between 2017 and 2022. More support has been channeled toward food security and nutrition, which is critical; but in the long-term, this does not strengthen the financial resilience of the agricultural sector and family farmers.
- Social protection systems are oriented toward short-term relief as well as education and employment access rather than long-term livelihood protection. Further expenditure and coverage of social protection programs in NCA is still low compared to other lower-middle-income countries. The building blocks for shock-responsive social protection (social registry, targeting, payment systems, objective triggers, and prearranged funds) are at a nascent stage and could be complemented through macro-level DRFI instruments.

3.1. An overview of disaster risk finance and insurance

Disaster risk finance and insurance involves prearranging financial resources to ensure predictable and timely availability of resources and in turn improve the effectiveness and reduce the cost of disaster response. This financial protection helps affected governments, businesses, farmers, households, and the most poor and vulnerable cope with, and recover quickly from, the impact of shocks, thereby increasing their financial resilience. It reduces the cost of response by binding partners to preagreed objectives, decision processes, and implementation modalities and by promoting greater discipline, transparency, and predictability in post-disaster spending. A cost-benefit analysis of DRFI for small-scale agricultural producers found that US\$1 invested in rapid response reduced humanitarian spending by US\$2.9. The analysis further found that support is cheaper if provided earlier as the cost of support to drought-affected households increased from US\$50 after four months to US\$1,300 after six to nine months (Clarke and Hill 2013).

DRFI contributes to sustainable and resilient development. It is a critical component of a comprehensive approach to disaster risk management (DRM) that complements risk reduction, preparedness, and recovery measures. Risk finance instruments can contribute to risk reduction and preparedness, for example by pricing risk and by establishing clear rules for managing risk and for bearing the costs for post-disaster response, including clear assignment of responsibilities. Similarly, by reducing damage and the subsequent recovery cost, risk management measures reduce disaster-related contingent liabilities (Figure 23).

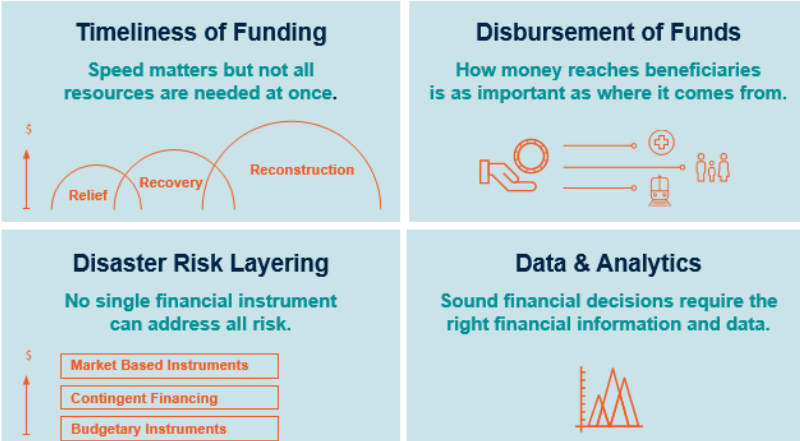
Figure 23. DRFI as a core part of disaster risk management



Sources: World Bank.

The core principles of disaster risk finance that have emerged from over a decade of implementation and learning by countries around the world provide a framework that helps decision-makers evaluate policy decisions and financial mechanisms to ensure DRFI strategies meet policy objectives. Figure 24 summarizes the four core principles. The application of these principles may differ from one country context to another, as well as for different sectors. Furthermore, the timing needs, disbursement mechanisms, and risk layering approach within the agriculture sector may differ depending on strategic priorities. Protecting food security and livelihoods may require less funding that is supplied more rapidly, while protecting agricultural assets may require more funding that is supplied less rapidly.

Figure 24. Four core principles of DRFI

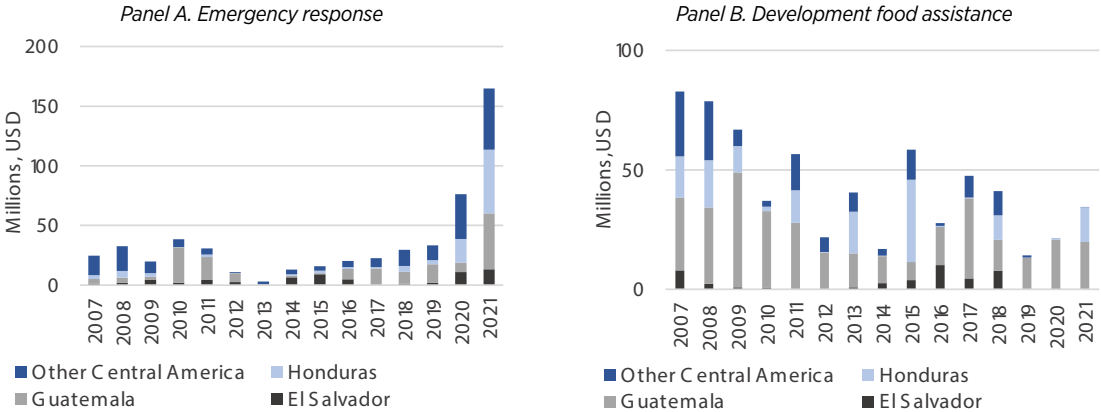


Sources: World Bank 2012.

3.2. Humanitarian funding in response to disasters

Development assistance is a significant source of funding for disaster response in NCA. Contributions to NCA form more than two-thirds of the resources provided to the Central American region. Emergency response to the NCA increased sixfold in 2021 from US\$20 million in 2019, having doubled to nearly US\$40 million in 2020. While support for emergency response has been increasing, support for development food assistance has generally been declining (Figure 25). The decline in support to farmers and food producers compromises long-term development efforts to build resilient food systems and exacerbates the impact of shocks in the short term.

Figure 25. Official development assistance flows for emergency response and development food assistance in Central America, 2007–2021

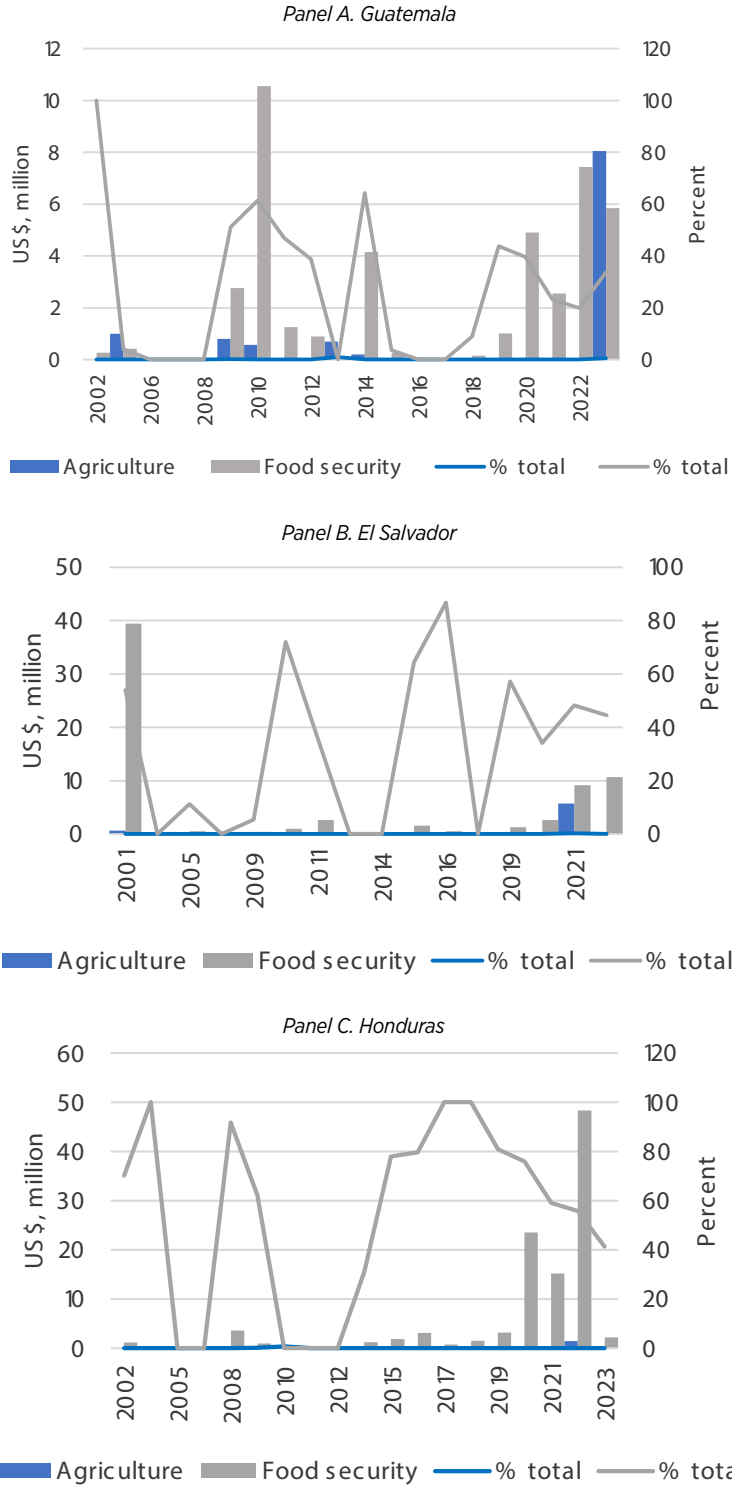


Source: Organisation for Economic Co-operation and Development, Stat Credit Reporting System database, <https://stats.oecd.org/Index.aspx?DataSetCode=crs1>.

Note: Emergency response includes emergency food assistance, relief material and services, relief coordination, and support services.

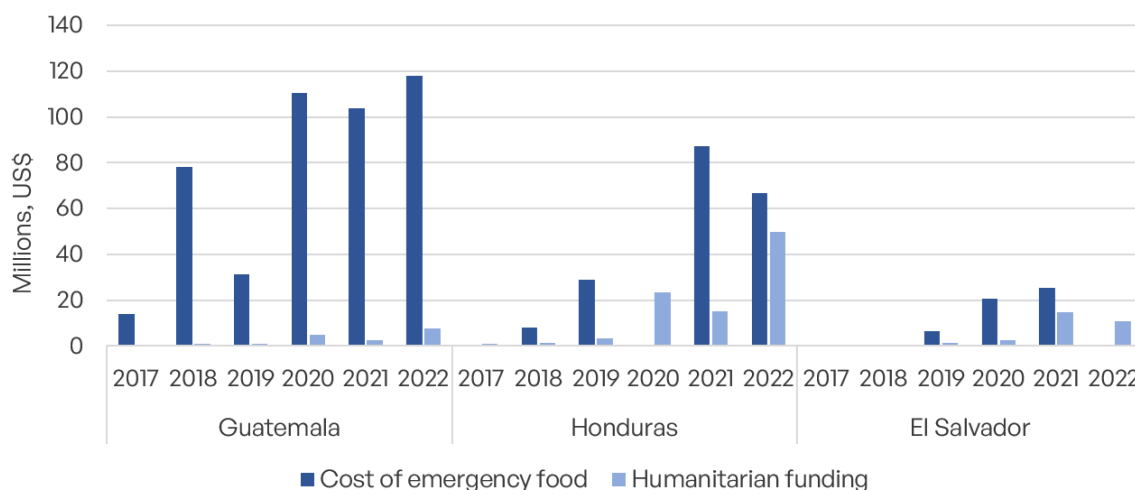
Overall support to the agriculture sector has been low, on average ranging between 3% and 8% of total humanitarian assistance in the three countries. More support has been channeled toward food security and nutrition, which is critical; but in the long-term this support does not strengthen the financial resilience of the agricultural sector and family farmers. Figure 26 compares assistance for agriculture versus food security in the NCA countries.

Figure 26. Official development assistance flows for agriculture and food security in NCA, 2002–2021



Source: Financial Tracking service (FTS), <https://fts.unocha.org/>.

Figure 27. Humanitarian funding gap in Guatemala, Honduras, and El Salvador, 2017–2022



Source: Financial Tracking service (FTS), <https://fts.unocha.org/>; Integrated Food security Phase Classification (IPC), <https://www.ipcinfo.org/ipc-country-analysis/population-tracking-tool/en/>.

Note: Humanitarian funding is from FTS. Costs of emergency food are estimated based on number of people in IPC Phases 3+. The estimate assumes that the cost of emergency food relief is US\$30 per person.

3.3. Disaster risk financing in NCA

NCA governments recently adopted DRFI strategies that aim to establish risk-layered financing:³⁷ however, none of the strategies makes provision for financial protection of farmers. All three strategies make high-level provisions to support the development of domestic insurance markets; the goal is to make more risk transfer instruments available for private use in sectors that are exposed to disasters, such as agriculture, agro-industry, and tourism. However, these strategies make no provision for the role of the public sector in providing agricultural insurance or any other DRFI mechanisms. There are no policies in place that relate to insurance or agriculture insurance. Guatemala drafted an Agricultural Insurance Policy in 2016, but it was never enacted. In 2009 Honduras created an Agricultural Insurance Committee (Comité de Seguros Agrícolas [CSA]) and Risk Unit (Unidad de Riesgo) within the SAG to promote agricultural insurance, but these entities are no longer operational. Both countries implemented policies to enable provision of insurance premium subsidies between 2009 and 2018 (see Section 4.4 for more details).

The GoG has a comprehensive risk-layered financing mechanism, including sovereign risk insurance and multiple retention funds, while the GoES has historically relied on ex post reallocation and borrowing, and the GoH on contingent credit and Contingency Emergency Response Components (CERCs). Total prearranged financing in 2022 shown in Table 7 was estimated at about US\$77.5 million (less than 0.1% of GDP) in Guatemala, US\$520 million (1.8% of GDP) in El Salvador, and US\$300 million (1.1% of GDP) in Honduras.

³⁷ This approach entails financing disaster response using a combination of risk retention and risk transfer instruments, considering funding needs, timeliness, and frequency and severity of events.

Table 7. The status of risk financing in Guatemala, El Salvador, and Honduras

Instruments		El Salvador ^a	Guatemala ^b	Honduras ^c
Risk transfer	Sovereign insurance	None	CCRIF SPC excess rainfall coverage limit: US\$7.16 million	CCRIF SPC excess rainfall coverage limit: US\$7.3 million
	Livelihood insurance	Index insurance against excessive rainfall, drought, and earthquake; credit-linked index insurance for loans of US\$10,000+ at 4.6% of loan value targeting 50,000 BFA clients ^d	Index insurance: 40,000 farmers covered with 70% to 100% premium subsidies through MAGA and Guate Invierte	Pilot for farmers offering insurance bundled with financial tools for the agricultural sector (e.g., <i>cajas rurales</i>)
	Agriculture insurance	Indemnity insurance for cotton farmers (premium subsidy)		Mandatory credit-linked insurance for farmers through BANADESA (National Bank for Agricultural Development)
	Partial credit guarantee funds	None	Guate Invierte: 80% credit guarantee fund for farmers and herders	None
Risk retention	Contingent credit	World Bank: US\$60 million (2021) JICA: US\$46.1 million (2020) IDB: US\$400 million (2021)	IDB: US\$400 million (2021)	World Bank: US\$110 million (2022–2025) IDB: US\$400 million (2021)
	Contingency funds	Civil Protection, Disaster Prevention and Mitigation Fund (FOPROMID) Emergency, Recovery and Economic Reconstruction Fund (FERRE) Fund for Emergencies in Coffee (FEC)	Emerging Fund (cumulative): Q 300 million (2017)	Agriculture Contingency Fund
	Budgetary mechanisms	Budget reallocation: 21% of national budget for COVID-19 response	Budget reallocations: n.a. National Permanent Fund for Disaster Reduction National Climate Change Fund: Q\$50 million (2022)	Budget reallocation: 2% of national expenditure National Preparedness and Response Fund (FONAPRE)

Source: Authors analysis based on Disaster risk finance strategies, information from interviews with officials from CABEL and IDB available here for El Salvador, here for Guatemala and here for Honduras.

Notes: BFA = Banco de Fomento Agropecuario; CABEL = Central American Bank for Economic Integration; CRIFF SPC = Caribbean Risk Insurance Financing Facility Segregated Portfolio Company; IDB = Inter-American Development Bank; JICA = Japan International Cooperation Agency.

- In El Salvador, FERRE was established by Articles 11 to 14 of DL N°608 of 2020. The government offers 50% subsidy on premium payments only for this product as part of a program to resuscitate the cotton subsector. The Fund for Emergencies in Coffee (FEC) was created in August 2000 and modified in 2006.
- Guatemala annual budget lines include Emergencies and Public Calamity and Formation of the Emergency and Public Calamities Fund. Resources are not cumulative. The Emerging Fund is the Fondo Nacional Emergente, which was created by Governmental Agreement 105-2012. The National Permanent Fund was established in the CONRED (Coordinadora Nacional para la Reducción de Desastres) Law and Regulations, Decree 109-96 and Governmental Agreement 49-2012. The National Climate Change Fund (Fondo Nacional de Cambio Climático, FONCC) was established under the Ministry of Environment and Natural Resources.
- In Honduras, FONAPRE was created as part of the National Disaster Risk Management System (SINAGER Law, Article 21).
- Ayala 2018.

Guatemala’s strategy, which was adopted in 2018, aims to promote the development of the insurance market and increase insurance penetration, among other strategic priorities.

Implementation of this strategy has been challenging owing to the lack of a formal coordination platform. The National Permanent Fund for Disaster Reduction and the Emergency Fund are the main risk retention instruments used for recurrent medium loss events, and neither has been accessed by the Ministry of Agriculture.³⁸ The Emergency Fund is accessed by public sector entities on declaration of a state of public calamity. However, regulations on the criteria and conditions to

38 The Permanent Fund is used to finance disaster prevention, mitigation, preparedness, response, and recovery. It is financed through an annual budget allocation and is noncumulative. The Emergency Fund is an accumulating deposit account administered by Guatemala’s Ministry of Finance and used only for emergency response to mitigate damage caused by natural events upon declaration of a disaster. It is financed through an annual budget allocation and voluntary contributions from extractive industries.

access and utilize the funds, as well as allowable expenditures, have yet to be developed.³⁹ The National Climate Change Fund (Fondo Nacional de Cambio Climático [FONCC]) was established in 2022 for risk management of extreme weather events, vulnerability reduction, forced adaptation, and forced mitigation.⁴⁰ Agriculture is a priority sector for both adaptation and mitigation, and therefore use of FONCC to support family farmers would be consistent with the objectives of the fund. Guate Invierte (Fideicomiso) formerly provided subsidies for credit-linked agricultural insurance, and it continues to provide partial credit guarantees to enable mainly rural agricultural livestock producers and artisanal producers access to working capital. Guatemala has over a decade of experience using sovereign contingent credit, having mobilized a total of US\$285 million between 2010 and 2023.⁴¹ This includes World Bank CAT-DDOs, which it used to respond to a tropical storm (Agatha) and the simultaneous eruption of a volcano (Pacaya), and more recently to COVID-19. None of the CAT-DDOs were used for the agriculture sector or to support farmers specifically.

The GoES adopted a Disaster Risk Financial Management Strategy in 2021. Two of its five strategic priorities are highly relevant to the DRFI solutions for family farmers: strengthening mechanisms and procedures for identifying, quantifying, and evaluating the fiscal risk of disasters; and adopting a risk financing strategy. The latter includes assessing the viability of promoting insurance market penetration in sectors exposed to disaster risk (such as agro-industry or tourism). Overall, however, the strategy has a gap in terms of operational preparedness.

In El Salvador, the most widely used instruments are budget reallocations, contingent credit lines (with the World Bank and Japan International Cooperation Agency), and post-disaster debt issuance. Two of its three funds—the Fund for Emergencies in Coffee (FEC) and the new Emergency, Recovery and Economic Reconstruction Fund (FERRE)—were created in 2020 to support farmers. FEC provides coffee farmers an advance payment of US\$25 per 100 kg of coffee produced over the last two years.⁴² FEC, which is managed by the Salvadoran Coffee Council, was initially capitalized by issuance of a US\$80 million 10-year bond.⁴³ It also receives contributions from coffee producers estimated at US\$5 per 100 kg sold/exported. A contingency reserve of 10% of the value of the fund is set aside to support producers in the event of disasters. FERRE was created to protect poor households, livelihoods, and the micro, small, and medium enterprise (MSME) and agricultural sectors. It was mainly funded through emergency borrowing. Funds were used to provide cash transfers to vulnerable households, wage subsidies, and liquidity facilities for MSMEs.

The GoH adopted its Disaster Risk Financial Management Strategy in 2020. The strategy aims to strengthen fiscal resilience and financial capacity for response to disasters associated with natural phenomena, the adverse effects of climate change, and public health emergencies. The strategy includes strengthening the financial sector to increase number of risk transfer instruments available for use by the private sector (such as agricultural insurance) and the state (public goods insurance).

In Honduras, the National Preparedness and Response Fund (FONAPRE) is intended to be the main risk retention instrument. However, its technical design makes it inadequate for addressing

39 Still unclear is who can access, when, and under what criteria. The World Bank is providing technical assistance to design and establish a DRM Fund based on successful international practices. However, the sustainability of this effort remains a challenge, given that conducting regulatory reforms to establish a DRM Fund is not considered as part of the current government's agenda.

40 FONCC is funded by public or private sources, including budgetary allocations, climate change debt swaps, climate change securities, international funds, and donations, as well as fines, environmental compensation (e.g., proceeds from carbon credits), and tariffs. Risk management of extreme weather events covers the local to the national level, including prevention systems and the provision of basic services in cases of emergency.

41 Staff calculations based on World Bank Catastrophe Deferred Drawdown portfolio review.

42 Global Regulation, "Law of Creation of Emergency Fund for Coffee," <https://www.global-regulation.com/translation/el-salvador/3370068/law-of-creation-of-emergency-fund-for-coffee.html>.

43 The Free Library, "Emergency Fund for Coffee Growers," <https://www.thefreelibrary.com/EMERGENCY+FUND+FOR+COFFEE+GROWERS.-a064162954>.

the scale of the needs across all sectors, including agriculture. FONAPRE is a budgetary mechanism to channel resources from various sources to emergency assistance. It does not have annually allocated resources and cannot accumulate funds.

3.4. Existing climate resilience programs for family farmers by government, humanitarians, and development partners

Table 8 summarizes the main ongoing and former programs supporting family farmers in the region. These include government programs as well as programs implemented by development and humanitarian partners. Depending on government priorities, these present opportunities to embed agricultural insurance. However, taking advantage of these opportunities would require a robust coordination mechanism to ensure that the right farmers are targeted.

Table 8. Main programs supporting family farmers in NCA

El Salvador	Guatemala	Honduras
Government programs		
Master Plan to Rescue Agriculture	Guate Invierte and FONADES	CNBS debt relief program
Food sovereignty and agriculture rescue	Partial credit guarantee scheme	Implemented in response to floods in 2018
Coffee rescue	Agriculture insurance premium subsidies	Enabled financial institutions to restructure or refinance loans to agriculture, forestry, and fisheries
Implementation of National Agricultural Policy	MAGA Seguro Colectivo Paramétrico for small farmers	BANHPROVI
	MAGA fully finances the agricultural insurance premiums (100% subsidies)	Provided 50% premium subsidies between 2008 and 2018 to BANADESA crop credit insurance clients
	Program launched in 2021/22	
Development programs		
WFP with Ministry of Agriculture and Livestock		AgroMoney implemented by Cadelga Group and IFC
Emergency preparedness and response through emergency food assistance		Microcredit package consisting of input loans and irrigation technology
Resilience-building programs through inclusive climate risk management		
Market access programs		
Integration of smallholder agriculture risk transfer into existing programs, e.g., MICRO-designed drought and excess rain index insurance to vulnerable farmers, women's groups, and micro enterprises (see Chapter 4 for details)		
UNDP with Ministry of Environment and Ministry of Agriculture	JICA with Ministry of Agriculture and Livestock	Alternative Community Economy Network (COMAL)
Nature-based climate change adaptation project in South Ahuachapan	Seeks to improve livelihoods of producers through financial and technical assistance to cooperatives in specific value chains, coffee and	Climate resilience and food security through economic empowerment and agricultural system transformation in three target Dry Corridor areas
	Potentially delivered through BANRURAL	Targets women's groups and aims to empower their participation and leadership in cooperatives and
	Fintech platform for financial institutions and agtech services for	
	Federation of Cooperatives of the Verapaces (FEDECOVERA, R.L.)	International Fund for Agricultural Development (IFAD) with the GoH
	Provides aggregation and market facilitation services for coffee and	Implements Developing Resilience in Sula Valley project
	Provides low-interest loans with training on financial literacy, business skills, and agricultural technologies	Jointly funded by IFAD and the Green Climate Fund
		Promotes small-scale climate-smart agriculture in the country
	Food and Agriculture Organization (FAO) in Honduras and Guatemala	
	Supports community contingency funds created and managed by associations of producers to support their members in an emergency	
	Provides funds to households that lack access to insurance or formal finance systems to enable them to cope with and recover from the impact of droughts, hurricanes, floods, and earthquakes	
	Encourages good agricultural practices, income-generating activities, early warning systems, and community disaster risk management plans	
Humanitarian programs		
USAID Bureau for Humanitarian Assistance		
Food assistance		
Economic recovery		

Source: World Bank compilation.

Note: BANADESA = Honduran National Bank for Agricultural Development; BANHPROVI = Honduran Bank of Production and Housing; BANRURAL = Rural Development Bank; CNBS = National Banking and Insurance Commission; IFC = International Finance Corporation; JICA = Japan International Cooperation Agency; MAGA = Ministry of Agriculture, Livestock and Food; MICRO = Microinsurance Catastrophe Risk Organisation; UNDP = United Nations Development Programme; USAID = United States Agency for International Development; WFP = World Food Programme.

The GoG supports rural and agricultural development through an economic development fund (FONADES) and a credit guarantee fund (Guate Invierte). Guate Invierte provided 70% premium subsidies to increase affordability of credit-linked agricultural insurance between 2005 and 2022 (at a total cost of US\$3.4 million), as well as up to 80% partial credit guarantees to crop and livestock producers to enhance access to credit, covering 6,525 loans between 2005 and 2022.⁴⁴

FONADES is an economic development agency under Guatemala’s Ministry of Agriculture that was established to promote comprehensive rural development through the transformation and modernization of the agricultural, forestry, and hydrobiological sectors, with the ultimate goal of achieving food security, sovereignty, and competitiveness. FONADES receives a total of Q 10.64 million annually. It is responsible for implementing the Food and Nutrition Security Policy. FONADES’s strategic objectives include providing risk management information to prevent and mitigate damage caused by natural disasters; coordinating programs and projects that help mitigate the effects of recurring natural disasters and socioeconomic crises by providing food; and strengthening the agricultural and rural financial system by creating mechanisms that encourage strategic investments in rural territories. The strategic objectives of FONADES are well aligned to and could be achieved by improvement and scale-up of the MAGA agriculture insurance program.

The GoES’s Disaster Recovery Framework (DRF) 2022 and Sectoral Investment Plan for Economic Revitalization and Disaster Resilience (2021) identify agriculture as a priority sector. With support from development partners, GoES is implementing a range of programs and projects to support family farmers within the framework of the Master Plan to Rescue Agriculture. The framework defines the policy and strategy for recovery, the financing mechanisms, and the institutional and implementation arrangements. Financing is coordinated by the Ministry of Finance and includes investment loans, budget reorientation, and budget expansion. The Master Plan to Rescue Agriculture aims to transform livestock and agricultural production, making it more profitable and efficient. It provides for assistance, technology, and monitoring of the sector and will be financed by the creation of two trusts, one for coffee rescue and one for food sovereignty and agriculture rescue. The plan has three main pillars—food sovereignty and agriculture rescue, coffee rescue, and rural development—and aims to stimulate the production chain, dignify producers, and create 2 million jobs. The food sovereignty and agriculture rescue fund has received US\$635 million, while the coffee rescue fund has received US\$637 million. The plan includes short-term actions, such as the implementation of the National Agricultural Policy (Infoagro.com 2021).

The GoES is also working with development partners—including WFP, United Nations Development Programme (UNDP), and the International Fund for Agricultural Development (IFAD)—on programs aimed at supporting family farmers. WFP is working with the MAG to support programs focused on smallholder agriculture risk transfer (see Chapter 4 for details). The UNDP is supporting the Ministry of Environment and MAG in implementing a nature-based climate change adaptation project in South Ahuachapan to protect livelihoods (UNDP 2021).⁴⁵ The region relies mainly on agriculture and livestock production; and livelihoods and food security are being threatened by erratic precipitation patterns, high temperatures, unsustainable land management practices, and an increase in extreme weather events.

44 Based on reports shared by Guateinvierte.

45 Activities involve integrating forest landscape restoration to increase forest cover, improving the hydrological cycle, increasing the amount of available water, and regulating surface water and groundwater flows to reduce the impact of extreme weather on this vulnerable landscape.

In Honduras, private sector-driven programs are addressing access to credit and strengthening physical resilience of smallholder farming systems. With support from the Private Sector Window of the Global Agriculture and Food Security Program (GAFSP), the Cadelga Group, one of the largest distributors of agricultural products and services in Honduras, partnered with the International Finance Corporation (IFC) to launch AgroMoney, which provides a microcredit package that lends family farmers fertilizer, seeds, and irrigation technology.⁴⁶ Between the program's start at the beginning of 2019 and the end of June 2022, around 3,150 Honduran farmers—mainly from Santa Bárbara, Comayagua, Francisco Morazán (Anillo Verde), and Santa Rosa del Copan—had received a total of US\$5.6 million in loans. To keep the cost of credit low, farmers pay interest only on the amount of the loan that they have used. As part of the loan, farmers also receive training in crop diversification and upgraded irrigation techniques to help increase physical resilience against drought.⁴⁷ In addition, a US\$2.13 million grant to Alternative Community Economy Network is improving climate resilience and food security through economic empowerment and agricultural system transformation in three target areas of the Dry Corridor. The project is focused on developing value chains (for avocado, vegetables, and honey) through agro-ecological approaches and improved market access.⁴⁸

The USAID Bureau of Humanitarian Affairs supports disaster response mainly through food assistance to the poorest households. It also supports households in resuming agricultural production and in economic recovery. It supports the agricultural sector by providing seeds, tools, livestock, and agriculture/livestock training to strengthen local agricultural activities and livelihoods, and it also implements pest management programs, provides veterinary medicine and supplies, and supports improved agriculture production and irrigation to assist farmers. Economic recovery assistance aims to restore livelihoods by providing assets to support small businesses, creating short-term employment opportunities, and providing cash or vouchers to enable families to buy food and household items while also supporting local businesses.

In Guatemala and Honduras, the Food and Agriculture Organization of the United Nations (FAO) has been supporting community contingency funds as a way to increase the resilience of family farmers through shared savings and adoption of good agricultural risk management practices. Disbursement of funds is activated by declaration of an emergency by the community, based on an early warning system. The solidarity funds were created and are managed by associations of producers to support their members in an emergency. Members raised money and seed capital to put up 40% of the fund. FAO contributed 40%, and the remaining 20% is constantly capitalized through various activities, such as the production of woven fabrics and operation of community shops for the sale of food. Between 2014 and 2015, the contingency funds established by FAO projects lent US\$170,000 to members for income-generating activities and invested US\$23,000 in community projects. In addition, US\$85,000 was invested to ensure the functioning and sustainability of the funds, and US\$19,000 was used for post-emergency rehabilitation. To ensure sustainability, management and administration systems were put in place, and each association strengthened its statutes, regulations, and internal organization. In addition, association members were trained in loan administration and transparent management of community funds (FAO Regional Office for Latin America and the Caribbean 2016). According to the project evaluation, 81% of the beneficiaries of community contingency fund credits for emergency response are women (FAO 2016).

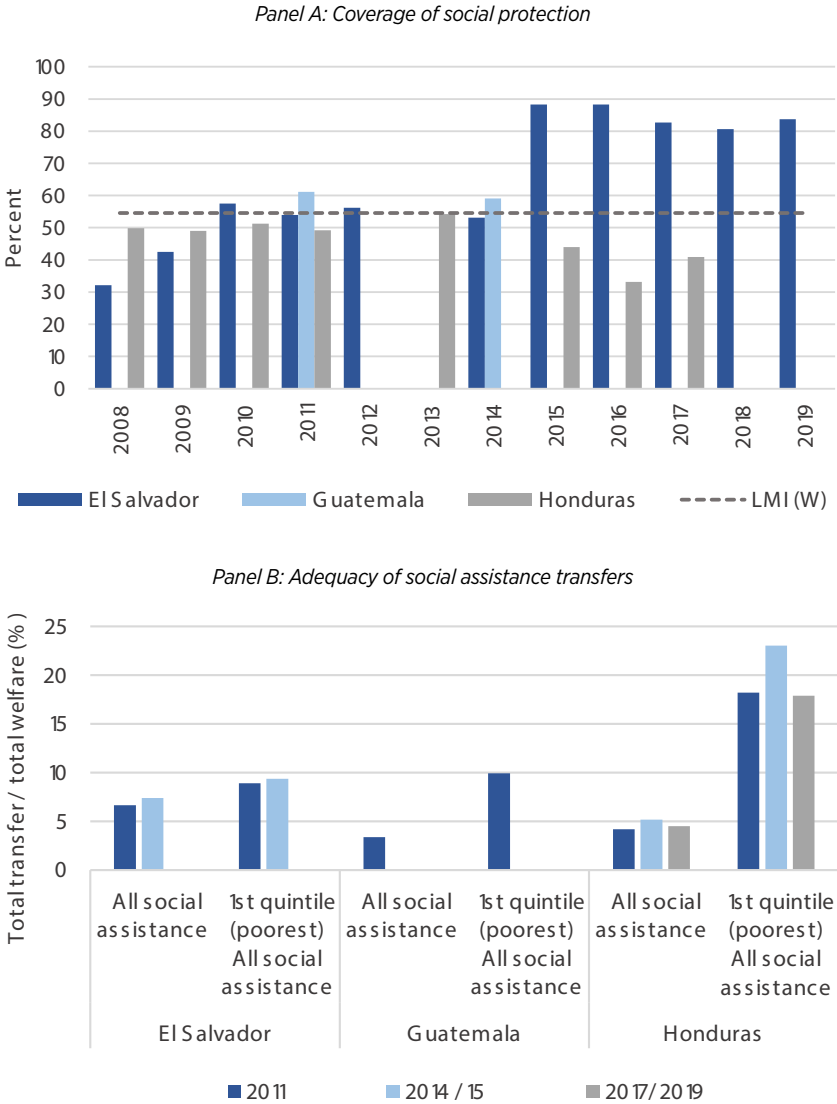
46 GAFSP was launched by the G20 in response to the 2007–2008 food price crisis. It works to build resilient and sustainable agriculture and food systems in low-income countries, in times of crisis and beyond.

47 GAFSP, “Smallholders in Honduras Weather the Effects of Climate Change,” <https://www.gafspfund.org/projects/smallholders-honduras-weather-effects-climate-change>.

48 GAFSP 2021; GAFSP, “Strengthening Capacities for Climate Resilience and Economic Empowerment of Rural, Smallholder Producers in the Dry Corridor,” <https://www.gafspfund.org/projects/strengthening-capacities-climate-resilience-and-economic-empowerment-rural-smallholder#:~:text=In%20Honduras%2C%20a%20%242.13%20million,suffered%20large%20livelihood%20losses%20due>.

Social protection in NCA remains limited, with generally small benefits. Coverage and adequacy of social assistance have increased in El Salvador but have regressed in Honduras, while Guatemala has stagnated (Figure 28). As shown in Panel A, coverage in El Salvador shot up in 2015 and now exceeds the weighted average coverage levels of lower middle income countries. However, as shown in Panel B, adequacy of assistance remains low for all programs including those supporting the poorest households. Meanwhile, in Honduras adequacy for the poorest is nearly 4 times higher. Adequacy refers to the total transfer amount received by all beneficiaries in a population group as a share of the total welfare of beneficiaries in that group. The average per capita refers to the average transfer amount among program beneficiaries. Overall, the average amount of daily per capita transfers is very low, albeit slightly higher in rural areas; it ranges from US\$0.04 in Guatemala to US\$0.27 in Honduras, which is less than the average for lower-middle-income countries of US\$0.40.⁴⁹

Figure 28. Coverage of social protection and adequacy of social assistance, 2009–2019



Source: The Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE). [datatopics.worldbank.org/aspire/](https://www.worldbank.org/aspire/)

Note: Adequacy refers to the total transfer amount received by all beneficiaries in a population group as a share of the total welfare of beneficiaries in that group. LMI (W) = Lower Middle Income (weighted)

49 The Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE), <https://www.worldbank.org/en/data/datatopics/aspire>

Social protection systems are fundamentally based on solidarity, which aims to ensure the poorest households have access to some form of protection. However, a large proportion of the extreme poor still lack protection, which suggests gaps in the efficacy of targeting this group. Of the three NCA countries, El Salvador has the highest coverage and most advanced social protection system. It evolved rapidly between 2009 and 2014 due to the government's strong political commitment and policy dialogue,⁵⁰ and it benefited over 2 million people, or 30% of the population. As detailed in table 9, El Salvador enacted its Social Development and Protection Act in 2014 and since then has developed a single social registry, information systems and M&E system to enhance its operations and institutionalize the Universal Social Protection System (SPSU). While El Salvador's solidarity in communities program was scaled up in response to the 2008 financial shock, Guatemala has the most experience in using social safety nets to respond to shocks. Overall, the lack of prearranged funding, objective trigger mechanisms and efficient payment systems in El Salvador and Honduras as well as the weak legal and institutional framework in Guatemala need to be addressed to enable shock responsive social protection systems in the NCA.

50 The National Development Plan (2010–2014) prioritized social protection. In 2009, a Universal Social Protection System (SPSU) was introduced that aimed to ensure universal social protection in terms of health, food, income security, and vocational training. In 2014, Congress adopted the Social Development and Protection Act (LDPS) to institutionalize the SPSU and bolster its operations. In 2017, El Salvador launched the Strategy Towards the Eradication of Poverty, which creates a set of interinstitutional and intersectoral actions and public policy aimed at supporting families in poverty and extreme poverty.

Table 9. Status of social protection programs

	El Salvador	Guatemala	Honduras
Coverage of social assistance (% of population)	83.40%	59.10%	40.90%
Rural	88%	71.40%	54.40%
Poorest 20%	92%	72.10%	62.90%
Extreme poor (< US\$1.9/day)	6.30%	1.80%	0.10%
Main programs and experience with shock response	<p>Solidarity in Communities (2005–2016) CCT for human capital investment, local infrastructure development, income generation, and productive development (training and microcredit) with a strong emphasis on food security Benefited 102,106 households (377,325 people, or 5.97% of population) Expenditure of US\$42.91 million (0.16% of GDP) Scaled up in response to 2008 financial shock</p>	<p>Bono Familia (2021-) Unconditional cash transfer Electronic payments (banks, ATMs, and retailers) Superintendency of Banks (Superintendencia de Bancos, SIB) facilitated digital payments by issuing guidelines for opening of simple single-purpose virtual accounts Benefited 2,700,000 households in 2021 Total expenditure of Q 6 billion</p> <p>Bono Social (2012-) CCT for health and/or education Includes a Public Calamity Transfer (unconditional cash transfer) of Q 4,300–6,500 in zones under declared state of emergency Benefited 243,356 households in 2021 Total transfers of Q 347 million in 2020 (0.6% of GDP)</p> <p>Bolsa Social ((2012-) Main mechanism for disaster response Transfer via debit card or food packages in areas affected by natural disaster Maximum of US\$34 per household</p> <p>Public calamity bond— without co-responsibility^a</p>	—
Trigger mechanism	—	Declaration of state of calamity	—
Payment systems		Ongoing World Bank support to improve the ecosystem for digital payments and account-based G2P transfers	Cash or bank account World Bank Group and Inter-American Development Bank (IDB) technical assistance to establish a G2P payment platform
Linked to prearranged funding	—	No ^b	Budget and IFIs
Management information system/social registry	Single Registry of Participants (RUP) Social Programs Information System Social Policy Monitoring and Evaluation System	Ongoing World Bank support to redesign and implement the Information System of the Bono Social (SIBS) and create a social registry	Unique Registry of Participants (RUP) Beneficiaries Registration System of Honduras (SIRBHO) since 1990
Legal framework	Social Development and Protection Act enacted in 2014 to institutionalize the Universal Social Protection System (SPSU) and enhance its operation Strategy Towards the Eradication of Poverty launched in 2017		

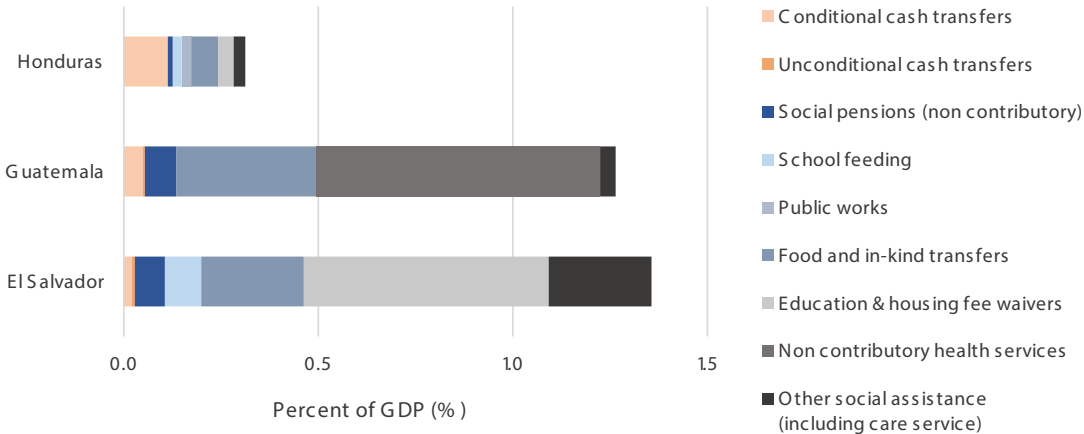
Source: The Atlas of Social Protection Indicators of Resilience and Equity (ASPIRE). datatopics.worldbank.org/aspire/

Note: CCT = conditional cash transfer; G2P = government-to-person; IFIs = international finance institutions; — denotes not available.

- The public calamity bond is only for current beneficiaries of Mi Bono. Its maximum amount is 50% of the amount granted under normal conditions.
- Funding comes mainly from budget reallocation of social programs and from the Social Development Fund (FODES).

Expenditure on social protection programs is still low compared to other lower-middle-income countries, and coverage is oriented toward short-term relief rather than long-term livelihood resilience. Assistance is dominated by conditional cash transfer for health and education, along with in-kind and school feeding programs. In El Salvador, 60% of assistance goes toward education and housing waivers; in Guatemala, 70% of social assistance goes toward health services (Figure 29). While these forms of support are important for addressing immediate needs, they are less suitable for enabling financial resilience, which is critical for the long-term resilience of rural and agricultural households.

Figure 29. Expenditure on social assistance in NCA



Source: World Bank, ASPIRE, <https://www.worldbank.org/en/data/datatopics/aspire>.
 Note: Estimates include both direct and indirect beneficiaries. Other social assistance includes last-resort programs and noncontributory social pensions. Cash transfer programs include child, family, and orphan allowances; birth and death grants; disability benefits and other allowances; and conditional cash transfers. In-kind food transfers include food stamps and vouchers, food rations, supplementary feeding, and emergency food distribution. Other social assistance programs include housing allowances, scholarships, fee waivers, health subsidies, cash for work, and food for work.

4

Financial Inclusion, Agricultural Finance, and Agricultural Insurance

Box 3. Key takeaways from Chapter 4

- Only one-third of adults are financially included in North Central America: low levels of financial inclusion limit the financial resilience of family farmers and present challenges for the safe and efficient disbursement of payouts from social protection programs and risk transfer instruments.
- In the absence of widespread financial inclusion, authorities in NCA and elsewhere have deployed “second-best” options to deliver payments to vulnerable populations, for example, the token-based method used to distribute COVID-19 emergency payments under Guatemala’s Bono Familia program.
- Lending to the agricultural sector is relatively low in NCA countries, and family farmers lack access to short-term credit. Levels of insurance market penetration are very low in all three countries, varying from a low of 1.9% of GDP in Guatemala to a high of 2.93% of GDP in El Salvador in 2020.
- Traditional indemnity-based agricultural insurance has been offered by a limited number of insurers in NCA countries for many years; however, these programs have failed to scale up, and the products are not suited to the risk transfer needs of family farmers.
- In recent years index-based insurance products and programs have been introduced in Guatemala and El Salvador. These products are more appropriate to the risk transfer needs of family farmers. There are currently five index insurance programs under implementation in El Salvador and Guatemala, all based on satellite index excess rainfall and drought insurance products.
- Four of the five programs are micro-level individual-farmer and microentrepreneur programs. Two of the index insurance programs are targeted at semicommercial farmers, are linked to bank credit, and carry no premium subsidies. A further two programs—both sponsored by WFP—are targeted at vulnerable women farmers and microentrepreneurs and carry smart premium subsidies funded by WFP.

- The fifth program, which operates in Guatemala (Seguro Colectivo Paramétrico, also known as Seguro Catastrófico), is fully funded (100% premium subsidies) by MAGA. This program represents a “modified macro-level” approach and includes the following key features: MAGA is the insured entity, contracts disaster risk insurance, and pays the full premiums on behalf of large numbers of pre-identified and registered family farmers (beneficiaries); in the event the policy is triggered, these farmers receive direct and individual payouts from the insurer.
- Most of these index-based insurance programs have been operating for a few years only, and it is therefore too early to judge their scalability and sustainability, or their impact on stabilizing family farmers’ consumption, incomes, and farming systems. The eldest of these programs is Esfuerzo Seguro in Guatemala. It is linked to bank credit and has now been operating for six full years, and it is showing promising results. Guatemala’s MAGA Seguro Colectivo Paramétrico has achieved major coverage of 40,000 family farmers in its first year of operation and it is planned to scale to at least 100,000 beneficiaries in 2022/23.
- With technical and operational strengthening, the Guatemala MAGA modified macro-level approach (Seguro Colectivo Paramétrico) offers the greatest potential to scale up and to provide index insurance protection to family farmers (beneficiaries) in NCA countries over the next five years. Technical areas for strengthening product design are reviewed in Chapter 6, and operational strengthening is discussed in Chapter 7.

This chapter assesses financial inclusion trends and provides an overview of the agricultural credit and agricultural insurance markets in NCA countries. Section 4.1 reviews the financial sector composition and structure in each country, documents relevant trends in financial inclusion, and identifies innovative approaches to deliver insurance and/or social protection payments to financially excluded populations. Section 4.2 summarizes relevant trends in the provision of agricultural credit in North Central America. Section 4.3 reviews the development of insurance and reinsurance markets in NCA countries. Finally, Section 4.4. highlights the key features of the traditional indemnity-based agricultural programs and the weather index insurance (WII) programs that are currently being piloted and scaled up in NCA; it presents lessons and experiences from these programs that can provide useful guidelines for the planning and design of any future large-scale catastrophe index insurance for family farmers in the three countries.

4.1. General trends in financial inclusion

Banks are the main providers of financial services in NCA countries, though financial cooperatives, microfinance institutions (MFIs), and mobile money providers also play significant roles. Table 10 presents an overview of financial service providers in each country. While the typology and regulation of providers is diverse and not standardized across the three countries, commercial banks dominate the financial sectors in each market, accounting for 77% of total financial sector assets in El Salvador and approximately 90% in Guatemala and Honduras.⁵¹ State-owned retail banks operate in each country—including Banco de Fomento Agropecuario (El Salvador), Banco Credito Hipotecario (Guatemala), and BANHPROVI and BANADESA (Honduras), though their relative size and reach vary across the three jurisdictions. Financial cooperatives play a key role in the subregion, in particular in rural areas, and hold 3–6% of financial sector assets. In Guatemala, for example, there are 325 savings and credit cooperatives with approximately 2.2 million

51 Authors calculations with data from the SSF, SIB and CNBS.

members⁵² (or about 20% of the total adult population), although they are not directly regulated or supervised by financial sector authorities. Mobile money providers (e.g., Tigo Money) operate in all three countries but are formally regulated only in Honduras and El Salvador.

Table 10. Status of social protection programs

Financial institution	El Salvador			Guatemala			Honduras ^a		
	Number	Total assets		Number	Total assets		Number	Total assets	
		US\$, millions	%		G, millions	%		L, million	%
Commercial banks	12	22,373	77.10%	18	486,323	92.40%	15	773,750	89.30%
State banks	3	2,904	10.00%	1	n/a	n/a	2	16,732	1.90%
Savings and loans cooperatives	625	1,062 ^b	3.70%	458	30,975 ^c	5.90%	333	56,096	6.50%
Financial companies	—	—	—	11	8,921	1.70%	9	15,532	1.80%
Microfinance institutions	11	—	—	21	—	—	12	—	—
Mobile money providers	1	—	—	2 ^d	—	—	1	—	—
Cooperative banks	7	2,097	7.20%	—	—	—	—	—	—
Savings and loans societies	4	587 ^a	2.00%	—	—	—	—	—	—
<i>Cajas rurales</i>	—	—	—	—	—	—	690	n.a.	n.a.
Private financial development organizations ^e	—	—	—	—	—	—	5	4,234	0.50%

Sources: El Salvador Superintendency of the Financial System (SSF); Guatemala Superintendency of Banks (SIB); Durán 2022; Honduras National Banking and Insurance Commission (CNBS); Conucoop; Central Bank of Honduras (BCH);
Note: n.a. = not applicable; — = not available.

- Data as of the end of 2021.
- Assets for the 23 savings and loans cooperatives affiliated to FEDECACES.
- Assets for the 25 savings and loans cooperatives affiliated to MICOOPE and INGECOOP.
- Data as of 2020.
- Organizaciones Privadas de Desarrollo Financieras

Only approximately one-third of adults are financially included in NCA. Account ownership—a basic metric of financial inclusion—stands at 36–38% of adults (ages 15+) across the three countries as of 2021/22. In El Salvador, adults living in rural areas are seven percentage points less likely to be financially included than those residing in urban areas (the difference is not statistically significant in Honduras, and the urban/rural breakdown is not available in Guatemala). Account ownership has been stagnant in Honduras and Guatemala since 2017, and has increased only marginally in El Salvador. These trends differ considerably from the broader LAC region, where account ownership was 73% as of 2021, a significant increase from 54% in 2017 (Figure 30, Panels A and B).

Most adults in NCA who save and borrow do so via informal mechanisms. On average, 33% of adults across the three countries reported having saved or set aside money in the past year; however, just 10% of adults (or less than a third of savers) report having used a formal financial institution to save (Figure 30, Panel D.) The trend is similar for borrowing: 33% of adults report having borrowed money in the past year, but just 11% report having done so via a formal financial institution (Figure 30, Panel C). Borrowing from family or friends is more commonly reported

52 DGRV (German Cooperative and Raiffeisen Confederation), “Guatemala,” <https://www.dgrv.coop/project/guatemala/>.

than formal borrowing in each of the three countries. Saving and borrowing trends are broadly similar across rural and urban populations in NCA.

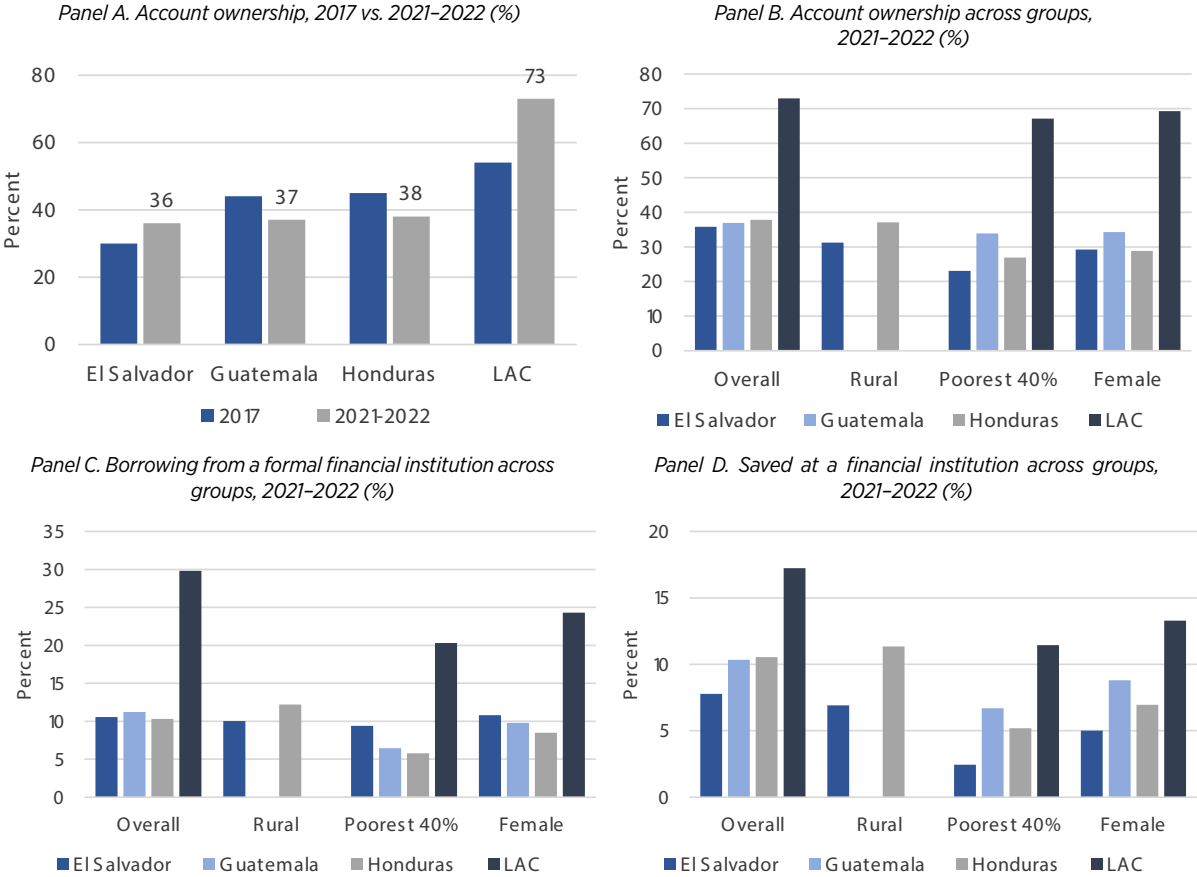
Low levels of financial inclusion limit the financial resilience of family farmers and present challenges for the safe and efficient disbursement of payouts from risk transfer instruments.

Robust empirical evidence has demonstrated that access to digital financial services can improve the financial resiliency of households during economic shocks, including those resulting from climate change. For example, evidence from Kenya has shown that access to mobile money strengthened households’ capacity to adapt to negative shocks (including droughts and floods) by enabling them to receive timely and affordable remittances from their social networks; widespread ownership of transaction accounts also enables governments to provide emergency financial support in the wake of climate-related or public health crises (Suri et al. 2016).

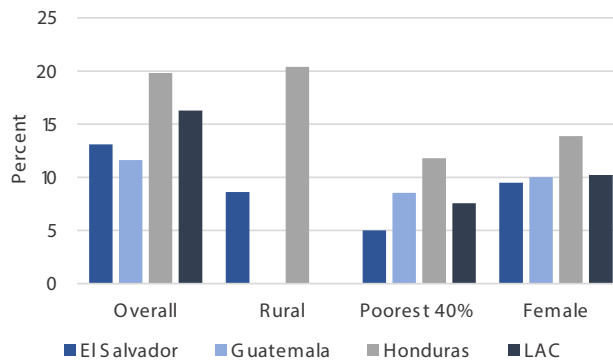
Indeed, recent data also show that most adults in North Central America would struggle to come up with funds in case of an emergency.

When asked if they could come up with funds equivalent to 5% of gross national income (GNI) per capita (approximately US\$200 in El Salvador, US\$215 in Guatemala, and US\$118 in Honduras) within 30 days in the event of an emergency, less than 20% of adults across the three countries indicated that they would be able to do so without difficulty (Figure 30, Panel E). Approximately 20–25% of adults reported that coming up with these funds would not be possible at all, a share significantly above the regional average (11%). Women and those in lower-income quintiles indicated lesser ability to come up with emergency funds.

Figure 30. Financial inclusion indicators



Panel E. Possible without difficulty to come up with emergency funding in 30 days across groups, 2021–2022 (%)



Source: World Bank, Global Findex Database 2021, <https://www.worldbank.org/en/publication/globalfindex>.

Note: Data for Guatemala as of 2022. Rural data not available for Guatemala and LAC. LAC = Latin America and the Caribbean (excluding high income).

Cost, distance, documentation, and trust are cited as key barriers to financial inclusion among the unbanked in NCA. Among respondents from the three NCA countries and LAC, the two main reasons for not having an account at a financial institution are insufficient funds and cost of financial services (Table 11). Distance (“financial institutions are too far away”), lack of trust in financial institutions, and lack of necessary documentation are each cited by 20–26% of adults in each NCA country.

Table 11. Reasons for not having an account among those aged 15+ (%)

Reason	El Salvador	Guatemala	Honduras	LAC (excluding high income)
Financial institutions are too far away	20%	22%	27%	12%
Financial services are too expensive	42%	36%	46%	22%
Insufficient funds	52%	45%	47%	22%
Lack of necessary documentation	26%	24%	20%	12%
Lack of trust in financial institutions	25%	26%	25%	11%
Religious reasons	5%	10%	7%	4%
Someone in the family has one	15%	21%	15%	13%

Source: World Bank, Global Findex Database 2021, <https://www.worldbank.org/en/publication/globalfindex>; World Bank, Global Findex Database 2022.

Data from financial sector authorities confirm that rural areas in NCA have lower penetration of financial access points compared to urban areas. For example, in Honduras, approximately 48% of all financial access points are concentrated in the departments of Cortés and Francisco Morazán (where the metropolitan areas of San Pedro Sula and Tegucigalpa are located), even though the departments represent less than 40% of the national population (Table 12). Similarly, approximately 25% of financial access points in Guatemala are located in the department of Guatemala (where Guatemala City is located), although the department accounts for 17% of the national population.

Table 12. Physical points of service provided by financial service providers

Financial system: Points of service	ATMs	Bank branches	Service counters	Agents ^a	Subtotal	POS	Other ^b	Total
El Salvador ^c	1,743	422		2,262	4,427	48,970		53,397
Guatemala ^d	4,283	2,733		25,985	33,001	—		33,001
<i>Guatemala City</i>	<i>2,460</i>	<i>1,216</i>		<i>4,539</i>	8,215	—		8,215
Honduras ^e	1,765	1,826	332	7,329	11,252	71,032	105	82,389
<i>Cortés</i>	—	—	—	—	2,565	—	—	
<i>Francisco Morazán</i>	—	—	—	—	2,543	—	—	

Sources: For El Salvador: Banco Central de Reserva de El Salvador, “Operaciones de tarjeta de crédito y débito,” <https://estadisticas.bcr.gob.sv/serie/operaciones-de-tarjetas-de-credito-y-debito>; Banco Central de Reserva de El Salvador, “Instrumentos de pago minoristas,” <https://estadisticas.bcr.gob.sv/serie/instrumentos-de-pago-minoristas>. For Guatemala: SIB 2022a. For Honduras: Comisión Nacional de Bancos y Seguros 2022.

Note: n.a. = not applicable; — = not available.

- “Agents” refers to bank and financial agents’ establishments/correspondents.
- “Other” includes autobanks and electronic branches.
- El Salvador includes first-tier public and private banks; cooperative banks; and savings and loans societies. Data by department were not found. Data are as of 2021.
- Guatemala refers to first-tier public and private banks. Data are as of 2022.
- Honduras includes commercial banks, savings and loans cooperatives, financial societies, microfinance institutions, OPDFs, and other financial inclusion organizations. Data are as of December 2021.

Many of the abovementioned barriers to financial inclusion can be directly addressed by financial sector authorities, and several such efforts are underway. While baseline levels of wealth and infrastructure are key factors in enabling financial inclusion, several barriers related to cost, distance, documentation, and trust can be directly addressed by policy and legal/regulatory reforms, including efforts to leverage low-cost delivery channels (e.g., retail agents), foster innovation and competition (e.g., by enabling interoperability and market entry of fintech providers), introduce risk-based documentation requirements (e.g., tiered customer due diligence and basic accounts), and improve financial consumer protections (e.g., strengthening of transparency and fair treatment rules). Several such efforts are underway in NCA countries in the context of national financial inclusion strategies.⁵³ For example, El Salvador has developed a fast and interoperable payment system (Transferencia 365) with the goal of improving the affordability and accessibility of digital payments. In 2022, Honduras introduced basic accounts aimed at fostering financial inclusion. In Guatemala, a draft law on e-money providers is being prepared by financial sector authorities. Recent World Bank publications offer more detailed assessments of the financial inclusion reform efforts of authorities in each country (World Bank 2022c).⁵⁴

In the absence of widespread financial inclusion, authorities in NCA and elsewhere have deployed “second-best” options to safely and efficiently deliver payments to vulnerable populations. Access to a range of financial services is a key pillar of strengthened financial resilience among vulnerable populations. Ownership of basic transaction accounts and use of digital payment mechanisms also provide the optimal enabling environment for the safe, reliable, and efficient distribution of payments from risk transfer instruments or social protection programs. However, alternative approaches for the distribution of such payments do exist, and several have been successfully deployed by authorities in NCA and elsewhere. Two large-scale social compensation schemes implemented in the LAC region in response to the COVID-19 pandemic are particularly notable for their innovation, speedy development, public-private collaboration, and ultimate success in reliably delivering payments to vulnerable populations: Programa Bono Familia in Guatemala and Programa Pytyvö in Paraguay.

⁵³ El Salvador’s National Financial Inclusion Policy was launched in 2021. Guatemala’s National Financial Inclusion Strategy 2019–2023 is currently being updated.

⁵⁴ See, for example, World Bank–Committee on Payments and Market Infrastructure (CPMI) Payment Aspects of Financial Inclusion (PAFI) assessments in Guatemala (2021) and El Salvador (2022).

Guatemala’s Bono Familia program during the early stages of the COVID-19 pandemic offers a promising model for digital delivery of payments to unbanked populations. The creation of temporary bank accounts for electronic transfer of compensation payouts was a key feature of the program. Beneficiaries received SME messages with a code (called a “token”) that allowed them to access their payments at a broad network of ATMs, bank branches, and agents. Close coordination of public and private actors facilitated the design and execution of this innovative approach: (i) the Superintendencia de Bancos (SIB) issued guidelines for opening temporary bank accounts specifically for the program; (ii) the Registro Nacional de las Personas (RENAP) provided essential information on applicants to validate data for opening of temporary bank accounts; (iii) 11 banks created temporary accounts; (iv) VisaNet Guatemala S.A. integrated the financial component in the technology platform;⁵⁵ and (v) companies that manage ATMs facilitated the channel for cashing out the compensation.

In Paraguay, the activation of the national identity document as a payment card (so-called tarjeta-cédula) under Programa Pytyvõ allowed the delivery of payouts to 150,000 beneficiaries. After applicants registered, approximately 10% were found to be digitally illiterate, or had no access to internet, or did not own a bank account. For those beneficiaries without access to an electronic platform for receipt of the conditional cash transfer, the solution was to use the national identity document as a card for purchases at businesses within the Bancard network. Only the ID holder could make the purchases. The mechanism was also applied by the Programa de Seguridad Alimentaria Ñangareko for beneficiaries who could not receive food assistance via electronic wallet transfers.

Such approaches could be leveraged in the design of payout mechanisms for a large-scale insurance program, as indeed is already the case in Guatemala. A version of the mechanism pioneered for the Bono Familia program is already being leveraged as one of the payout mechanisms for the MAGA program: in 2022/23 most payouts have been distributed to the individual beneficiary farmers via mobile phone SMS tokens that can be used to cash out funds at ATMs affiliated with the 5B network or at Banco CHN (Crédito Hipotecario Nacional) bank branches. Such approaches could also be leveraged in El Salvador and Honduras, taking advantage of the existing network of physical points of service. Moreover, the mechanism could be applied permanently for predefined typology of beneficiaries to be targeted by various livelihoods protection programs. It could also be enhanced by creating bank accounts to be used by the beneficiary multiple times, as opposed to the one-use-only virtual bank account under the Programa Bono Familia.

4.2. Access to agricultural credit

Lending to the agricultural sector is relatively low in NCA countries, and does not reflect the contribution of agriculture to GDP, exports, and employment (Table 13). As discussed in Chapter 2, agriculture contributes significantly to all these areas in NCA, albeit to a larger degree in Guatemala and Honduras than in El Salvador. Yet across all three countries, lending to the agricultural sector does not reflect the sector’s economic significance: agricultural lending accounts for just 2.3% of the total loan portfolio in El Salvador, 3.7% in Guatemala, and 5.9% in Honduras. Moreover, lending to the agricultural sector is decreasing. In Guatemala, for example, agricultural lending has decreased from 6.1% of the total loan portfolio in 2017 to 3.7 in 2023.

⁵⁵ VisaNet was in charge of several tasks within the process: it generated formats authorized by SIB for the creation of virtual bank accounts; created a token and sent pre-lists to banks to create the virtual accounts; consolidated the number of virtual bank accounts and tokens for each approved beneficiary; and once funds were available, activated tokens and notified beneficiaries on availability of compensation.

Table 13. Levels of formal lending to the agricultural sector in NCA countries

Indicator	El Salvador	Guatemala	Honduras
	Dec. 2022	Dec. 2022	Dec. 2022
Agricultural sector loan portfolio/total loan portfolio (%)	2.3% ^a (Sept. 2022)	3.7% ^b	5.9% ^c
Agricultural sector GDP/total GDP	4.70%	9.30%	14.00%
Agricultural sector exports/total exports	5.40%	26.7% (Dec. 2021)	26.50%
Agricultural sector employment/total employment	15%	29%	25%

Sources: World Bank using data from International Labour Organization, Central Bank of Honduras (BCH), Inter-American Institute for Cooperation on Agriculture (INE)-Guatemala, INE-Honduras, El Salvador Superintendency of the Financial System (SSF), Guatemala Superintendency of Banks (SIB), and Honduras National Banking and Insurance Commission (CNBS).

- a. Includes first-tier public and private banks, cooperative banks, and savings and loans societies.
- b. Includes first-tier public and private banks.
- c. Includes first-tier banks (commercial banks), financial societies, representation office, and state bank (BANPROHVI).

A high risk perception due to climate and price volatility limits lending to agricultural producers.

Anecdotal evidence suggests that many financial service providers avoid lending to the agricultural sector due to a high perception of risk and potential losses associated with climate variability and extreme weather events (excess of rain, drought) or in the case of commodities, price volatility in international markets.

Banks that specialize in agricultural finance operate in each NCA country, but most of their lending does not flow to family farmers.

Each NCA country has a handful of public sector agricultural development banks and private commercial banks that actively lend to the agricultural sector. Table 14 shows that the top-four banks lending to agriculture in the three NCA countries account for more than three-quarters of all lending to the agricultural sector. Data are lacking on the proportion of loans that are disbursed to family farmers, but anecdotal evidence suggests that these loans represent only a fraction of total lending.⁵⁶ Several of the banks listed in Table 14 also offer index-based agricultural insurance linked to credit products (for example, Rural Development Bank of Guatemala [BANRURAL] and Banco de Fomento Agropecuarios in El Salvador; see Section 4.4 for further details).

⁵⁶ In this context it is important to note the important role of remittances in financing the operations of family farmers: a high proportion of family farmers have relatives living overseas, mainly in the US, who send regular remittance payments to their families to supplement their consumption and incomes and to invest in agricultural activities.

Table 14. Loan portfolio allocated to the agricultural sector per bank, December 2022 (monetary value and % participation)

Country & bank	Dec. 2022	
	Value	%
El Salvador: Total agricultural sector loan balance (US\$, thousands)	375,737	100.00%
Total four main banks that lend to agricultural sector (US\$, thousands)	329,242	87.60%
Banco de Fomento Agropecuario	145,097	38.60%
Banco Hipotecario de El Salvador	113,150	30.10%
Banco Agrícola	37,641	10.00%
Banco Atlántida	33,355	8.90%
Guatemala: Total agricultural sector loan balance (Q, thousands)	1,289,907	100.00%
Total four main banks that lend to agricultural sector (Q, thousands)	1,062,625	82.40%
Banco de Desarrollo Rural (BANRURAL)	338,160	26.20%
Banco Industrial	315,381	24.40%
Banco Agromercantil de Guatemala	256,691	19.90%
Banco de América Central	152,394	11.80%
Honduras: Total agricultural sector loan balance (L, thousands)	1,119,731	100.00%
Total four main banks that lend to agricultural sector (L, thousands)	863,437	77.10%
Banco Atlántida	309,012	27.60%
Banpaís	217,746	19.40%
Banco de Occidente	186,648	16.70%
Banco Ficohsa	150,031	13.40%

Sources: El Salvador Superintendency of the Financial System (SSF), Guatemala Superintendency of Banks (SIB), and Honduras National Banking and Insurance Commission (CNBS).

4.3. Status of insurance and reinsurance market development

4.3.1. Insurance legal and regulatory frameworks

In each NCA country, an Insurance Act governs life and non-life insurance, and a national insurance supervisor or regulatory authority supervises and regulates the markets (Table 15). There is currently no formal microinsurance legislation in any of the three countries. Non-admitted insurance is strictly prohibited in NCA, so any future large-scale regional insurance solution for family farmers will have to involve locally registered non-life insurer(s) or require special exemptions by governments, as in the case of the CCRIF.

Index insurance is not explicitly regulated in NCA countries, but existing legal and regulatory frameworks do not prohibit its development. Index-based insurance is a special class of insurance that in some jurisdictions requires specific insurance legislation to make it admissible. (See Box 4 explaining the key difference between traditional indemnity-based insurance and index insurance). In some markets, index insurance is treated as a derivative product rather than an insurance product, while in other markets index insurance is prohibited by anti-gaming laws because it is considered a lottery. In the three NCA countries, index insurance is not explicitly recognized under existing legal and regulatory frameworks, but neither is it explicitly excluded as a class of business. Financial sector authorities in Honduras are drafting a revised Insurance Law that does include specific provisions on index insurance. In practice the insurance regulators in Guatemala and El Salvador have adopted a pragmatic approach to accepting a new disaster risk index insurance product for small famers and microentrepreneurs, in which contracts, wordings, and rating tables have been carefully designed to conform to best insurance practices (see Section 7.2 for further discussion). In each of the NCA countries, there is scope to improve supervisory capacity to facilitate technical analysis and timely approval of new index insurance products.

Box 4. Index insurance

Index insurance is distinct from traditional indemnity-based insurance in that it does not insure an object, good, or life against physical loss or damage: rather, it uses a proxy variable (the index) to approximate the loss or damage incurred to that object or good. In the case of agricultural crop index insurance, rainfall is often indexed because of the important relationship between the amount of rainfall received in the form of soil moisture by the crop roots and the amount of crop production and yield: too much rainfall results in waterlogging, anaerobic conditions, and death of the plants, while too little rain results in water stress, stunted plant growth, and yield reduction or loss.

In NCA countries the interests of private sector insurers are represented by insurance associations, which are likely to play an important role in promoting any new public-private partnerships for the envisaged large-scale index insurance program for family farmers (Table 15).

There are no pools operating in any of the NCA countries, though insurance legislation does not prohibit them. International experience with public sector–subsidized agricultural insurance shows that national pool programs are quite common both in Europe (for example, the Spanish Combined Agrarian Insurance Program underwritten by the AGROSEGURO pool insurers, and the Tarsim Pool program in Turkey) and in Asia (for example, the Thailand National Crop Insurance Scheme). In South America the only example of a pool program is the Mendoza grape hail coinsurance scheme. NCA countries currently have no pools in the non-life insurance sector; however, some insurers coinsure larger and more difficult risks. It is noted that in discussions related to this study, the insurance associations in both Guatemala and Honduras expressed their firm conviction that some form of pool program would work best to crowd in the private sector insurers needed to underwrite a large-scale index insurance program for family farmers. (See Section 7.4 for further discussion of coinsurance pool options, including advantages and drawbacks.)

Although there are no local insurance pools in NCA, Guatemala has been a member of the regional risk pool, Caribbean Catastrophe Risk Insurance Facility (CCRIF SPC), since 2019 and has purchased index-based cover for excess rainfall; in June 2023 Honduras also joined CCRIF (Table 15). In June 2020, Guatemala received US\$3.6 million in payments from the CCRIF SPC following Tropical Storms Amanda and Cristobal. To date, Nicaragua is the only other country in Central America to join CCRIF (AXCO 2023b). Whether CCRIF can offer any technology-related or underwriting support to the large-scale index-based insurance initiative for small family farmers in NCA countries is reviewed in Chapter 5.

Table 15. NCA insurance markets: Legal and regulatory frameworks and institutions

Item	El Salvador	Guatemala	Honduras
Insurance legislation	Legislative Decree No. 844, Law of Insurance Companies, October 10, 1996; effective January 1, 1997	Decree 25-2010 of July 14, 2010; effective January 1, 2011	Law on Insurance and Reinsurance Companies, Decree No. 22-2001; effective September 1, 2001
Microinsurance legislation	None	None	None
Insurance supervisor	Superintendency of the Financial System (Superintendencia del Sistema Financiero, SSF).	Banking Superintendency (Superintendencia de Bancos, SIB). SIB is governed by the 2002 Law of Financial Supervision, Decree 18-2002. SIB comes under the central bank (Bank of Guatemala) and is accountable to the Monetary Board.	National Banking and Insurance Commission (Comision Nacional de Bancos y Seguros, CNBS). The CNBS is independent from the Central Bank of Honduras (Banco Central de Honduras, BCH) and from any government department.
Insurance association	Association of Insurance Companies of El Salvador (Asociacion Salvadorena de Empresas de Seguros, ASES). There are 15 ASES members out of 23 licensed and operative insurers.	Guatemalan Insurance Association (Asociacion Guatemalteca de Instituciones de Seguros, AGIS). Membership is currently 17 insurers out of a total of 28.	Honduran Insurance Association (Camara Hondurena de Aseguradores, CAHDA). CAHDA was founded as the market organization for insurance companies. All insurers are members.
Non-admitted insurance	Not permitted	Not permitted	Not permitted
Pools	None	None	None
Membership in Caribbean Catastrophe Risk Insurance Facility (CCRIF)	No	Yes (since 2019 for excess rain)	Yes (since 2023 for excess rain)
Fronting	Permitted	Permitted	Permitted

Sources: AXCO 2023 reports on non-life insurance market in El Salvador (AXCO 2023a), Guatemala (AXCO 2023b), and Honduras (AXCO 2023c).

The planning and design of any future large-scale climatic index insurance program for family farmers in NCA will need to involve the insurance regulators in each country to ensure that the program complies with local insurance and reinsurance legislation and regulations. Any insurance company that wishes to introduce a new insurance product or program must first present a technical note (nota técnica), along with general policy wording, any special terms and conditions, and a rating schedule, to the insurance supervisor for scrutiny and approval before the product can be launched in the local insurance market and sold to clients.

4.3.2. Size and structure of insurance markets

Insurance markets in NCA are characterised by low insurance penetration, the lack of a domestic reinsurance market, and consequent high dependence on foreign reinsurers to cover significant earthquake exposure (AXCO 2023a). In 2020, Guatemala had the largest market of the three countries; with total written premium income of US\$1,472 million, it was the 70th largest insurance market in the world. El Salvador's market ranked 89th in size, and Honduras's ranked 103rd. In all three countries, non-life insurance was the largest sector (Table 16).

Size of life and non-life insurance markets in NCA countries, 2020

	Life	Non-life	Personal accident and health	Total	World ranking 2019
El Salvador					
Premium (US\$, millions)	260	326	136	722	89
% of total market	36.00%	45.10%	18.90%	100.00%	
Guatemala					
Premium (Q, millions)	2,122	5,821	3,424	11,368	70
Premium (US\$, millions)	275	754	443	1,472	
% of total market	18.70%	51.20%	30.10%	100.00%	
Honduras					
Premium (L, millions)	3,971	5,102	2,496	11,569	103
Premium (US\$, millions)	162	208	102	471	
% of total market	34.30%	44.10%	21.60%	100.00%	

Sources: AXCO 2023 reports on non-life insurance market in El Salvador (AXCO 2023a), Guatemala (AXCO 2023b), and Honduras (AXCO 2023c).

Levels of insurance market penetration are very low in all three countries and range from 1.9% of GDP in Guatemala to 2.93% of GDP in El Salvador in 2020. Insurance expenditure is lowest in Honduras at US\$47.5 per capita per year and considerably higher, at US\$111.3 per capita, in El Salvador (Table 17). Comparison with other Central American countries shows that insurance penetration is lowest in Nicaragua, and that the highest per capita expenditure on insurance is in Costa Rica and in Panama. Insurance penetration per capita is very low in both Honduras and Guatemala because of the very high proportion of poor rural and urban families who have no access to financial and insurance products and services. This suggests that the proposed large-scale agricultural insurance solution for family farmers will require major investment in insurance awareness and education programs.

Table 17. Market premium as a percentage of GDP and expenditure on a per capita basis in Central America, 2020

Country	Life including riders		Non-life (P&C)		Personal accident & health		Total	
	%	Per capita (US\$)	%	Per capita (US\$)	%	Per capita (US\$)	%	Per capita (US\$)
El Salvador	1.05%	40.1	1.32%	50.2	0.55%	21	2.93%	111.3
Guatemala	0.35%	15.3	0.97%	42.1	0.57%	24.8	1.90%	82.2
Honduras	0.68%	16.3	0.87%	21	0.43%	10.3	1.98%	47.5
Nicaragua	0.33%	6.3	1.16%	22.2	0.14%	2.7	1.63%	31.2
Costa Rica	0.19%	22.5	1.58%	192.4	0.40%	48	2.17%	262.9
Panama	0.75%	92.3	1.42%	174.4	0.68%	83.5	2.85%	350.2

Sources: AXCO 2023 reports on non-life insurance market in El Salvador (AXCO 2023a), Guatemala (AXCO 2023b), and Honduras (AXCO 2023c).

Note: Figures for Nicaragua are from 2019. P&C = property and casualty.

Key features of the insurance markets in the three NCA countries are summarized in Table 18. In 2021 there were 23 operating insurance companies in El Salvador, 28 in Guatemala, and 12 in Honduras. In all countries, the non-life insurance market is concentrated among the top three to five insurance companies. In El Salvador, Agricola Comercial (ACSA) and Seguros e Inversiones (SISA) are the largest insurers collectively, with a 47% share of non-life premium; in Guatemala, El Roble and Seguros G&T contribute 44% of non-life market premium; and in Honduras, Ficohsa Seguros and Seguros Atlantida are the largest non-life insurers, with a 49% market share. The non-life insurance markets are dominated by property and casualty and motor insurance: insurance markets are very liberal, and motor insurance third-party liability remains voluntary in all NCA countries, unlike most of the rest of the world, where cover is compulsory. Agricultural insurance falls under miscellaneous in all NCA countries; in Guatemala, Seguros G&T—the second

largest non-life insurer—offers traditional indemnity-based crop and livestock insurance, and in Honduras, both market leaders—Ficohas Seguros and Seguros Atlantida—offer it (Table 18).

Guatemala is the only NCA country with public sector insurers, which include the insurance department⁵⁷ of the CHN and Aseguradora Rural, part of BANRURAL banking group, which is partly owned by government.⁵⁸ Formerly all government business used to be passed to CHN, but government entities are today free to place their insurance in the private market (AXCO 2023b). It is notable that both CHN and Aseguradora Rural are the leading natural and climate risk index insurers for small farmers and microenterprises in Guatemala (see Section 4.4.2 for further discussion).

Table 18. Key features of non-life insurance markets in NCA, 2021

	El Salvador	Guatemala	Honduras
No. of licensed & active insurance companies	25 (23 active)	28	12
No. of life insurance companies	9	-	1
No. of non-life (general) insurance companies	7	-	11
No. of composite (life & non-life) insurance companies	7	-	0
State-owned insurance companies	None	(i) Insurance Department of Credito Hipotecario Nacional (CHN); (ii) Aseguradora Rural, part of BANRURAL Bank group, part state-owned bank	None
Top three to five non-life insurance companies	Agrícola Comercial (ACSA) (21% share), Seguros e Inversiones (SISA) (16% share), Seguros SURA SA (formerly Aseguradora Suiza Salvadoreña), MAPFRE and ASSA Seguros	El Roble (24.8% non-life share), Seguros G&T (19.1% share), MAPFRE Seguros Guatemala, Universales, Seguros Agromercantil	Ficohas Seguros SA (29% share), Seguros Atlántida SA (20% share), MAPFRE Seguros Honduras SA, Seguros del Pais SA, ASSA Comp. de Seg. Honduras SA
Share of non-life market premium of top-five non-life insurers (%)	75% (top 5)	69% (top 5)	63% (top 3); 83% (top 5)
Major non-life classes of business	Property: 35.7%; motor: 27.8%; surety, bonds, & credits: 4.7%; marine, aviation, & transit: 3.7%; miscellaneous: 28.1%.	Motor: 43.7%; property: 33.2%; marine, aviation, & transit: 7.5%; surety, bonds, & credits: 5.0%; miscellaneous: 4.1%; construction & engineering: 3.8%	Property: 49.6%; motor: 30.5%; liability: 5.5%; construction & engineering: 5.4%; marine, aviation, & transit: 5.0%; surety, bonds, & credits: 2.7%; miscellaneous: 1.3%
State-owned local reinsurance companies	None	None	None
Privately owned domestic reinsurance companies	None	None	None
Registered international reinsurance companies	101	160	162

Sources: AXCO 2023 reports on non-life insurance market in El Salvador (AXCO 2023a), Guatemala (AXCO 2023b), and Honduras (AXCO 2023c).

4.3.3. Distribution channels and role of microinsurance and insurtech

In the NCA countries, non-life insurance business is mainly transacted in traditional ways by sales agents and insurance brokers; insurers with links to financial groups may transact business through bancassurance (insurance services aligned to credit), while insurtech and e-commerce have yet to take off. According to best estimates in 2020, between 50% and 70% of non-life business was sold through independent brokers to commercial and group clients in the three countries; a smaller percentage was sold by commission sales agents appointed by the insurance

⁵⁷ The department in question is the Departamento De Seguros Y Previsión de El Crédito Hipotecario Nacional de Guatemala.

⁵⁸ BANRURAL replaced an earlier institution with similar goals (Bandesa) in 1997 under Decree 57-97. Article 10 of Decree 57-97 requires the government to maintain a minimum of 30% shareholding in BANRURAL (AXCO 2023b).

companies and the companies' own employees involved in direct sales (Table 19). In Guatemala, many of the larger non-life insurance companies are owned by banks and financial groups, and bancassurance is an important source of business for these insurers (AXCO 2023b). Insurers in Honduras are also involved in bancassurance, including the market leaders, Seguros Atlantida with Banco Atlantida and Seguros Ficohsa with Ficohsa Bank (AXCO 2023c).

Insurtech is being developed in the NCA countries, driven by digital technology and smartphone penetration, and advanced by necessity during the COVID-19 pandemic. However, no significant volume of insurance business is currently transacted either on the internet or using mobile phone applications in any of the three countries. In July 2019, the SIB launched its Innovation Hub in Guatemala, intended as a contact point between the SIB, its regulated entities, and those entities engaged in technological innovation in the financial services sector (fintech). For the time being, such developments have been confined to the banking sector, but the concept is viewed as an important step in the National Strategy for Financial Inclusion in Guatemala (AXCO 2023).

There is no notable microinsurance sector in any of the three countries, although microfinance is important, especially in Guatemala and to a lesser extent in El Salvador. International experience shows that microcredit infrastructure offers the potential to develop and distribute microinsurance products to small-scale farmers and rural households.

The current mainly broker-led insurance distribution channels in NCA do not service the insurance needs of small rural households and family farmers. The proposed large-scale index insurance program needs to develop innovative ways of reaching these microinsurance clients (see Chapter 7 for further discussion).

Table 19. Non-life distribution channels in NCA

Channel	El Salvador	Guatemala	Honduras
Direct	0–5%	0–5%	10%
Broker	50–70%	50–65%	70%
Agent	20–30%	15–20%	10%
Bancassurance	-	15–30%	10%

Sources: El Salvador (AXCO 2023a), Guatemala (AXCO 2023b), Honduras (AXCO 2023c).

4.3.4. Reinsurance

There are no domestic (private or public sector) reinsurers in the three NCA countries (see Table 18 above), and law requires international reinsurers to be registered locally. Because of their low capitalization and reserves, local insurance companies in the three countries have limited ability to retain catastrophe risk such as earthquake, and they therefore depend on foreign reinsurers to place their facultative and treaty (proportional and nonproportional) reinsurance requirements. In 2020, local market retentions in non-life business varied from 52% of written premium in El Salvador, 53% in Guatemala, and a high of 60% in Honduras; but in property catastrophe earthquake business, retentions are as low as 20% of premium. International reinsurers must be locally registered and approved by the insurance regulators (AXCO 2023a,b,c). A large number of registered international reinsurers do business in Central America,⁵⁹ but currently, only a handful reinsure agriculture in the NCA countries. Reasons include the small size of the agricultural insurance programs and consequent lack of sufficient premium volume to attract reinsurers, and the tendency of companies to consider agriculture too risky.

59 Reinsurance business is transacted by a large number of registered North American, Bermudan, and European reinsurers, including (in 2021) about 100 registered reinsurers in El Salvador, 160 in Guatemala, and 162 in Honduras. Key reinsurers include Munich Re, Swiss Re, MAPFRERE, SCOR, Hannover Re, Odyssey Re, TransAtlanticRe, and various Lloyd's of London syndicates (AXCO 2023a,b,c).

Fronting (or the ceding of all or nearly all of an original risk to international reinsurers) is permitted under insurance law in all three NCA countries. In some countries fronting is prohibited by the insurance supervisor in order to retain premium and build local insurance markets, but this does not apply in NCA countries. Fronting is usually practiced by insurers that have low risk retention capacity for potentially catastrophic risks like earthquake, excess rain/flood, and drought. Fronting commissions paid by reinsurers to local cedants are typically between 5% and 10% of ceded premium, but occasionally as high as 15% (AXCO 2023a,b,c). Currently in NCA, local insurers of traditional indemnity-based agricultural insurance and new index-based natural/climatic risk insurance have little capacity or appetite to retain risk, and they tend to front and cede 100% of the risk to the small number of international reinsurers willing to underwrite this class of business. (See Sections 4.4 and 4.5 for further details.)

Since 2021, the costs of international catastrophe reinsurance have been soaring, and capacity has been much more restricted. The reinsurance market has seen major hardening, due not only to climate change and major weather-related loss events (with property losses amounting to about US\$65 billion in the first half of 2022), but also to environmental, social, and governance (ESG) concerns, cyber risks, and the war in Ukraine.⁶⁰

In Phase II of the current study, it will be very important to work closely with international reinsurers in the detailed planning and design of the proposed large-scale index-based disaster risk insurance program for family farmers. This step will help ensure that reinsurance capacity is available at an affordable price. (See Section 8.5 for further discussion of insurance and reinsurance structuring options).

4.4. Agricultural and disaster risk insurance provision in NCA

This section summarizes analysis of the traditional indemnity-based and new index-based agricultural insurance products and programs available in the three NCA countries.

4.4.1. Traditional indemnity-based agricultural insurance markets

Key features of markets

Traditional indemnity-based agricultural insurance provision in NCA countries dates back to the early 2000s, when several Mexican companies helped local insurers in El Salvador, Guatemala, and Honduras develop traditional indemnity-based crop and livestock insurance products similar to the products offered by the Mexican market to commercial farmers and members of the Fondos program.⁶¹ The indemnity-based crop insurance products ranged from a multiple peril loss of investment cost (Seguro a la inversion) cover for cereals and other field crops to a named peril damage-based crop insurance (NPCI) cover for tree crops such as bananas, oil palm, and coffee (Seguro por planta). Individual animal mortality insurance was offered for cattle (World Bank 2010).

The traditional indemnity-based crop and livestock insurance programs were targeted at medium- to large-scale commercial farmers and agribusinesses in Guatemala and Honduras, and most were directly linked to crop credit insurance provision through their banking affiliates. In Guatemala, clients borrowing from G&T Bank had access to G&T's agricultural insurance, and Aseguradora Rural exclusively insured crop credit clients of BANRURAL bank. In Honduras, Ficohsa Seguros insured clients of Ficohsa Bank, and Seguros Atlantida insured clients of Atlantida Bank. These arrangements are still in place (Table 20).

⁶⁰ See, for example, Howden 2023. Reinsurance a Tipping Point. <https://www.howdengroup.com/sites/g/files/mwfley566/files/2022-09/howden-reinsurance-a-tipping-point-report.pdf>

⁶¹ The Mexican companies included ProAgro, a leading agricultural insurance company, and LatinRisk, a consultancy company specializing in agricultural insurance products.

In Guatemala and Honduras, governments were instrumental in developing the traditional agricultural insurance markets through the provision of partial premium subsidies, but in El Salvador the programs did not attract any government premium subsidies. In Guatemala, the Guate-Invierte trust fund was created under MAGA to provide partial loan guarantees and to administer government premium subsidies on crop and livestock insurance; since 2005, this fund has disbursed Q 26.02 million (US\$3.38 million) in up to 70% premium subsidies to farmers taking out the insurance required for accessing seasonal production credit or investing in livestock. The loanees have been mainly medium-size to large farmers, as shown by the average size of crop loan (US\$14,000) and livestock loan (US\$23,000) (Guate-Inveirte 2023) . In Honduras, a special fund of L 25 million (approximately US\$1.3 million) was created in 2008 under the management of BANHPROVI (Banco Hondureño de la Producción y la Vivienda) to subsidize agricultural producers who received seasonal crop production loans from the National Bank for Agricultural Development (Banco Nacional de Desarrollo Agrícola [BANADESA]); the fund subsidized up to 50% of the agricultural insurance premium, and the producer paid the remaining premium once the credit was formalized.⁶² The premium subsidy programs in both Guatemala and Honduras were suspended by 2018, since the demand for traditional agricultural insurance had by then significantly declined.

In 2009, to foster development of agricultural insurance, the GoH created the Agricultural Insurance Committee and Risk Unit to provide technical support and capacity building for private insurers. The CSA was created under Executive Decree PCM-M-025-2009 as an intersectoral entity and was attached to SAG. Its mission was to coordinate the national development policy for agricultural insurance in the country, with priority for small and medium-size producers. Some of the key outputs of the CSA include the preparation of a strategic plan (2011–2013), which led to the formation of the Risk Unit in SAG with a mandate to collect, analyze, and disseminate data and information on agricultural risks.⁶³ The CSA also prepared the National Risk Management Plan for the Agri-Food Sector 2016–2019. The Risk Unit has been disbanded for a number of years, and the CSA has also suspended its activities because of a lack of interest among public and private stakeholders. However, launch of the proposed large-scale index insurance program for family farmers offers a major opportunity to reinstate the CSA to coordinate the design, planning, and implementation of this program in Honduras.

62 This fund was regulated by Article 7 of Decree No. 39-2008, the Emergency Law to Prevent Shortages of Basic Grains (Ley de Emergencia para Prevenir el Desabastecimiento de Granos Básicos), available at <https://www.tsc.gob.hn/web/leyes/Leyde%20Emergencia%20Para%20Prevenir%20el%20Desabastecimiento%20De%20Granos%20Basicos.pdf>.

63 For details of the Risk Unit, see Moncada (2012).

Table 20. Key features of traditional agricultural insurance markets in NCA

	El Salvador	Guatemala	Honduras
Agricultural insurance law	No	No (Draft Law No. 5032 of April 28, 2016, was never enacted)	No
Traditional agricultural insurance available commercially	Yes (very limited)	Yes (very limited)	Yes (very limited)
No. of active agricultural insurers	2	3–5	2
Names of traditional agricultural insurers	- Seguros SISA - Seguros Pacifico	- G&T Seguros - Columna Compañía de Seguros S.A. - Seguros Agromercantil - Seguros Univerales - Aseguradora Rural	- Ficohsa Seguros - Seguros Atlantida
Crop insurance products available	- Loss of investment costs cover (<i>seguro a la inversión</i>) - Loss of yield cover (<i>garantía de producción</i>) - Loss of growing tree cover (<i>seguro por planta</i>)	- Loss of investment costs cover (<i>seguro a la inversión</i>) - Loss of yield cover (<i>garantía de producción</i>) - Loss of growing tree cover (<i>seguro por planta</i>)	- Loss of investment costs cover (<i>seguro a la inversión</i>) - Loss of yield cover (<i>garantía de producción</i>) - Loss of growing tree cover (<i>seguro por planta</i>)
Livestock individual animal mortality cover	Very restricted	Very restricted	Very restricted
Linkage with credit	n.a.	Yes (G&T, Aseguradora Rural)	Yes (both insurers and their banks)
Government premium subsidy support	No	Yes (2009–2016: 70% subsidy administered by Guate Invierte)	Yes (2008–2018: 50% subsidy administered by BANHPROVI)
Other forms of government support	No	No	Creation in 2009 of an Agricultural Insurance Committee under SAG

Source: Information collected by World Bank during 2023 survey of NCA from various sources.

Note: BANHPROVI = Honduran Bank of Production and Housing; n.a. = not applicable; SAG = Ministry of Finance.

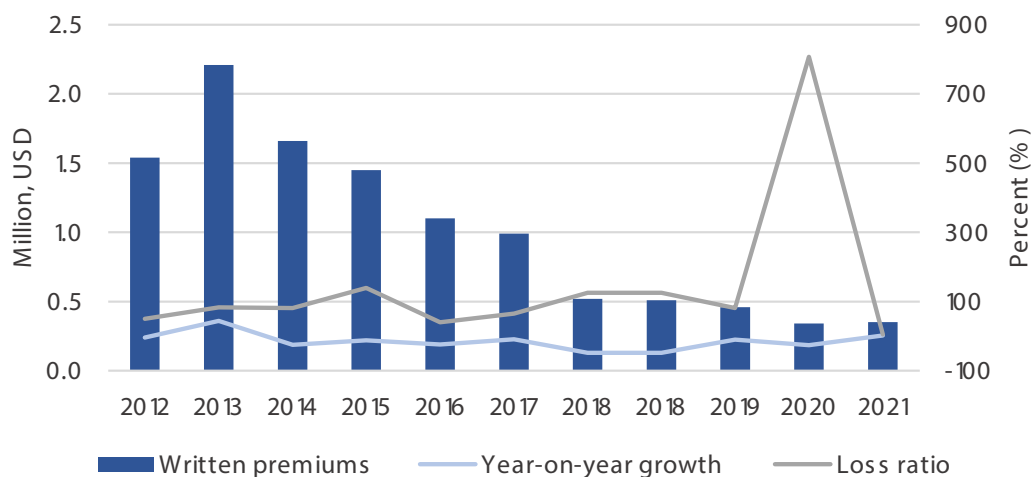
Uptake and performance

The market for traditional agricultural insurance has been very small in Guatemala: between 2013 and 2022, agricultural insurance premium income was in the order of US\$1.5 million to US\$2.5 million per year, representing less than 0.3–0.4% of non-life premium income. Over this period, Guate Invierte has been the largest subscriber of traditional crop and livestock insurance linked to credit. Agricultural insurers have experienced three underwriting loss years when the loss ratio exceeded 100% of premium, namely 2014 (105% loss ratio), 2015 (102% loss ratio), and 2021 (154% loss ratio) (AXCO 2023). While data on the number of insured crop and livestock producers are not available, the Guate Invierte loan guarantee data for the 23-year period 2005 to 2022 are suggestive; they show a total of 6,020 agricultural loans backed by loan guarantees and crop insurance, and only 320 livestock loans backed by guarantees and protected with livestock insurance (as noted above, these loanees were mainly medium-size to large farmers). The premium subsidy program in Guatemala was suspended in 2018 as the demand for traditional agricultural insurance declined.

A similar pattern of low demand for traditional agricultural insurance applies to Honduras.

Demand for subsidized agricultural insurance offered by Seguros Atlantida (accounting for about two-thirds of premium) and by Ficohsa Seguros peaked at about US\$2.25 million in 2013, but it has declined sharply since the 50% premium subsidies were terminated in 2018, to less than US\$0.5 million per year. Crop premiums in 2020 totaled L 8.40 million (US\$341,748), representing less than 1% of non-life income (AXCO 2023). Very high losses were incurred by insurers in 2020, when the overall loss ratio was 807% due to excess rain and flood claims associated with Hurricanes Eta and Iota; these affected the north (Valle de Sula) and northwest where much of the country's agricultural and agro-industrial sector is concentrated (Figure 31).

Figure 31. Agricultural insurance premiums and loss ratios in Honduras, 2012–2021



Source: AXCO 2023; historical insurance market statistics.

Finally, in El Salvador, traditional agricultural insurance has experienced very limited demand and uptake by commercial farmers over the past 20 years. According to available data, in 2006 total agricultural insurance market premium volume was about US\$0.2 million; crop insurance penetration was less than 0.5% of national cropped area; and livestock (cattle) insurance penetration was less than 1% of the national herd (World Bank 2010).

4.4.2. New index-based insurance for small-scale farmers and microenterprises in NCA

Background and key actors

In the past decade, NCA countries have shown great interest in developing parametric or index-based disaster risk insurance, which is seen as being much more appropriate to the risk transfer needs of small-scale family farmers and microentrepreneurs than traditional indemnity-based insurance. Some of the earliest work was conducted in Guatemala and Honduras by the Agricultural Risk Management Team of the World Bank, working closely with Guatemala’s MAGA and Honduras’s SAG; the aim was to conduct basic agricultural risk analysis and assessments for the major food and cash crops and to build capacity in these local government institutions (ARMT 2010). In 2013, with technical assistance from the International Research Institute for Climate and Security (IRI), Honduras’s SAG developed a prototype crop WII cover aimed at providing drought protection at critical stages of crop vegetative growth in food crops such as maize and beans. Although the prototype was tested with groups of farmers between 2015 and 2016, and a local insurer, Seguros Equidad, expressed interest in fronting the product, the program was never launched.

A major breakthrough in the development of index-based insurance for small-scale farmers and microenterprises in Central America began in 2013, when MiCRO (Microinsurance Catastrophe Risk Organisation), a Barbados-registered company, formed a partnership with the Swiss Agency for Development and Cooperation (SDC), Swiss Reinsurance Company Ltd. (Swiss Re), and Mercy Corps to design and implement specialist natural catastrophe and climate risk management solutions across Central America. In 2014, the Inter-American Development Bank, managed by the Multilateral Investment Fund, joined this effort, followed by the Climate Adaptation Platform managed by KfW. In 2017, MiCRO launched its first risk management solution in Central America, called Seguro Esfuerzo; this index-based insurance covers relevant risks that affect small farmers and microentrepreneurs in Guatemala. In June 2018, a similar solution called

Produce Seguro was launched in El Salvador. MiCRO expanded its products into Colombia in 2019 and most recently into Mexico.⁶⁴ To date MiCRO has not launched any products in Honduras.

Since 2020 the World Food Programme has been actively involved in promoting index-based insurance for its vulnerable clients (farmers and microentrepreneurs in El Salvador and Guatemala)

and is working closely with MiCRO and local insurers. In 2021 in Guatemala, WFP and Aseguradora Rural launched an excess rain and drought index insurance program designed by MiCRO for vulnerable small farmers (mainly women) and microenterprises called Seguro Productivo. In the same year, WFP launched a similar program in El Salvador called Emprende Seguro, with Seguros Futuro as the insurer.

In 2021, Guatemala's MAGA contracted MiCRO to design a large-scale index-based disaster risk insurance program for small-scale family farmers.

This program, termed Seguro Colectivo Paramétrico, is a response to the devastating flood losses caused by Hurricanes Iota and Ita. The underlying index insurance product was again designed as an excess rain and drought cover for large numbers of family farmers.

Several other innovative index-based insurance programs are either in the design stage or being piloted in the region:

- 1. Café Seguro excess rain and drought index insurance programs for Guatemala (pilot launched in February 2023) and Honduras (cover design has been approved by the insurance regulator for launch in June 2023).** This initiative is supported by the Blue Marble Consortium and Nespresso, as well as the WFP in Guatemala and Honduras. ASSA Insurance Company, Costa Rica, which is a member of Blue Marble, will underwrite the Café Seguro program in both countries, and reinsurance will be provided by Blue Marble reinsurance members (including TransRe, Zurich, and Aspen Re). The Café Seguro product was first launched in Colombia in 2018 with Seguros Bolivar; it has been piloted and tested for proof of concept for several years and is now being scaled up. Blue Marble has its own contract design and risk rating platform that uses open source climatic risk data to design these index products. The Café Seguro policy is based on CHIRPS (Climate Hazard Group Infrared Precipitation with Station) satellite rainfall estimates at a resolution of 0.05° (approximately 5 km x 5 km): excess rain cover is provided during the flowering window for coffee bushes (April to June, 60 days), and rainfall deficit/drought cover is provided during grain filling and coffee bean maturation. In Guatemala, the Café Seguro pilot is being marketed as a micro-level policy to coffee-producing Nespresso-affiliated cooperatives and their members in the Fraijanes Plateau region of southeast Guatemala. Nespresso is financing the growers' premiums in Year 1: the aim is to adopt the WFP smart premium subsidy model, under which growers are gradually required to contribute increasing amounts toward the costs of their premiums. In Guatemala, many coffee growers are unbanked, and so initially any payouts from ASSA Insurance Company would be through redeemable tokens that can be cashed in at a local bank branch.⁶⁵ This initiative represents a major breakthrough for the 175,000 smallholder coffee growers in Guatemala and more than 100,000 coffee producers in Honduras, who previously had no access to climate risk insurance cover.
- 2. Willis Towers Watson (WTW) index-based solution to protect the Mesoamerican Barrier Reef System in the Caribbean Sea.** The solution protects against hurricane damage to the reef system using a specific risk model. The initial pilot phase of the solution will be carried out in Guatemala, Mexico, Honduras, and Belize. AXA Climate, the index-based and climate risk transfer-oriented unit of the major insurance and reinsurance carrier AXA Group, is the insurer behind the index-based reef insurance policy (AXCO 2023a).

⁶⁴ MiCRO, "About Us," <https://www.microrisk.org/about-us/>.

⁶⁵ Virtual meeting with Blue Marble and World Food representatives for NCA countries, May 5, 2023.

3. **Climate risk index insurance solutions in Honduras.** In 2023, WFP is collaborating with Blue Marble to design suitable climate risk insurance solutions in Honduras, including a new temperature index insurance cover for certain crop value chains.

Key features of the index insurance programs

In 2023, two index-based insurance programs are being piloted and/or commercially implemented and scaled up in El Salvador, and three index insurance programs are being implemented in Guatemala; index-based insurance has yet to be launched in Honduras. Key features of these programs are listed in Table 21.

The earliest of these MiCRO-designed index insurance programs, Esfuerzo Seguro, was launched in Guatemala in 2017 by Aseguradora Rural in conjunction with BANRURAL and has now been operating for six years. This was followed by Produce Seguro in El Salvador, which was launched in 2020 with Seguros Futuro insurance company; by Empeño Seguro (WFP initiative) in El Salvador, launched in 2021 and again underwritten by Seguros Futuro; by the Seguro Productivo (WFP initiative) in Guatemala with Aseguradora Rural; and finally by the large-scale MAGA initiative in Guatemala underwritten by the insurance department of the state bank Crédito Hipotecario Nacional (CHN).

Swiss Re has been a major supporter of four out of five of these index insurance programs, offering design guidance and rating of these schemes and providing major reinsurance capacity support. Section 4.3 highlighted the fact that private commercial insurers in NCA countries have very low ability to retain catastrophe risk, and this applies equally to these agricultural insurance programs that insure a range of perils, including excess rain (as a proxy of flood), drought, and earthquake. To date most of these programs have been fronted by the local insurers, who have then ceded up to 100% of risk to Swiss Re; the insurers have received ceding commissions from Swiss Re to promote, underwrite, and settle payouts on these schemes.⁶⁶ With the hardening of reinsurance markets in the past two years, insurers will likely feel pressure to retain more risk.

All these index-based insurance schemes in NCA countries were designed by MiCRO and are very similar in design: the insurance policies are not conventional crop WII products, but rather catastrophic event “business interruption” covers that are targeted at small-scale farmers and small and medium enterprises (SMEs) or microentrepreneurs.⁶⁷ In NCA, with the exception of El Salvador, food crop production and yields are not systematically recorded and reported at either national or local level, and this limitation severely constrains any attempt to calibrate either a conventional WII policy covering excess rainfall or a drought index insurance cover with loss of yield in important smallholder food crops such as maize and beans. Furthermore, the operation of a crop WII cover is rendered impractical because of the widely varying sowing dates, technology use, and husbandry practices adopted by the small-scale family farmers in these NCA countries. Thus MiCRO decided from the outset to offer a business interruption cover against extreme excess rain, drought, and earthquake events that would lead to the interruption of the productive activity of farmers or microentrepreneurs and cause severe financial and economic losses to their

⁶⁶ Under Esfuerzo Seguro in Guatemala, Swiss Re has paid ceding commissions to Aseguradora Rural of 20% to 30% of premium (Biese, McCord, and Gopalakrishna 2022).

⁶⁷ The first generation of micro-level individual-farmer crop WII products were launched back in 2003 in India, Africa, and a few countries in LAC. Nearly all were designed as three (and sometimes up to five) vegetative-phase covers (sowing, germination, and tillering; flowering and grain formation; crop grain ripening leading up to harvest). They insured against rainfall deficit or drought (and excess rain) in each vegetative phase, and were designed primarily for food crops such as maize, rice, wheat, and sorghum. The designers attempted to correlate as closely as possible the effects of drought at each stage of the vegetative crop cycle with its effect on crop production, yield reduction, and losses. Many of these earlier crop WII programs suffered from severe temporal and spatial basis risk (and also product design basis risk) and were terminated at the end of the pilot phase.

enterprise. (See Chapters 5 and 6 for further discussion of the crop yield data issues surrounding the development of index insurance solutions for family farmers in NCA.)

Four of the five index-based insurance programs are micro-level individual-farmer/microentrepreneur programs; the exception is MAGA’s large-scale index-based insurance program in Guatemala (Seguro Colectivo Paramétrico), which for the purposes of this report is referred to a modified macro-level index insurance program. The distinction between micro-level individual-farmer index insurance and a modified macro-level program is somewhat blurred, but some of the key differences include the following:

- **Under a micro-level index insurance program, individual farmers are the insured policyholders.** They may or may not pay for part or all of the premium, and in return they usually receive an individual policy wording, policy schedule for cover, and insurance certificate: in the event of a claim, payout is usually made directly to the insured.
- **Under a conventional macro-level or sovereign risk finance index insurance program, government is the insured policyholder responsible for payment of premium:** in the event of a claim on the policy, government receives a lump-sum payment, which it may choose to expend as it wishes in compensating farmers who have been adversely affected under the event.
- **Under a modified macro-level approach, government is the insured policyholder and is responsible for the payment of premium on behalf of the pre-selected and registered farmers who are termed “beneficiaries.”** Each beneficiary receives a certificate of cover accordingly, and **in the event of a claim, payouts are made directly by the insurer to each individual farmer-beneficiary.** (Key features and benefits of the modified macro-level approach are discussed further in Chapter 5.)

These index covers insure against key perils, including excess rain and drought, in all five programs; the two programs with a direct linkage to bank credit provide additional cover against earthquake. Chapter 2 highlighted the exposure of NCA farmers to excess rain that leads to localized flooding (sometimes related to tropical cyclones) and also to extreme droughts, especially in the Dry Corridor. The index insurance covers have been designed to protect farmers against these climatic risks. In El Salvador, the Produce Seguro program exclusively insures the clients of the Banco de Fomento Agropecuario, which includes loanee farmers and SMEs. In this case the bank asked MiCRO to design a cover that also protects against earthquake, since an earthquake could prevent loanees from repaying their loans. This earthquake cover also applies to the Esfuerzo Seguro program in Guatemala, which insures loanee farmers and SMEs borrowing from BANRURAL against excess rain, drought, and earthquake.

The distribution channels vary considerably across the five index insurance programs:

- **Bundled micro-crop credit and insurance.** The Produce Seguro program in El Salvador exclusively insures loanee clients of the Banco de Fomento Agropecuario (BFA), including semicommercial medium-size farmers and SMEs; the same arrangement exists for Guatemala’s Esfuerzo Seguro program, which insures BANRURAL clients. In both programs, loanee farmers and entrepreneurs are apparently able to select on a voluntary basis whether to insure their loans. In both these programs, the insurers—Seguros Futuro and Aseguradora Rural, respectively—benefit from their ability to distribute their index insurance products through the banks to their borrower clients; this reduces the costs of promoting the policies, collecting premiums, and settling claims.
- **The WFP-sponsored programs *Emprende Seguro* in El Salvador and *Seguro Productivo* in Guatemala.** WFP clients are among the poorest and most vulnerable farming communities: WFP aims to work through groups and associations, with an emphasis on gender equality and

targeting of disadvantaged women, and to bundle insurance with other activities, including savings and credit, as part of its R4 Rural Resilience Initiative (WFP 2022d). Insurance is voluntary for WFP clients and is promoted by the groups to their members, among them farmers and microentrepreneurs. In Guatemala, WFP is partnering with Heifer International and several municipality administrations to distribute insurance to organizations, mainly women's associations (WFP2022b, 2022c).

- **Large-scale MAGA-financed index insurance program.** MAGA's agricultural extension officers, located in each municipality in Guatemala, have for the past two years been engaged in targeting and registering both semicommercial farmers involved in supplying food to the government-run free school meals program and family farmers involved in MAGA's agricultural improvement extension and training programs.

The five programs show a range of different premium financing strategies: the oldest of the programs, Esfuerzo Seguro in Guatemala, has zero premium subsidies; both WFP programs are fully financed (100% premium subsidies) in Year 1; and the MAGA's Seguro Colectivo Paramétrico, the large-scale modified macro-level program for family farmers in Guatemala, likewise has 100% premium subsidies. Under Esfuerzo Rural, BANRURAL initially offered incentives to farmers/microentrepreneurs who bought voluntary insurance protection on their production loans in the form of concessionary (reduced) rates of interest on their loans. But the bank's credit officers preferred to sell insurance based on the quality of their services rather than cheaper loans, and these incentives were soon withdrawn (Biese, McCord, and Gopalakrishna 2022). The program is unique in offering no premium subsidies to its customers. In El Salvador, in the Produce Seguro program's first year, the BFA agreed to subsidize the premiums of loanees who elected to purchase index insurance cover, both to promote uptake of insurance and to promote trust in the credit-insurance package.

In both WFP-sponsored index insurance programs, WFP and its funding partners agreed to pay 100% premium subsidies in Year 1, given that the insured are among the most vulnerable poor people and would struggle to pay the premiums. However, the WFP's smart premium strategy requires the insured to contribute increasing shares toward the costs of their insurance premiums as they gain experience with and trust in the index insurance products.⁶⁸ Finally, under the large-scale MAGA index insurance program, MAGA is funding 100% of the premiums for its beneficiary farmers with financial assistance from USAID.

68 Starting in Year 2 (2022/23) of the Seguro Productivo program, nearly 20% of the insured people contributed 10% (Q 25 or / toward the costs of their premiums (WFP 2022c); in 2023, these contributions are expected to increase to 30%, and between 2024 and 2025 to reach up to 60% of the costs of premiums (WFP 2022d).

Table 21. Key features of the disaster risk index insurance programs for farmers and SMEs in NCA countries

	El Salvador		Guatemala		
Name of program	Produce Seguro	Emprende Seguro	Esfuerzo Seguro	Seguro Productivo	Seguro Colectivo Paramétrico
Main sponsor	BFA	WFP	BANRURAL	WFP	MAGA
Year launched	2020	2021	2017	2021	2021
Micro/meso/macro program	Micro	Micro	Micro	Micro	Modified macro
Insurer	Seguros Futuro	Seguros Futuro	Aseguradora Rural	Aseguradora Rural	Insurance Dept. Crédito Hipotecario Nacional (CHN)
Reinsurer	Swiss Re	Swiss Re	Swiss Re	Swiss Re	Swiss Re + 1 other
Technology provider/calculation agent	MiCRO	MiCRO	MiCRO	MiCRO	MiCRO
Basis of cover					
Insured interest	Business interrupti	Business Interruption	Business interrupti	Business interrupti	Business interruption
Insured perils	Excess rain, drought, earthquake	Excess rain, drought, earth	Excess rain, drought, earthquake	Excess rain, drought	Excess rain, drought
Basis of sum insured	Amount of credit	Agreed value	Amount of credit	Agreed value	Cost of replanting food crops
Distribution					
Channel(s)	Banco de Fomento Agropecuario	WFP client groups	BANRURAL	WFP client groups	MAGA extensionists
Target clients	Bank loanee clients: Farmers, SMEs	WFP clients: Vulnerable farmers and microentrepreneurs	Bank loanee clients: Farmers, SMEs	WFP clients: Vulnerable farmers and microentrepreneurs	Small-scale farmers
Special programs for women	n.a.	Women's associations targeted: 81% of insured are women (2022)	n.a.	Women's associations targeted: 38% of insured are women (2021)	n.a.
Linkage with credit	Yes (voluntary)	No	Yes (voluntary)	No	No
Financial support					
Premium subsidies	Yes (Year 1)	Yes	No	Yes	Yes
Funding agency	Banco de Fomento Agropecuario/SD C (for product design)/ FOMIN/BID for strengthening local capacity	WFP & partners	SDFC (for product	WFP & partners	USAID/MAGA
Level of subsidy	n.a.	100% initially, smart subsidies reducing over time		100% initially, smart subsidies reducing over time	100%

Source: Information collected by World Bank during 2023 survey of NCA from various sources.

Note: BFA = Banco de Fomento Agropecuario; FOMIN/BID = Fondo Multilateral de Inversiones del Banco Interamericano de Desarrollo; MAGA = Ministry of Agriculture, Livestock and Food; MiCRO = Microinsurance Catastrophe Risk Organisation; n.a. = not applicable; NCA = North Central America; SDC = Swiss Agency for Development and Cooperation; SMEs = small and medium enterprises; USAID = United States Agency for International Development; WFP = World Food Programme.

International experience shows that when smallholder farmers incur major crop losses due to a catastrophic natural/climatic event, their insurance payouts should be settled as quickly as possible; otherwise they might be forced to sell productive assets or borrow from informal and often expensive sources to maintain their consumption or get back into production. Section 3.1 showed that in NCA countries, most rural residents lack formal bank accounts with which to receive insurance payments.

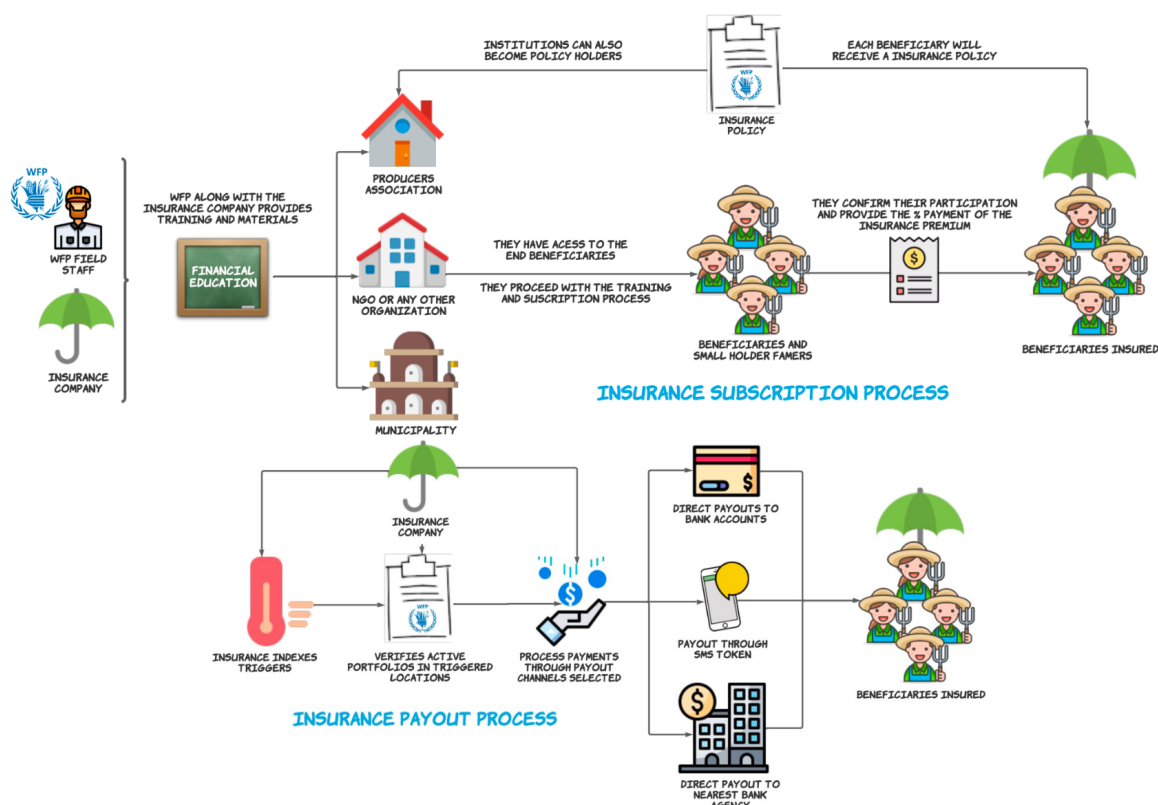
The payment systems differ for the five index insurance programs:

- **Under the two index insurance programs linked to credit**, loanees have their own bank account. Thus if the Produce Seguro program makes a payout, Seguros Futuro can directly pay to BFA to credit to each insured individual's bank account, with the payout automatically

offset against the balance of outstanding credit. This also applies to the Esfuerzo Seguro program, where Aseguradora Rural can directly make payouts to BANRURAL to credit the account of each insured individual.

- **In the case of the two WFP insurance programs for vulnerable farmers and entrepreneurs** belonging to associations or groups, payments may be made in one of three ways: (i) if the insured has a bank account, directly to that account; (ii) if the insured has a mobile phone, by a smart token redeemable at a bank or ATM; or (iii) by direct payment to the nearest bank where the insured can collect his or her payment (see Figure 32 for Seguro Productivo payment systems).
- **For the large-scale MAGA Seguro Colectivo Paramétrico program insured by Banco CHN,** the insurer informs individual beneficiaries by SMS text that they are due a payout of a certain amount, and sends a smart token or code that they can redeem at the nearest Banco CHN branch or ATM after proving their identity. The insurer is also responsible for advising MAGA on a monthly basis of the names and locations of beneficiaries who are due a payout; if beneficiaries cannot receive SMS messages, a MAGA extension officer can assist them in collecting their payouts from the nearest bank branch (MAGA 2023).

Figure 32. Guatemala: WFP–Aseguradora Rural Seguro Productivo index-based microinsurance subscription and payout procedures



Source: WFP 2022c.

Note: NGO = nongovernmental organization; WFP = World Food Programme.

Index-based insurance technical parameters

Index insurance can be based on ground weather station data or satellite data, or a combination of both; the choice depends on the availability of time series data, frequency of measurement, and spatial resolution or granularity. It is generally preferable to use local ground weather station data, which is more granular than other data sources, captures very localized weather conditions, and better reflects the actual weather conditions on the ground. However, a number of conditions must be met in order to use weather station data: ideally, the insured farmer or individual needs to be within a 3–5 km radius of the station to minimize basis risk; the station should be automatic/synoptic to avoid human recording errors; the historic data should have a sufficiently long uninterrupted track record to pick up extreme events (at least 20 to 25 years); and the recorded data must be of good quality with a minimum of gaps or inconsistencies.

In NCA countries, the density of ground weather stations with uninterrupted time series weather data is inadequate to support the development of climate risk index insurance against excess or deficit rainfall. For these reasons, MiCRO from the outset has used remote sensing satellite imagery and data to design and rate its index-based insurance products for climate risk in these countries.

A large number of open source, free satellite data sources could be used for an index-based insurance product for excess rain and drought risk in NCA countries. Under its earliest index insurance programs—Esfuerzo Seguro in Guatemala and Produce Seguro in El Salvador—MiCRO used Tropical Rainfall Measuring Mission (TRMM) data for its excess rainfall covers and used monthly Enhanced Vegetation Index (EVI) data for drought.⁶⁹ However, since 2020, MiCRO has upgraded its satellite indexes in all countries and has switched to ERA5 satellite rainfall data provided by the European Centre for Medium-Range Weather Forecasts (ECMWF). ERA5 data are used to calibrate both the excess rainfall and the drought indexes for all the index insurance programs in El Salvador and Guatemala; these data are available at a spatial resolution of 0.25° (approximately 27 km x 27 km). Excess rainfall cover is provided over the 12-month contract and is defined as the amount of cumulative rainfall in a two-thirds of a day period that exceeds the threshold (in millimeters), with a graduated payout scale according to rainfall amount up to a maximum of 100% of the sum insured. The policy permits several excess rainfall payouts to be triggered in any cover period up to the maximum liability of 100% of the sum insured. For drought, the cover period is defined in terms of number of consecutive dry days during a window that varies by country and program from May to September or October. For earthquake, MiCRO uses the Modified Mercalli Intensity (MMI) scale, and data are readily available through the Ministry of Environment and Natural Resources (MARN) and the National Coordinator for the Reduction of Disasters (Coordinadora Nacional para la Reducción de Desastres [CONRED]) in Guatemala. (See Table 22 for a summary of the technical parameters of index insurance)

MiCRO has developed its own climate risk database and calculation platform (MiCAPP) to capture satellite imagery on a continuous basis, design the index insurance contracts and their triggers, and help insurers and reinsurers monitor the performance of these contracts and advise them when the contracts trigger. MiCRO enters into service contracts with insurers and reinsurers to provide them access to their contract design and rating outputs through MiCAPP. During the contract cover period, MiCRO also acts as the calculation agent responsible for

69 TRMM is a product of NASA and Japan's space development agency that provides hourly rainfall data at a spatial resolution of 0.25° (approximately 27 km x 27 km). For more information on TRMM, see NCAR Climate Data Guide, "TRMM: Tropical Rainfall Measuring Mission," <https://climatedataguide.ucar.edu/climate-data/trmm-tropical-rainfall-measuring-mission#:~:text=It%20provides%20rain%20rate%20in,a%20lag%20for%20data%20processing>. EVI is provided by LANDSAT-NASA and is available at a resolution as low as 250 m. EVI is similar to the Normalized Difference Vegetation Index (NDVI) and can be used to quantify vegetation greenness. However, EVI corrects for some atmospheric conditions and canopy background noise and is more sensitive in areas with dense vegetation.

monitoring the development of each insured index in each unit area of insurance (UAI); it also advises insurers and reinsurers if the policy has been triggered in one or more UAI and the amount of payout due in that UAI (Table 22). It is understood that the UAI in each country—often termed the “populated unit”—is typically a municipality or smaller administrative area. (See Chapter 6 for further discussion of these index insurance contract design parameters.)

Table 22. Technical parameters of satellite index insurance products in NCA countries

Item	El Salvador		Guatemala			Honduras
	Produce Seguro	Emprende Seguro	Esfuerzo Seguro	Seguro Productivo	Seguro Colectivo Paramétrico	Crop weather index insurance
Earthquake	MMI	MMI	MMI	Not insured	Not insured	Not insured
Excess rainfall						
Source	ERA 5 (formerly TRMM)	ERA 5	ERA 5	ERA 5	ERA 5	CHIRPS
Method	Gridded data, recalculated from satellite measures and other data	Gridded data, recalculated from satellite measures and other data	Gridded data, recalculated from satellite measures and other data	Gridded data, recalculated from satellite measures and other data	Gridded data, recalculated from satellite measures and other data	Satellite measure from upper cloud temperatures
Time series	1979	1979	1979	1979	1979	1979
Resolution	0.25° (27 km x 27 km)	0.25° (27 km x 27 km)	0.25° (27 km x 27 km)	0.25° (27 km x 27 km)	0.25° (27 km x 27 km)	0.05° (5.5 km x 5.5 km)
Trigger	mm rainfall over 2/3 day	mm rainfall over 2/3 day	mm rainfall over 2/3 day	mm rainfall over 2/3 day	mm rainfall over 2/3 day	mm rainfall over 2/3 day
Coverage	12 months	12 months	12 months	12 months	12 months	n.a.
Maximum payout	100% of the SI	100% of the SI	100% of the SI	100% of the SI	100% of the SI	100% of the SI
Drought						
Source	ERA 5 (formerly EVI)	ERA5	ERA 5 (formerly EVI)	ERA 5	ERA 5	CHIRPS
Trigger	No. consecutive dry days	No. consecutive dry days	No. consecutive dry days	No. consecutive dry days	No. consecutive dry days	n.a.
Coverage	4 months (June-Sept)	May 15–October 15	n.a.	May 15–October 15	n.a.	n.a.
Maximum payout	12.5% of SI/month	50% of the SI	n.a.	50% of the SI	n.a.	n.a.
Area unit of insurance	n.a.	Populated place (<i>lugar poblado</i>)	n.a.	Populated place (<i>lugar poblado</i>)	n.a.	n.a.
TA provider and calculation platform	MICRO MICAPP	MICRO MICAPP	MICRO MICAPP	MICRO MICAPP	MICRO MICAPP	n.a.

Source: Information collected by World Bank during 2023 survey of NCA from various sources.

Note: CHIRPS = Climate Hazard Group Infrared Precipitation with Station; EVI = Enhanced Vegetation Index; MMI = Modified Mercalli Intensity; n.a. = not applicable; SI = sum insured; TA = technical assistance.

Uptake and penetration of climate risk index insurance

In Guatemala, the number of small family farmers and entrepreneurs who have purchased microinsurance or who are beneficiaries has increased; in 2022 a total of 60,739 policies were issued, representing a penetration rate of about 4.7% of the country’s estimated 1.3 million family farming households (Table 23). The oldest index insurance program in Guatemala, Esfuerzo Seguro, has been operating since 2017 or for six full years, and under this voluntary micro-level individual-farmer insurance program linked to credit, the demand for insurance has increased gradually from 2,600 policies in 2017 to 11,369 policies in 2022. In El Salvador, where micro-level index insurance is relatively new (only three years old), a total of 10,962 policies were sold in 2022 by the two index insurers, representing an insurance penetration rate of 2.8% of the population of family farmers. These uptake results are encouraging.

The MAGA Seguro Colectivo Paramétrico index insurance program is by far the largest program in Guatemala; and under the modified macro-level approach by which the MAGA extensionists identify and register targeted farmers for insurance,⁷⁰ it has been possible to scale up cover to 40,000 beneficiaries in Year 2 of this program. In 2023/24, MAGA plans to scale the program further to reach between 100,000 and 300,000 family farmers. This approach merits further study in all NCA countries using appropriate distribution channels. In Honduras, where there is no operational agricultural extension service under MAG, alternatives will need to be explored, including the cajas rurales (rural credit and savings banks) network of 3,760 rural bank outlets. (See Chapter 7 for further discussion of distribution channels.)

Table 23. Index insurance uptake and penetration rates in NCA countries

Name of program	El Salvador		Guatemala			Honduras
	Produce Seguro	Emprende Seguro	Esfuerzo Seguro	Seguro Productivo	Seguro Colectivo Paramétrico	Crop weather index insurance
Date of program launch	2020	2021	2017	2021	2021	
Number of insured policies (beneficiaries) by year						
2022	8,763	2,144	11,369	9,370	40,000	
2021	6,114	4,800	11,121	1,292	6,096	
2020	3,797		10,100			
2019			7,100			
2018			5,600			
2017			2,600			
Number of family farms per country	395,588		1,299,377			600,300
Total number insured 2022	10,907		60,739			0
Index insurance penetration rate (%)	2.80%		4.70%			0%

Source: Information collected by World Bank during 2023 survey of NCA from various sources.

Underwriting performance and results

A key measure of success of family farmer index insurance programs is whether they reach scale and financial sustainability, whereby the collected premiums are sufficient to cover not only the triggered payouts but also the administration and operating costs of insurers and their reinsurers.

Most of the index insurance programs in NCA have been operating for only a year or two, and it is therefore difficult to assess their success to date. However, in Guatemala the Esfuerzo Seguro program has now operated for six full years, and in El Salvador the Produce Seguro program has operated for three full years. Various consolidated financial performance figures are summarized in Table 24 for each program according to the number of years of available data. Key features of this analysis include the following:

- The smallest of these programs to date is the Emprende Seguro micro-level insurance program underwritten by Seguros Futuro in El Salvador, with 4,800 insured farmers and microentrepreneurs in 2021 (Year 1 results); the largest is the Esfuerzo Rural micro-level

⁷⁰ The eligible beneficiary farmers are identified by the MAGA extension officers in each municipality and are then automatically registered for the free SCP insurance program. This procedure is much faster than voluntary micro-level insurance where farmers, once they have expressed an interest in buying the insurance product, tend to be signed up on a one by one basis.

insurance program underwritten by Aseguradora Rural in Guatemala, which has insured a total of nearly 48,000 loanee farmers and microentrepreneurs over the past six years.

- Most of these micro index insurance programs have been successful in targeting female farmers and microentrepreneurs. For example, under Esfuerzo Rural in 2017–2022, between 52% and 68% of the insured borrowers were women clients (Biese, McCord, and Gopalakrishna 2022), and under the WFP Seguro Productivo program, 69% of those insured in 2021 and 80% of those insured in 2022 were female crop producers (WFP 2022a).
- There is considerable variation in the average sum insured offered by each program, ranging from just US\$104 per policy in the WFP-sponsored *Emprende Seguro* program in El Salvador, which is targeted at poor and mainly female farmers and microentrepreneurs, to US\$780 per farmer under the MAGA large-scale program, where the sum insured is based on the notional average costs of production for food crops over the two growing seasons per year. The highest sums insured are found in the two insurance programs linked to bank lending: *Seguro Productivo* in Guatemala, with an average sum insured of US\$889/insured, and *Produce Seguro* in El Salvador, with an average sum insured of US\$1,335/insured. This evidence suggests that on average, farmers who borrow seasonal production credit are considerably larger than non-borrowers.
- The average premium per policy varies from US\$5.3 per insured in the *Emprende Seguro* program to US\$65.7 per beneficiary of the large-scale MAGA program underwritten by HCN. The average premium rates vary from 4.2% in the *Produce Seguro* program in El Salvador, which insures against earthquake, excess rain, and drought, to 8.4% in the MAGA excess rain and drought program in Guatemala.
- In terms of the insurance payouts, over the past six years (2017–2022), the *Esfuerzo Rural* program has made over 92,000 payouts to its insured clients, representing a payout frequency of 1.93 payouts per policy per year; total payouts are valued at US\$2.2 million, or an average of US\$14.4 per insured per payout received. Most of these payouts have been due to excess rain losses. At completion of the 2022 insurance year, the long-term average loss ratio in *Esfuerzo Rural* stood at 60%, or about a break-even position for Swiss Re, the reinsurer, after deduction of the ceding commission and its own operating overhead expenses. The *Produce Seguro* program insured by *Seguros Futuro* incurred very severe excess rain losses associated with tropical cyclones in 2020, its first commercial year of operation, with payouts valued at nearly US\$1 million and a 2020 loss ratio of 462%. However, in 2021 and 2022, payouts were much lower, and the cumulative three-year loss ratio at end 2022 stood at 105%. Over the three years, the bulk of payouts (86%) in the *Seguro Produce* program have been due to excess rain events, and only 14% due to drought. The claims position on the WFP–*Seguro Productivo* program in Guatemala after two full years shows a cumulative loss ratio of 100%, due mainly to three major excess rain events in 2022 that resulted in 13,203 payouts to insured people.⁷¹ Underwriting information for the large-scale MAGA *Seguro Colectivo Paramétrico* program is available only for the 2022/23 underwriting year: as of December 2022, a total of 10,000 mainly excess rain payouts were settled, valued at US\$676,203 and equivalent to a loss ratio of 26%. However, there will likely be further payouts between now and the end of the underwriting year. In 2021, the WFP *Emprende Seguro* program in El Salvador made small payouts to 25 insured beneficiaries, with total payouts valued at US\$155, equivalent to a loss ratio of only 1% (WFP 2022d). Underwriting results are not available for 2022, but it is likely that the payouts will have been much higher in 2022.

71 This is the number of payouts reported as of December 15, 2022, and the number will have increased by the end of the cover period, May 15, 2023.

Table 24. Consolidated results of index insurance programs in El Salvador and Guatemala

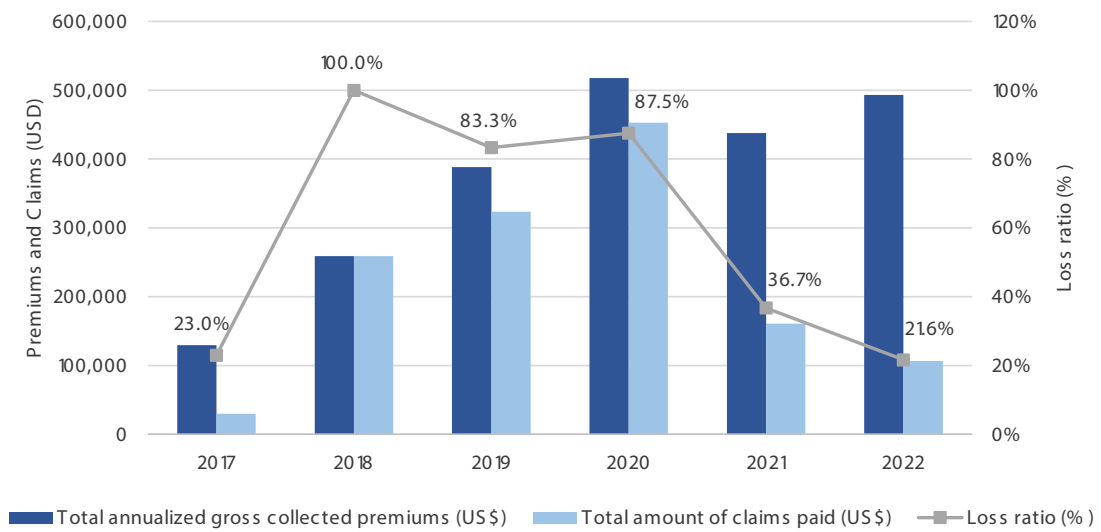
Name of program	El Salvador			Guatemala	
	Produce Seguro	Emprende Seguro	Esfuerzo Seguro	Seguro Productivo	Seguro Colectivo Parametrico
Insurance company	Seguros Futuro	Seguros Futuro	Aseguradora Rural	Aseguradora Rural	CHN
Number of years included in results	3 (2020–2022)	2 (2021–2022)	6 (2017–2022)	2 (2021–2022)	1 (2022/23)
Total number of policies sold/clients covered	18,674	6,944	47,890	10,662	40,000
% clients covered	—	—	43%	—	—
Total annualized sum insured (US\$)	24,926,835	1,991,200	42,551,803	4,082,242	31,209,363
Average sum insured per client (US\$)	1,335	287	889	383	780
Total annualized gross collected premiums (US\$)	1,054,614	122,586	2,224,723	295,881	2,626,788
Average premium rate (%)	4.20%	6.20%	5.20%	7.20%	8.40%
Average premium per client (US\$)	56.5	17.7	46.5	27.8	65.7
Number of paid claims	n.a.	256	92,294	13,238	10,000
Total value of claims paid (US\$)	1,107,349	3,716	1,332,232	295,852	676,203
Average claim amount (US\$)	n.a.	14.5	14.4	22.3	67.6
Average number of claims per policy (claims frequency) (%)	n.a.	n.a.	193%	124%	n.a.
Loss cost (%)	4.40%	3.00%	3.10%	7.20%	2.20%
Loss ratio (%)	105%	3%	60%	100%	26%

Source: Information collected by World Bank during 2023 survey of NCA from various sources.

Note: n.a. = not applicable

The Esfuerzo Seguro program in Guatemala is an example of a program that has learned from experience over time and has adjusted the contract design parameters to control the number and frequency of payouts made to its bank clients. Between 2017 and 2020, the program incurred a very high frequency of claims payouts, ranging from an average of 3.78 payouts per insured policy in 2018 to 2.88 payouts per policy in 2020; accompanying loss ratios were high, peaking at 100% in 2018, with a four-year loss ratio at end 2020 of 84%. These losses were unsustainable, and therefore Aseguradora Rural and MiCRO adjusted the product parameters and threshold triggers to reduce the frequency and size of payouts (Biese, McCord, and Gopalakrishna 2022). Following the strengthening of the policy triggers, the past two years have seen much less frequent payouts and lower annual loss ratios, with a six-year long-term average of 60% (Figure 33).

Figure 33. Guatemala: Esfuerzo Seguro premium and claims, 2017–2022



Source: Data for 2017 to 2020: Biese, McCord, and Gopalakrishna 2022; data for 2021 and 2022: courtesy of Aseguradora Rural in March 2023

A central theme of this feasibility study is to examine how governments, insurers, and development partners in NCA countries can rapidly and cost-effectively reach out to NCA’s estimated 1.9 million family farmers to provide index-based disaster risk insurance protection to them.

This report argues that a modified macro-level approach, like that of the Seguro Colectivo Paramétrico program of Guatemala’s MAGA, is the most appropriate way to meet this goal and achieve scale in NCA. Chapter 5 provides a review of international experience with micro-level, meso-level, macro-level, and modified macro-level approaches to implementing small-farmer natural and climatic risk index insurance in developing countries, while Chapters 6 and 7 consider ways the MAGA program in Guatemala could be further strengthened and its approach extended to the other NCA countries.

5

DRFI Regional and International Experience

Box 5. Key takeaways from Chapter 5

- **International experience shows that index-based insurance is more suitable for family farmers than traditional indemnity-based agricultural insurance** because it reduces adverse selection and moral hazard and lowers operating costs.
- **Index insurance is a flexible class of insurance** that can be offered as a micro-level retail cover to individual farmers, as a meso-level cover to protect the financial exposure of risk aggregators such as banks, or as a macro-level product purchased by national or regional governments as part of their disaster risk management and financing programs. In recent years, a modified macro-level approach has been implemented successfully in several countries.
- **International evidence shows that purely voluntary micro-level disaster risk index insurance programs take many years to achieve scale and sustainability because farmers require years of education and experience to gain trust in the program.** Voluntary micro-level programs also face challenges in terms of very high overhead operating costs and basis risk.
- **Basis risk is of less concern under a modified macro-level approach, where government finances premiums on behalf of the beneficiaries, than under conventional micro-level retail programs.** If farmers who pay for their premiums under a micro-level program experience downside basis risk and receive no payouts, they will be financially worse off than if they had never purchased index insurance.
- **Experience from the first generation of modified macro-level index insurance programs shows potential to cost-effectively increase the financial resilience of the most vulnerable.** The potential to insure large numbers at relatively low cost was demonstrated by the Kenya Livestock Insurance Program (KLIP) and Satellite Index Insurance Program for Pastoralists in Ethiopia (SIIPE). These programs enrolled many more pastoralists than the micro-level schemes in African countries, including Kenya and Ethiopia, which struggled to achieve significant voluntary demand and uptake and which were extremely costly to implement. Further, evidence shows that such insurance schemes can be significantly

more cost-effective to scale up than the alternative of government-implemented cash transfer programs, while achieving comparable impacts on welfare (Jensen, Barret, and Mude 2015).

- **A key feature of the sustainability and scale-up of macro-level sovereign risk programs has been the provision of premium finance by donors and development partners.** Although some countries have increased their contributions to the costs of such programs from domestic sources, they will likely be unable to afford the premiums of the beneficiary farmers without the medium- to long-term commitment of donors to support the funding of premiums (Scott et al. 2022).
- **The Caribbean Catastrophe Risk Insurance Facility is the most relevant of the regional sovereign disaster risk financing and insurance programs, as it currently operates in three Central American countries.** However, CCRIF policy pay-outs are intended to be correlated with a broad spectrum of physical damages and losses (e.g., buildings and infrastructure) but do not mimic indemnity coverage for any specific assets or sectors. CCRIF products do not require the transfer funds directly to affected populations.
- **International experiences suggests opportunities for regional collaboration that should be carefully considered in Phase II of this study.** While a regional insurance facility does not appear appropriate, regional cooperation—in product design and rating, design of farmer registration processes, development of insurance awareness and training modules, and appointment of a calculation agent to monitor contract performance during the cover period—could lead to major economies in the costs of program design and implementation.

5.1. Introduction

This chapter reviews the international experience with disaster risk index insurance at different levels of aggregation, including micro-level, meso-level, and macro-level applications, and considers the most recent developments with modified macro-level index insurance programs for smallholder crop and livestock producers. The aim is to identify lessons and experiences from these programs that may be applicable to the design and implementation of the large-scale index insurance program for up to 1.9 million family farmers in the three NCA countries.

5.2. Index insurance: Key features and suitability for family farmers in NCA countries

5.2.1. Advantages of index insurance

Crop index insurance overcomes several of the key problems associated with conventional indemnity-based crop insurance, including high operating costs, adverse selection, and moral hazard. To date, most crop index insurance has been in the form of micro-level or individual-farmer crop WII or AYII. The key feature of crop index insurance products is that they do not indemnify crop yield losses at the individual-field or grower level, but rather use a proxy variable (the index)—such as the amount of rainfall, the temperature, or the area yield—to trigger indemnity payouts to farmers. The main advantage of index insurance is the elimination of adverse selection and moral hazard problems, which are common to multiple peril crop insurance (MPCI). Since payouts are made based on an objective measurement at the reference weather station, there are few information asymmetries to be exploited, and the behavior of the insured cannot influence the extent of payouts. In addition, an index reduces administrative costs (particularly because it does not require in-field inspections or loss adjustment) for the insurer, and in theory this makes the premiums more affordable to small farmers.

Crop WII and AYII can be properly designed and implemented only in countries where the public or private sector is actively involved in the seasonal measurement and recording of crop sown and harvested area, production, and yields at a local level. Where historical crop yield data are available at a local level (e.g., municipality or village level), these data are used to calibrate crop WII covers (typically for excess rainfall, rainfall deficit, and/or extremes of temperature) and to design and rate AYII covers, such as in India and increasingly in many other countries.⁷²

NCA countries, however, face major constraints to the development of crop WII or AYII because they have little or no history of formally measuring and recording crop production and yields, including for staple food crops. In Guatemala and Honduras, there is no formal public or private sector entity responsible for recording and reporting on crop sown and harvested area, production, and yields for any crops except commercial plantation crops such as coffee and bananas. In El Salvador, MAG is involved in reporting on crop production and yields, but the data are published only at department level and above, which is too coarse to use for WII or AYII purposes.

In NCA, the alternative approach to offering a crop-specific WII or AYII cover, adopted by MiCRO on all its programs to date, has been to design a natural disaster and climatic risk index insurance cover that protects the insured against business interruption to his or her productive enterprise, whether a farm or small business.⁷³ In Guatemala, for example, the WFP–Aseguradora Rural Seguro Productivo policy wording defines the insurable interest as “the economic interest that the insured has in the continuity of its productive activity in the covered area, and that is affected by an insured risk. The insurable interest is determined and quantified by the productive investment or the income expected by the insured” (PMA-AsRural 2023).

Chapter 4 showed that the current generation of index insurance policies being offered to small-scale farmers and microentrepreneurs in NCA insure against earthquakes (under programs linked to bank credit) and excess rain and drought (insured under all programs). These perils have the potential to interrupt businesses and cause major financial losses to investments in or income expected from productive enterprises.

5.2.2. Disadvantages of index insurance

Basis risk is the major drawback of agricultural index insurance; it is the risk that the loss based on the index (e.g., amount of rainfall recorded at the weather station) will differ from the actual loss incurred by the individual insured farmer on the ground. There are two types of basis risk: (i) downside basis risk, where farmers incur significant loss to their crops but do not receive an indemnity, and (ii) upside basis risk, where a payout is triggered to farmers who have not incurred any crop losses. The consequences of downside basis risk are of major concern, especially for small resource-poor farmers, because it may leave them worse off than if they had not purchased insurance at all: not only do they not receive any payout to cover their crop losses, but they have also had to bear the cost of the insurance premium (which can be high, at between 5% and 10% of the sum insured, or even more). Conversely, upside basis risk provides payouts when least needed and—of more concern to insurers—unpredictably increases the cost of an insurance policy, which compromises product sustainability.

72 In India, AYII forms the basis of the subsidized national crop insurance program (Pradhan Mantri Fasal Bima Yojana, PMFBY) for small and marginal farmers that insures more than 40 million farmers each year. For further information, see the PMFBY website at <https://pmfby.gov.in>. In the past decade, AYII has been commercially introduced into other countries, including Pakistan, Burkina Faso, Kenya, Uganda, Brazil, and Peru.

73 “Business interruption insurance covers the Insured for loss of income during periods when the Insured cannot carry out business as usual due to an unexpected event. Business interruption insurance aims to put the Insured’s business back in the same trading position it was in before the event occurred.” ABI, “Business Interruption Insurance,” <https://www.abi.org.uk/products-and-issues/choosing-the-right-insurance/business-interruption-insurance/#:~:text=Business%20interruption%20insurance%20covers%20you,in%20before%20the%20event%20occurred.>

Basis risk can arise for a number of reasons, including spatial or temporal reasons, and reasons related to product or contract design. The most common source of basis risk is spatial: in some cases, the level of the indexed peril (e.g., amount of precipitation) varies over very short distances, and this variation is not picked up either by the local ground weather station or by the satellite.

Basis risk has been a major problem in many of the first-generation micro-level index insurance programs implemented mainly in Asia and in Africa since 2003 and has led many of these programs to fail. Basis risk has had major consequences for these programs: (i) farmers often did not receive payouts and were left worse off than if they had not purchased insurance; (ii) trust between the affected farmers and the insurer(s) and stakeholders broke down; (iii) insurers and partners had to make ex gratia payments to minimize their reputational risk; (iv) in a very few cases, including for the Banco CHN–MAGA Seguro Colectivo Paramétrico program, insurers and their partners established a special basis risk fund to compensate losses in cases of downside basis risk;⁷⁴ and (v) many pilot programs were terminated.⁷⁵

Basis risk is generally considered less problematic for macro-level sovereign risk index insurance programs. In these cases, insurance is based on aggregate losses over a defined geographic area or region rather than at the individual-farmer level, and spatial basis risk is therefore usually much lower. Furthermore, governments are much better able to absorb basis risk than individual farmers. Although basis risk is usually associated with micro-level index insurance, it can also affect macro-level sovereign disaster-risk insurance programs mainly due to product design and contract design issues; this was the case for the African Risk Capacity (ARC) experience with drought in Malawi in the 2015/16 crop season (Reeves 2017). The CCRIF also experienced basis risk in earlier years.⁷⁶

To date in NCA, there has been little formal monitoring and evaluation (M&E) to assess the quality of protection provided by excess rain and drought index insurance or the extent of basis risk. If a large-scale index insurance program modeled along the lines of the Guatemala MAGA program is approved, it will be important to build in an M&E component. Furthermore, the insurance superintendents in NCA countries may wish to learn about the Minimum Quality Standard (MQS) and Quality Index Insurance Certification (QUICC) standards⁷⁷ and to build these into their own procedures at the stage of reviewing and approving new index insurance products before they are launched on their markets. In this context, it is apparent that the insurance regulator in Honduras has devoted substantial time to conducting actuarial reviews of the index insurance contracts under development.⁷⁸

Other challenges of crop index insurance products include their complexity and costs of design, their focus on only one or two key perils (they do not protect against pest and diseases, for example), and their dependence on long-term investment in awareness, education, and training for clients.

74 As an alternative to making ex gratia payments, some index insurance programs have created a basis risk fund. An early example is the WFP R4 Rural Resilience Initiative in Ethiopia, which established a basis risk fund to address the very severe drought losses in 2015 that the drought index insurance only partly covered (Osgood 2016).

75 For a review of basis risk in micro index insurance programs in India, see Clarke et al. (2012) and Rao (2015); for programs in Africa, see Bankable Frontier Associates (2013) and Arce (2016).

76 CCRIF has experienced basis risk in instances when countries have suffered significant losses due to weather hazards, but payments have not been triggered—for example, following Hurricane Sandy in 2012 in Jamaica, the Bahamas, and Haiti. This experience moved CCRIF to eventually support small-scale, community-level projects in each of the three countries. CCRIF, “CCRIF Provides Post-Sandy Assistance to Haiti, Jamaica and the Bahamas,” https://www.ccrif.org/sites/default/files/publications/technical-materials/CCRIF_Post_Sandy_Assistance_2013.pdf.

77 Since 2018, there have been several initiatives led by the BASIS MRR Innovation Lab, University of California, Davis, to introduce quality controls for index insurance termed the Minimum Quality Standard (MQS) and in 2020, the Quality Index Insurance Certification (QUICC) was launched, an initiative between UC Davis and Kenya-based Regional Centre for Mapping of Resources for Development (RCMRD), funded by USAID, to offer Insurers voluntary quality certification for insurance products in East Africa. These indices aim to ensure that at a minimum, index insurance products do no harm by avoiding downside basis risk. See: <https://basis.ucdavis.edu/publication/policy-brief-minimum-quality-standard-mqs-ensure-index-insurance-contracts-do-no-harm> and <https://quicc.ucdavis.edu>

78 Interview with Superintendencia del Sistema Financiero (SSF) in April 2023

5.3. Index insurance opportunities at micro, meso, and macro level and modified macro-level approach

Index insurance is a very flexible tool that can be offered at different levels of aggregation (micro, meso, macro; see Box 6) and can achieve different objectives:

- **Index insurance for disaster relief** can protect people—their lives, health, and assets— against catastrophic losses and can save lives and livelihoods through faster, more cost-effective responses to disasters.
- **Index insurance for development** can help farmers protect their investments, can facilitate investments and behaviors that increase incomes (e.g., contract farming, access to credit), and can be part of a wider strategy to help farmers escape poverty.

Box 6. Applications of index insurance at micro level, meso level, and macro level

Micro level (direct): Policyholders are individuals—e.g., famers, market vendors, or fishers—who hold policies and receive payouts directly. These policies are often sold at the local level and retailed through a variety of channels, including microfinance institutions, farmers' cooperatives, banks, nongovernmental organizations (NGOs), and local insurance companies. Premiums are either paid in full by clients or subsidized.

Meso level (indirect): Policyholders are risk aggregators such as associations, cooperatives, mutuels, credit unions, or NGOs; a (re-)insurer makes payments to the risk aggregators, which then provide services to individuals.

Macro level (indirect): Policies are held by governments or national agencies within the international/regional reinsurance market. Payouts can be used to manage liquidity gaps, maintain governmental services, or finance post-disaster programs and relief efforts for predefined target groups. Beneficiaries of these programs can be individuals. These schemes can be operationalized through regional risk pools.

Source: Schäfer et al. 2016; IFAD and WFP 2010.

To date the widest application of index insurance has been in micro-level crop WII for small-scale farmers in Africa, Asia, and to a lesser extent in LAC. There are relatively few applications of index insurance at the meso level, and these cases are not reviewed in this chapter because they are less relevant to the livelihoods protection needs of family farmers in NCA. There has been major interest in macro-level regional disaster risk insurance pools, including CCRIF, ARC, the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), the Southeast Asia Disaster Risk Insurance Facility (SEADRIF), and (specific to agriculture) the CADENA program in Mexico. Several of these micro and macro programs are reviewed in this chapter.

Over the past decade, the World Bank has worked on another approach to index insurance, the “modified macro” approach, which aims to provide livelihoods protection to large numbers of targeted vulnerable farmers. This model builds on the experiences of one of the most comprehensive national macro-level agricultural index insurance schemes, namely the CADENA program targeted at vulnerable poor farmers, livestock producers, and aquaculture producers/fisherfolk. A major drawback of CADENA identified by the World Bank related to the payment of lump sums by the insurers to the state governments for distribution to affected farmers. This arrangement led to major delays in distributing payouts; often those in most need did not receive payouts, and rent seeking became a problem.

In order to overcome these constraints, the World Bank Group decided to modify the macro-level approach by the following means:

- **Pre-identifying and registering the target beneficiaries** of the government-purchased insurance policy and defining how much financial compensation each beneficiary receives in the event the policy is triggered.
- **Establishing for each beneficiary a payment system** (e.g., bank account, mobile money account, SMS token system, check) for receipt of a direct payout from the insurer.
- **Providing insurance education to the target beneficiaries** so that they understand the benefits and limitations of the protection being offered by government.

The modified macro-level approach was first designed as a satellite pasture drought index insurance cover for livestock ranchers in Uruguay and Argentina between 2010 and 2011, and was then transferred to Kenya and Ethiopia in 2014 as a livelihoods drought protection cover for vulnerable pastoralists. The KLIP was launched in Kenya in 2015/16, and, the SIPE was launched in Ethiopia in 2018. Most recently, a modified macro-level general livelihoods index insurance program has been designed by the World Bank for smallholder farmers in Paraguay (World Bank Group 2023b).

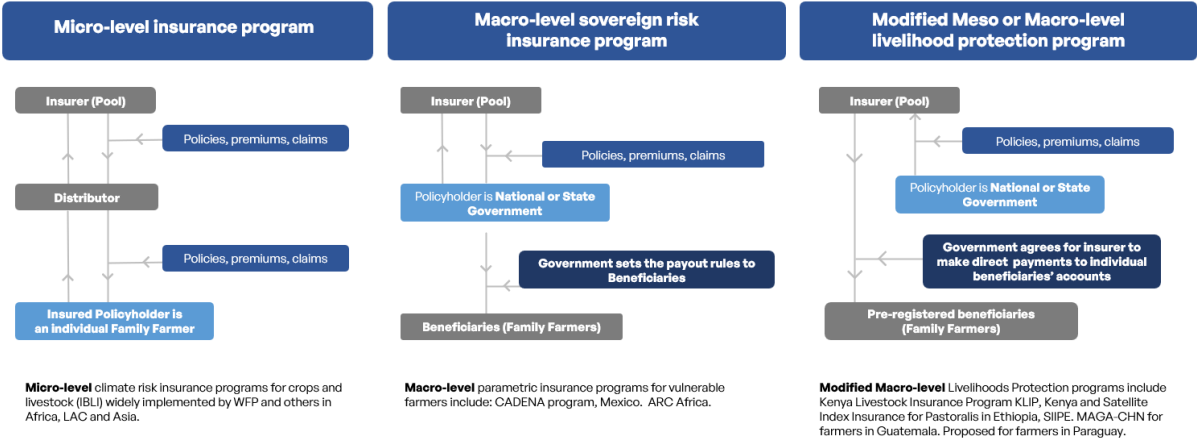
The level at which an index insurance product is designed and implemented leads to some fundamental differences between the products. As shown in Figure 34 and discussed below, there are key differences between (i) a voluntary commercial micro-level retail product sold to individual farmers and entrepreneurs, (ii) a conventional macro-level sovereign risk disaster financing instrument purchased by national governments, and (iii) a modified meso- or macro-level index product purchased by governments (or development partners) to protect the livelihoods of large numbers of smallholder crop and livestock producers and entrepreneurs.

Under a typical voluntary micro-level index insurance program, individual policies are purchased by individual farmers or entrepreneurs, who are responsible for the payment of part or all of the premium and who are the insured policyholders. If a payout is triggered, the insurer pays the insured farmer directly. One variation on this micro-level model includes group-based insurance programs, whereby an association arranges cover on behalf of its members and receives a single master insurance policy wording; under such a group-based approach, however, individual insurance certificates are usually issued to each insured person, who receives an individual payout. Micro-level index insurance programs may be voluntary or linked on a compulsory basis to credit (see left-hand chart in Figure 34).

Under a macro-level sovereign risk insurance program, governments typically purchase a single policy, and they or an appointed ministry are the insured policyholder. In the event the policy is triggered, the payout is made as a lump sum to government (the insured), which then decides how to utilize this payout for emergency relief and response. ARC is an example of a macro-level index insurance program that provides governments with timely payouts to respond to drought. In ARC's case, each country prepares an ex ante drought response plan for how the lump-sum payouts will be spent, but identification of farmers in affected regions who will receive compensation is done on an ex post basis. Under the CADENA program in Mexico, which operated between 2006 and 2020, the state governments purchased crop and livestock index insurance cover on behalf of vulnerable family farmers; if the policy was triggered, the state governments received a lump-sum payment which they then distributed in kind or cash to the farmers in the affected areas (see middle chart in Figure 34).

Under a modified macro-level approach, government also purchases a single policy, but does so on behalf of large numbers of pre-identified and registered farmers (beneficiaries), each of whom has a pre-agreed sum insured and has a bank account into which payouts are directly made by the insurance company. This model looks very similar to a micro-level program, but has key differences: (i) a farmer who is protected under the program is termed a beneficiary and not an insured; (ii) beneficiaries do not have a direct insured interest in the policy, as they do not pay any premium and do not receive an insurance policy—rather they receive a certificate proving enrollment as a beneficiary under the government program; and (iii) enrollment and registration of beneficiaries is semiautomatic where registries of the targeted group (e.g., family farmers) exist at a local level (see right-hand chart in Figure 34).

Figure 34. Differences between micro-level, macro-level, and modified macro-level crop and livestock index insurance



Source: World Bank.

Note: ARC = African Risk Capacity; CHN = Crédito Hipotecario Nacional; IBLI = index-based livestock insurance; KLIP = Kenya Livestock Insurance Program; MAGA = Ministry of Agriculture, Livestock and Food (Guatemala); PMFBY = Pradhan Mantri Fasal Bima Yojana; SIPE = Satellite Index Insurance Program for Pastoralists in Ethiopia.

5.4. Micro-level index insurance programs for small farmers: International experience

Relatively few of the first-generation micro-level index insurance programs launched over the past 15 years have achieved scale and commercial viability (sustainability). Some of the main programs have shown promise, including (i) the subsidized public and private sector weather index-based schemes and the national subsidized AYIL program in India;⁷⁹ (ii) the former Kilimo Salama/Acre Africa programs in Kenya, Tanzania, and Rwanda; (iii) the WFP R4 Rural Resilience Initiative in Ethiopia, which has scaled outward to more than 15 countries in Africa, Asia, and Central America; and (iv) the index-based livestock insurance (IBLI) programs in Mongolia, Kenya, and Ethiopia. Many of these programs have been operating for more than 10 years and provide evidence of scale-up; have published insurance data in order to assess their financial performance; and (in the cases of the R4 Rural Resilience Initiative and IBLI) have well-developed M&E frameworks and have generated considerable information on program benefits and impacts at the individual-farmer/herd level. These programs have been reviewed in recent years and cited as examples of scale-up (e.g., Greatrex et al. 2015; Schaeffer and Waters 2016).

79 See Clarke et al. (2012); IFAD and WFP (2010); Rao (2015) for review of the earlier generation of WII programs in India and issues of basis risk. India currently operates two main programs, the Revised Weather-Based Crop Insurance Scheme (RWBCIS) and the PMFBY AYIL scheme.

5.4.1. WFP R4 Rural Resilience Initiative

WFP's R4 Rural Resilience Initiative, started in Ethiopia in 2011, aims to build climate resilience and strengthen livelihoods for very small resource-poor farmers; it combines savings and credit, risk reduction measures, and weather index insurance.⁸⁰ The R4 model adopts sound risk management principles and is built around four pillars that integrate (i) disaster risk reduction measures aimed at enabling vulnerable resource-poor farmers to build their resilience against major drought shocks and improve their agricultural practices; (ii) better risk retention for households and communities through the promotion of group savings (risk reserves) and integration with social protection systems; (iii) access to seasonal crop credit (prudent risk taking) for farmers to allow investment in production- and yield-enhancing technology (improved seeds and fertilizers, etc.), thereby increasing their consumption and incomes; and (iv) risk transfer through weather index and other forms of index insurance. In the start-up phase of new programs, WFP and its partners usually fund premium subsidies in full to make cover affordable and accessible to their vulnerable poor clients; however, in the case of the R4 Rural Resilience Initiative, a smart premium strategy applies, and subsidy levels are reduced over time or the insured contributes in kind toward the costs of insurance premiums.⁸¹

R4 supports the development of innovative micro-level index insurance products and programs, helping vulnerable farmers to access insurance policies that best fit their needs and address risks across various regions and countries. Starting in 2009, with technical support from IRI, WFP designed a satellite rainfall deficit insurance cover for family farmers growing wheat and teff in Ethiopia. The cover provided protection for early-growing-season drought and a second window covering drought during grain formation and maturity. Since then, WFP has developed a wide range of climate risk index insurance products for crop and livestock producers:

- **Weather index insurance.** Provides protective coverage against weather-related risks, primarily for severe droughts
- **Index-based flood insurance.** Protects households from catastrophic flooding in Bangladesh
- **Area yield index insurance.** Protects farmers against a broad range of risks that can lower crop yields, such as pests and diseases
- **Hybrid index insurance.** Combines elements of WII and AYII (WFP 2022d)
- **Index-based livestock insurance.** Covers pastoralists and livestock farmers against scarce vegetation for grazing (WFP 2022d)

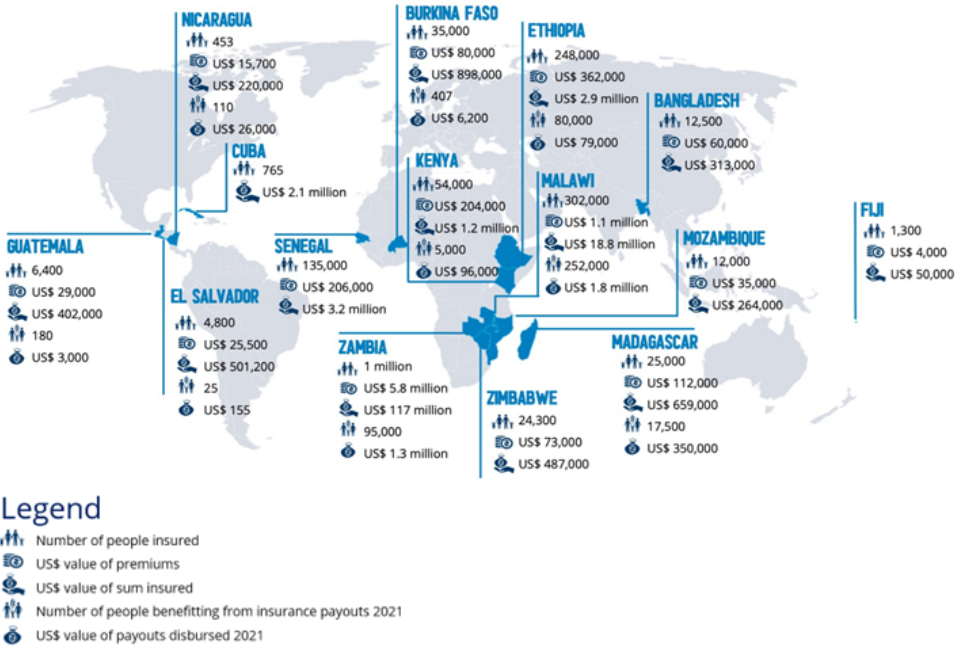
To ensure long-term sustainability and eventually phase out WFP's premium contribution, R4 promotes inclusion of insurance in government safety nets and contributes to the creation of rural financial markets. It does so by building local capacity and gradually requiring farmers to pay for insurance in cash. To support the scale-up of insurance, the products that are developed through R4 can be distributed to clients through additional channels.

⁸⁰ WFP and Oxfam America collaborated in Ethiopia under the Harita R4 Program to introduce rainfall deficit index insurance for smallholder farmers. In 2011, WFP assumed full responsibility for R4 implementation.

⁸¹ In-kind premium contributions occur under the Assets for Protection approach in Ethiopia, where farmers insured by R4 are required to provide their labor on risk reduction works to contribute in kind toward the costs of their index insurance premiums.

In 2021, WFP supported 395,000 vulnerable households and their families in accessing microinsurance solutions in Bangladesh, Burkina Faso, El Salvador, Ethiopia, Fiji, Guatemala, Kenya, Madagascar, Malawi, Mozambique, Nicaragua, Senegal, Zambia, and Zimbabwe. In 2021, WFP started new microinsurance programs in four new countries in the LAC region, including El Salvador and Guatemala in NCA, and one new country in Asia (Figure 35).

Figure 35. WFP R4 Rural Resilience Initiative: 2021 coverage under microinsurance programs in Africa, Asia, Central America, and the Caribbean



Source: WFP 2022d.

5.5. Macro-level (sovereign risk) index insurance programs: International experience

5.5.1. Rationale for macro-level index insurance

The rationale for using index insurance as an ex ante macro-level sovereign disaster risk financing tool centers on the ability to make very rapid payouts to governments following a disaster, enabling them to finance immediate emergency relief to the affected population. This is in contrast to ad hoc post-disaster relief and humanitarian assistance, which may take 6 to 12 months or more to be mobilized and reach the people in need. Thus, in the case of the CCRIF, the insurer aims to make payouts to the affected island governments within seven days of the triggering event, while ARC aims to pay out as soon as the cover period expires. Cost-benefit analyses for ARC (Clarke and Hill 2013) and the CADENA program for subsistence farmers in Mexico (Ritchie et al. 2017) show that it is considerably more cost-effective for governments to purchase ex ante sovereign risk insurance than to finance traditional post-disaster relief. Most of the macro-level index insurance programs that have been launched to date, including CCRIF, ARC, PCRAFI, and SEADRIF, are regional pool programs; by pooling risk across countries, members can benefit from risk diversification and from cost savings for pooled reinsurance protection.

5.5.2. Caribbean Catastrophe Risk Insurance Facility (CCRIF)

The Caribbean and Central America regions are highly exposed to adverse natural events, including hurricanes, earthquakes, excess rainfall, and increasingly droughts. Following Hurricane Ivan in 2004, which caused billions of dollars of losses across the Caribbean, the Caribbean Community (CARICOM) Heads of Government asked the World Bank for assistance in designing and implementing a cost-effective catastrophe risk transfer program for member governments. The result was the establishment of the Caribbean Catastrophe Risk Insurance Facility. As the earliest insurance instrument to successfully develop parametric policies backed by both traditional and capital markets, CCRIF was also the first multicountry risk pool in the world. Key features of CCRIF are summarized in Box 7.

Box 7. Features of the CCRIF

The Caribbean Catastrophe Risk Insurance Facility is designed to provide financial liquidity for emergency response to member states when a policy is triggered in the early stages of a disaster. Members currently include 19 Caribbean islands, most of which joined in 2007; four Central American countries—Panama, Nicaragua, Guatemala, and Honduras—that joined more recently; and two electricity utility companies. COSEFIN (Council of Finance Ministers of Central America, Panama, and the Dominican Republic) members participate in CCRIF through an insurance cell that is separate and independent from the existing Caribbean Community (CARICOM) and through a third cell shared between COSEFIN countries and CARICOM members.

The main benefits to members are rapid payouts and lower premium costs due to risk pooling and economies of scale. By adopting an index-based approach, claims payments can be settled very quickly following an insured event. By pooling risk, the insurance mechanism is estimated to cost 60% to 70% less than the members' cost of self-insurance through establishment of a reserve fund, and 45% to 50% less than the cost of coverage obtained individually in traditional markets. CCRIF was developed under the technical leadership of the World Bank and with a grant from the Government of Japan. It was capitalized through contributions to a multi-donor trust fund by the Government of Canada, the European Union, and the World Bank; by the governments of the United Kingdom, France, Ireland, and Bermuda; by the Caribbean Development Bank; and through membership fees paid by participating governments. Premium subsidies have also garnered donor support, and for example, the Caribbean Development Bank has provided a grant for the full payment of Haiti's premiums for earthquake, tropical cyclone, and excess rainfall policies (CDB 2016).

In 2023, CCRIF insures Caribbean and Central American governments against the modeled impacts of three key perils: tropical cyclones and earthquakes, which have been insured since inception in 2007, and excess rain, which was added in 2013 following demand by the island governments. CCRIF prepares country risk profiles for each member country for the insured perils, and countries are free to choose which of the perils they wish to insure. The profiles provide an outline of the hazard characteristics and risks for the country; they also include economic loss information used by the catastrophe models and information about the models that underpin the associated products. The profiles act as the basis for pricing of countries' CCRIF policies.^a

In response to demand by Central American countries, CCRIF is now developing a macro-level drought product, calibrated to a few cash crops for which exposure data exist. The product is expected to undergo review and validation in 2023/24. Prior to product launch, CCRIF will need to raise risk capital to underwrite this product line. In addition, for the

product to meet the liquidity needs of family farmers, CCRIF will need to invest in data on basic grains, or possibly consider a hybrid approach using remote sensing data as proxy for basic grain production.

CCRIF's member governments purchased US\$1.2 billion in coverage against climate-related and seismic hazards in 2022/23 (Reliefweb 2022). They renewed their index-based insurance coverage for tropical cyclones, excess rainfall, and earthquakes, and for the fisheries sector. For the earthquake, tropical cyclone, and excess rainfall policies, members ceded over US\$1.2 billion in coverage—an increase of 10% over the previous year. Thirteen member governments increased their coverage from the 2021/22 policy year. The renewal of policies and demand for increased coverage by members illustrate that countries continue to recognize the critical importance of financially protecting their economies against natural disasters, especially in the context of the increasing frequency and intensity of natural hazards.

Since its launch in 2007, CCRIF has made a total of 58 payouts valued at US\$260 million to 16 member governments, including Nicaragua and Guatemala. Over the past 15 years, CCRIF's single largest payout of US\$40.0 million was to Haiti for a severe earthquake on August 14, 2021. Guatemala joined CCRIF in 2016 and purchases excess rain cover alone; the government received a payout of US\$3.6 million following Tropical Cyclones Amanda and Cristobal in May and June 2020. The largest payouts have been due to tropical cyclone (55% of total), followed by excess rain (25%) and earthquake (19%) (CCRIF-SPC 2022).

a. See the CCRIF website at <https://www.ccrif.org>.

Apart from its macro-level sovereign disaster risk financing and index insurance programs, CCRIF is also involved in a micro-level catastrophe WII program called the Livelihood Protection Policy (LPP), which provides hurricane and excess rain protection to vulnerable people living in Jamaica, St. Lucia, and Grenada. Developed under the Munich Climate Insurance Initiative (MCII), LPP forms the central pillar of the joint MCII-CCRIF Climate Risk Adaptation and Insurance in the Caribbean (CRAIC) project.⁸² The LLP micro-level policy was launched in 2013 and is sold through cooperative banks, credit unions, and farmer associations. The lowest sum insured that can be purchased annually is about US\$370 per policyholder, and the maximum is US\$4,000; average premium rates are about 13%. The cover is not linked to any specific crop, but makes cash payouts within seven days of a triggering event (a hurricane or excess rainfall event) to enable insured clients to stabilize financially and rebuild their lives quickly.⁸³ LPP is very similar to the current generation of consequential loss/business interruption index insurance covers being offered by MiCRO in NCA countries.

Drawing on the experience gained over many years of underwriting tropical cyclones, CCRIF has more recently assisted in developing a dedicated index product to protect Caribbean fisherfolk via the Caribbean Ocean and Aquaculture Sustainability Facility (COAST). COAST offers protection for fisherfolk against “bad weather” (defined as high waves and occurrence of heavy rainfall throughout the policy year) that leads to losses of fishing vessels, fishing equipment, and fishing infrastructure. COAST was launched in 2019/20 by the governments of two islands, St. Lucia and St. Vincent and the Grenadines, to protect their fisherfolk. The COAST product is unique in CCRIF's product range in incorporating both a livelihood protection component (akin to microinsurance) for individual fisherfolk and a tropical cyclone component (sovereign insurance) (COAST 2019). As such, COAST may offer useful lessons for the design and implementation of the

82 For information on CRAIC, see the CCRIF website at <https://www.ccrif.org/projects/craic/craic-project>.

83 For further information on LPP see https://climate-insurance.org/wp-content/uploads/2020/04/MCII_Carib_Newsletter_Vol1_final.pdf

proposed large-scale index-based disaster risk insurance program for family farmers in NCA, and these lessons should be further explored during Phase II of this study.

Although CCRIF currently does not directly insure the agricultural sector, it has received requests for technical assistance from member governments for drought, hurricane, excess rain, and flood damage cover for agriculture, and in the future CCRIF may be able to offer specific index coverage for this sector. In Central America, where drought is the primary risk exposure in agriculture, governments have asked CCRIF to design a drought risk cover, and research into developing a drought risk module is underway. However, to date no product has been launched.

CCRIF does not currently offer risk transfer products that meet the needs of family farmers in NCA countries, but it could play a role in facilitating risk pooling and reinsurance in a potential large-scale program for family farmers in NCA. Given the current lack of appropriate products and operational capability, CCRIF may not be suitable in the short term to lead or coordinate the implementation of a large-scale program for family farmers. However, given that CCRIF is already established as a regional nonprofit insurance entity that operates as a mutual risk pool and has institutional linkages with relevant stakeholders in Central America (SICA-COSEFIN), a role for CCRIF should be further explored in Phase II.

5.5.3. African Risk Capacity (ARC)

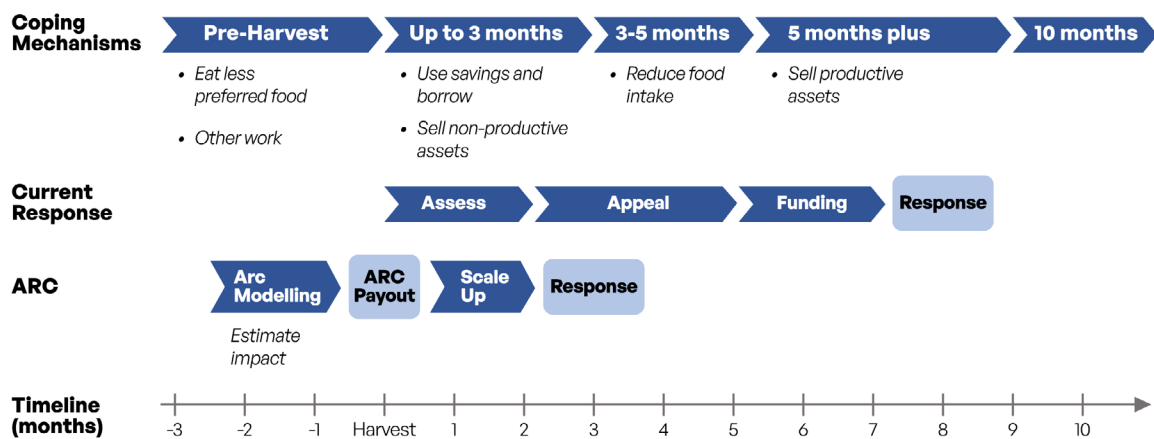
ARC is a macro-level disaster index insurance pool formed by 28 member states of the African Union. ARC has two specialized units: ARC Agency, founded by the African Union in 2012 and based in Johannesburg, which administers the program on behalf of ARC's members; and ARC Insurance Company Limited (ARC Ltd.), incorporated in 2014 and registered in Bermuda, which pools the risks from each member country, issues insurance cover to members, and purchases reinsurance protection on behalf of the pool from international reinsurers of this class of business. It is estimated that by pooling risk, ARC reduces its needs for capital and reserves by two-thirds (DFID 2014).

ARC initially developed Africa RiskView (ARV), which is a drought index insurance modeling platform that predicts droughts before crops fail and estimates the populations at risk in each district.⁸⁴ This platform enables governments to put in place their contingency plans as soon as payouts are received, and for the first payouts to be distributed to beneficiaries (in cash or kind) no later than 120 days after payouts have been received. Early response enables households to smooth their consumption and avoid depletion of productive assets—unlike ex post disaster relief and humanitarian assistance programs, whose first assistance is usually not received for about eight months (see Figure 36).⁸⁵

84 The ARV model was developed by WFP and uses National Oceanic and Atmospheric Administration (NOAA) historical synthetic satellite rainfall data (10 km by 10 km grids updated every 10 days) for each country. The rainfall data are combined with the FAO's Water Requirement Satisfaction Index (WRSI) to develop a seasonal model of drought risk on a country-by-country basis for risk quantification and rating purposes; this model is then combined with data on vulnerable populations to form a standardized approach to calculating the estimated drought response costs.

85 A cost-benefit analysis of ARC (Clarke and Hill 2013) showed that as a result of reduced response times and risk pooling, the potential benefit of ARC outweighs the estimated cost of running ARC by up to 1.9 times compared to traditional emergency appeals for assistance. Further analysis by the Boston Consulting Group estimated a higher cost-benefit ratio of 4.4 (DFID 2014). This means US\$1 spent on early intervention through ARC saves between US\$1.9 and US\$4.5 spent after a crisis is allowed to evolve. However, a more recent study suggests that ARC benefits may be somewhat lower because the costs of reinsurance are higher than originally recognized in the model (Kramer, Rusconi, Glauber 2020).

Figure 36. Comparison of ARC rapid response with conventional ex post disaster relief



Source: DFID 2014.

Note: ARC = African Risk Capacity.

ARC was formally launched in 2014/15 and at that time provided drought cover for four member countries: Kenya, Mauritania, Niger, and Senegal. As of 2021/22, a total of 13 African countries participated in the program, with total capacity of US\$182 million and protection for 18.2 million people. Over its eight years of operations, ARC has made payouts in five years (mainly for drought but also for tropical cyclone), with total payouts valued at US\$86.2 million.

In 2016, ARC established two new facilities: (i) the Extreme Climate Facility (XLF); and (ii) ARC Replica. ARC Replica aims to align the drought response of UN humanitarian agencies with the drought response of ARC member countries that have purchased drought cover. The humanitarian agencies purchase ARC Replica policies to protect their clients, thereby increasing the financial capacity in each country for disaster response. To date, WFP has been the major purchaser of ARC Replica policies to support its humanitarian assistance programs.⁸⁶

ARC has also expanded its range of insured indexed perils, starting in 2020/21 with a tropical cyclone insurance cover that several East African countries, including Madagascar and Malawi, have purchased. In 2021/22 it added a satellite-based Normalized Difference Vegetation Index (NDVI) rangeland drought index insurance cover for pastoralists, which Sudan has purchased. ARC has also been developing a riverine flood risk index insurance model; this was approved in 2022, and it is likely that flood index insurance will be commercially launched in 2023/24.⁸⁷

At the launch of ARC in 2014, donors capitalizing ARC made it a condition that member countries would fund their own insurance premiums; however, in recognition that some high-risk African countries cannot afford to fund premiums, the Africa Disaster Risk Financing Program (ADRFi) was launched in 2018. ADRFi is the result of an ARC–African Development Bank (AfDB) collaboration. ADRFi aims at embedding disaster risk management and financing in government systems by supporting national DRM public policies and strategies, and also by supporting the ARC insurance premium payments for participating government for a determined period while policies are being built and integrated. Resources for ADRFi come from concessional financing through the World Bank and an African Development Bank multi-donor trust fund (ARC 2021).

⁸⁶ In 2021/22, WFP purchased ARC Replica coverage in six African countries, and Start Network purchased it in one country. African Risk Capacity, "Risk Pools," <https://www.arc.int/risk-pools>.

⁸⁷ African Risk Capacity, "River Floods," <https://www.arc.int/river-flood>.

ARC's role in providing capacity building and DRM strengthening to African governments is subject to independent monitoring and evaluation, as is its provision of value for money (VfM).⁸⁸ The findings of a recent formative evaluation report (OPM 2022) suggest that ARC is contributing to capacity building and DRFI in member countries, but this contribution is being undermined by delays in governments' distribution of benefits to affected target populations. The report further suggests that demand for ARC products and services is well below the original targets, in spite of the introduction of ARC Replica and premium subsidies; this low demand is attributed to African governments' lack of confidence in the accuracy of the ARV drought risk forecasting model and to basis risk problems. Finally, it suggests that donors deem ARC's current operating cost structure—it is more than twice as expensive as CCRIF⁸⁹—to be unsustainable in the long term. VfM is assessed against four key criteria: economy, efficiency, effectiveness, and equity. The evaluation found that ARC is generally performing just within expectations across most (but not all) critical VfM factors, and there is significant scope for improvement, especially in effectiveness—specifically in the timeliness of implementation of response measure distribution by governments; and in implementation of M&E measures to record who is receiving the response measures and impacts on their consumption patterns and ability to maintain their productive assets (OPM 2022).

The main relevance of ARC to the NCA countries is (i) the underlying drought index product based on FAO's Water Requirement Satisfaction Index (WRSI), (ii) the operational plans prepared by governments for disbursement of ARC payouts, and (iii) the important role donors have played in financing premium subsidies. If the NCA large-scale program proceeds to Phase II, it may be appropriate for the scheme designers to study further these features of ARC.

5.5.4. CADENA in Mexico

In 2003, Mexico became the first country to use macro-level catastrophe weather index insurance as a social safety net mechanism for small subsistence farmers. In the past, Mexico had operated a government-funded ex post disaster relief/compensation program for small farmers and rural communities. In 2003, recognizing the potential to use index-based insurance as a risk financing tool for natural and climatic disasters, the Government of Mexico contracted Agroasemex, the national agricultural reinsurer, to design the first macro-level drought index insurance cover for small subsistence cereal producers in Guanajuato state. The objective of the program was to channel index insurance payouts to small subsistence farmers who had incurred severe climatic losses to their crops and livestock, thereby tiding them over until the next crop season and protecting their livelihoods. Key features of the CADENA program are summarized in Box 8.

⁸⁸ Oxford Policy Management (OPM) was commissioned by the UK's Foreign, Commonwealth and Development Office (FCDO) to conduct an independent evaluation of ARC over the 10-year period 2015–2024. OPM has prepared a series of formative evaluation studies of ARC and plans to prepare impact evaluations by 2024. For further detail, see OPM (2022).

⁸⁹ In 2020/21, ARC Ltd.'s operating costs were US\$4.1 million, substantially more than those of CCRIF (US\$2.4 million), which has a larger operation than ARC Ltd.

Box 8. CADENA program for subsistence farmers in Mexico

The CADENA program was fully funded by the federal and state governments, and insurance cover was provided free to all eligible subsistence crop and livestock producers. The program was underwritten by the national reinsurer, Agroasemex, and several leading private sector insurance companies, including ProAgro—which is also active in NCA countries. The CADENA program was administered by the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA). The state-level governments separately purchased macro-level crop and livestock index insurance to finance their climatic disaster programs for poor farmers in their states. The costs of the program (including most importantly premium financing) were shared, with about 90% of the costs assumed by the federal government and 10% by state-level governments.

The CADENA program targeted small-scale subsistence farmers and livestock producers who had no access to credit or insurance. It applied strict criteria to eligibility for free macro-level index insurance. For rainfed farmers, the maximum area farmed was originally 5 ha, but this limit was raised over time to 20 ha. CADENA applied fixed sums insured per benefiting household throughout the country; for rainfed annual crops, the maximum payout was fixed at Mex\$1,300/ha, or about US\$100/ha; and for tree fruit, the maximum was Mex\$2,200/ha, or about US\$175/ha. The sums insured and payout amounts were relatively small and did not cover the full costs of production of the crops, but they were designed to tide the small farmer over until the next crop season.

CADENA offered a wide range of crop and livestock index insurance products. For crops, CADENA developed both ground weather station index covers and satellite-based climate index products covering excess rain, rainfall deficit, temperature, and wind speed, as well as AYII covers. Livestock covers included satellite-based NDVI and traditional livestock insurance covers.

In Mexico, CADENA had two ways of making payouts to beneficiaries: (i) the state governments received a lump-sum payout for a specific locality (municipality), and then in conjunction with the local administration identified and channeled payouts to those who had incurred losses under the insured event; and (ii) direct payments were made to individual accounts of subsistence farmers who were already registered under the PROCAMPO program. **This latter payout model—with direct payments to individual pre-registered beneficiaries—closely mirrors the modified macro-level approach recommended under this feasibility study for NCA countries.**

Source: Schäfer et al. 2016; IFAD and WFP 2010.

Over time, the CADENA program was massively scaled up such that it provided macro-level index insurance protection to about 2.5 million small crop and livestock producers (about 56% of eligible farmers) in 31 states of Mexico. The massive scale of the CADENA program can be seen from the fact that in 2018, fully funded premium subsidies for CADENA accounted for Mex\$3.48 billion (US\$177 million), or 67% of the federal government's total budget for the national agricultural insurance system.

The CADENA program represented an unsustainable cost burden to the federal government and in 2020/21 was discontinued. The annual premium financing budget was running at more than US\$150–200 million per year, and the economic and financial crisis surrounding the global COVID-19 pandemic led to CADENA's termination. The program's demonstration effect, however—showing how governments can purchase natural and climate risk insurance to provide livelihood

protection for millions of their most vulnerable small-scale crop and livestock producers—has led to a new generation of programs; these are described in Section 5.6.

The Government of Mexico—working through the Ministry of Finance and Public Credit, the Insurance Development Forum (IDF), the United Nations Development Programme (UNDP), and the German government—in 2022 launched a tripartite project in Mexico to reinstate new sovereign index-based insurance solutions for climate-vulnerable family farmers (IDF 2022). This project is being cofinanced by the InsuResilience Solutions Fund (ISF), which is financed by KfW Bank on behalf of the German Federal Ministry of Economic Cooperation and Development (BMZ). In this case, rather than channel payouts to the state governments, the project plans to make direct payouts to the targeted beneficiaries—that is, it uses the modified macro-level approach recommended in this feasibility study for NCA.

The CADENA program represents the largest national parametric insurance PPP program to date with a specific focus on protecting the livelihoods of vulnerable subsistence farmers. Many of the lessons and experiences from this program will be highly relevant to the planning and design of any future large-scale disaster risk index insurance program in NCA countries.

5.6. Modified macro-level index insurance programs: International experience

The modified macro-level approach, which combines some of the benefits of both micro and macro schemes, has been used in several countries and shows promise. Section 5.3. highlighted the key advantages of the approach and its differences from both macro-level sovereign risk insurance and micro-level individual-farmer approaches. This section reviews the international experience with modified macro-level index insurance for livelihood protection of vulnerable farmers and presents the key lessons relevant for introducing this product into NCA countries.

5.6.1. Kenya Livestock Insurance Program

The KLIP, Africa’s first example of a modified macro-level IBLI program, was purchased by the Government of Kenya (GoK) as part of its drought resilience building and livelihoods protection programs for seminomadic pastoralists in the arid and semi-arid lands of northern Kenya. In response to the huge losses and extensive damage that occurred during the 2008–2011 droughts in Kenya, the GoK launched the Kenya Livestock Insurance Program in the short rains season of 2015/16 (Lung et al. 2021).⁹⁰

KLIP is a drought satellite index insurance product that aims to protect against loss of forage (pasture). It is based on a widely used vegetative indicator of drought, the NDVI, which is a proxy for vegetation condition. High NDVI values indicate healthier vegetation, and vice versa (Fava et al. 2021). KLIP was designed by the World Bank in conjunction with the GoK as an “asset protection” cover to enable pastoralists to keep their core breeding stock alive during severe droughts through timely payouts to purchase water, fodder, and feed supplements for their animals (World Bank 2015a, 2015b).

Under KLIP, through the State Department of Livestock in the Ministry of Agriculture, Livestock and Fisheries (SDL-MALF), GoK purchases a single master policy on behalf of large numbers of pre-identified, targeted, and registered vulnerable pastoralists (termed beneficiaries), each of whom receives protection for a fixed number of animals (measured in tropical livestock units

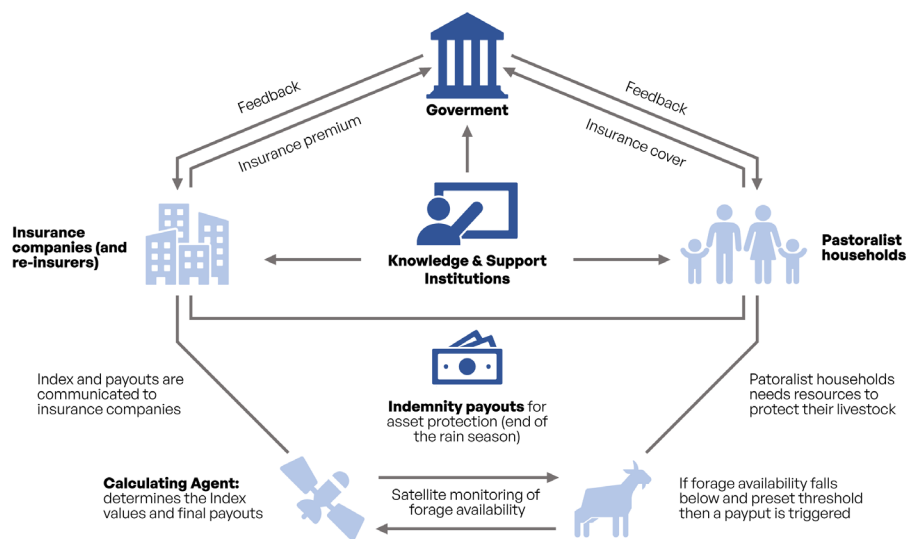
⁹⁰ The impact of the 2008–2011 droughts was estimated at US\$12.1 billion, or 17% of GDP (ACP-EU Natural Disaster Risk Reduction Program 2017).

[TLUs]). KLIP estimates the cost of keeping 1 TLU alive per year through supplementary feeding and water at US\$140; with five covered TLUs, the sum insured per beneficiary is US\$700 per year. The pastoralists do not pay toward their premiums; the program is fully funded by GoK.

KLIP insurers make direct payouts to beneficiaries, and this greatly speeds up the pastoralists' ability to convert the payouts into life-saving fodder and feed supplements, water, and veterinary drugs for their animals. Direct payouts are made to the pastoralists by mobile money (M-Pesa), deposit to their bank accounts, or occasionally by check. This is in contrast to a conventional macro-level disaster risk financing program (e.g., what is offered by ARC), where it takes many weeks or even months for the lump-sum insurance payouts received by government to reach the drought-affected rural and farming households. The modified macro-level approach also avoids the costly challenges of having to sell micro-level IBLI insurance in the arid and semi-arid lands, where most insurers have no distribution networks and where selling IBLI insurance to individual pastoralists may cost up to three times the premium received (Lung et al. 2021).

KLIP was designed as a public-private partnership program. The roles of the public and private partners are outlined below, and operational flows are shown in Figure 37. GoK issues an annual tender for KLIP, and interested insurers bid for the business on price. At inception in 2015/16, KLIP was insured by a pool of seven coinsurance companies led by APA Insurance Company Ltd. with reinsurance support from Swiss Re.

Figure 37. KLIP PPP organizational and operating structure



Source: Fava et al. 2021.

Note: KLIP = Kenya Livestock Insurance Program; PPP = public-private partnership

At its launch in the short rains season of 2015/16, KLIP initially provided fully subsidized coverage to 5,012 automatically selected vulnerable pastoral households from Turkana and Wajir Counties. The program rapidly expanded, and since 2017 it has covered 18,000 pastoral households, representing over 80,000 beneficiaries, across eight counties of northern Kenya (Turkana, Wajir, Marsabit, Mandera, Garissa, Tana River, Samburu, and Isiolo).

Between 2015/16 and 2019/20, KLIP made very significant payouts to pastoralists on account of a series of severe drought years related to the ENSO phenomenon. Over this period, GoK paid a total of K Sh 949 million (US\$9.5 million) in premiums on behalf of more than 73,000 vulnerable pastoralists, and they in turn received total drought payouts amounting to K Sh 1.095 billion (US\$10.1 million) for an overall long-term average loss ratio of 115% (Fava et al. 2021).

Due to budgetary constraints, GoK could not afford more than US\$2 million in funding for KLIP premium subsidies per year, and after 2017 the program was not able to scale up further. But premium financing constraints have been overcome since the 2022 launch of the World Bank-financed De-risking, Inclusion and Value Enhancement of Pastoral Economies in the Horn of Africa (DRIVE) project in selected countries, including Kenya, Ethiopia, and Somalia. This project allocates very substantial funding to drought index insurance premiums, and in Kenya both the micro-level IBLI program and the KLIP have been absorbed into DRIVE. (See Section 5.7 for further details of DRIVE; see also World Bank [2022a]).

5.6.2. Satellite Index Insurance for Pastoralists in Ethiopia

SIPE, an initiative of WFP and the Government of the Somali Region in Ethiopia, is very similar to KLIP in that it is a modified macro-level NDVI pasture drought index insurance program for vulnerable pastoralists. The regional government purchases a single pasture drought index insurance policy on behalf of large numbers of vulnerable pastoralists, and payouts are made directly by the insurers to each beneficiary. An innovative feature of SIPE is that at the time of registration, all beneficiary pastoralists are provided with a free Hello Cash mobile money account by local operator Bel Cash, and/or a bank deposit account with the Somali Microfinance Institution. SIPE is closely aligned to the Production Safety Net Program (PSNP), which provides conditional food and cash transfers to poor households throughout Ethiopia, including to a high proportion of the pastoral population in Somali Region. SIPE beneficiaries have between 5 and 11 TLUs, and the program insures 5 TLUs per beneficiary. SIPE was launched by a pool of four local insurance companies in 2018, and in the WFP and its funding partners financed the costs of SIPE premiums in full during the start-up years. However, in line with its smart premium subsidy strategy, first adopted for the Harita-R4 program, WFP has been examining the introduction of an Insurance for Assets (IfA) approach, whereby pastoralists provide their labor to cover part of their premium costs.

In Ethiopia, SIPE was launched in three woredas of Somali Region in the 2018 long rains/Gu season with a total of 5,001 benefiting pastoralists; by 2020 it had expanded into seven woredas and covered 15,504 beneficiary households. In 2021, WFP Ethiopia scaled up its insurance program to reach 49,797 households under R4 and 28,297 pastoralist households under SIPE. Severe drought conditions triggered a SIPE payout of over US\$981,000 to participating households (WFP 2021). Project participants were supported in opening digital or plastic accounts with the Somali Microfinance Institution (SMFI). These accounts allow participants to receive insurance payouts or access other financial services such as money transfers, payments, and airtime top-up (for use of a mobile phone). Improving pastoralists' access to financial services is one of the program's objectives. In 2021, field agents supported establishment of 29 new savings groups with nearly 600 members and provided SIPE participants with all necessary technical and material support (WFP 2021).

5.6.3. Key lessons from KLIP and SIPE

As part of the Drought Index Insurance–Insurance for Resilience in the Sahel and Horn of Africa (DIRISHA) study, Lung et al. (2021) identified a series of key lessons from the KLIP and SIPE programs that could guide development of new modified macro-level IBLI drought insurance programs for pastoralists in Sahel countries (Box 9).

Box 9. Key lessons for the design of any new modified macro-level IBLI program

Modified macro-level IBLI program can help build drought resilience of the most vulnerable. Increasingly, evidence of the positive impacts of KLIP and SIPE is emerging. These impacts include better protection of pastoralist livelihoods in the face of drought and enhanced management of scarce public resources to respond to drought.

Modified macro-level IBLI programs should actively help build an enabling environment for micro-level voluntary IBLI. Macro-level programs can help enable the operationalization of micro-level IBLI programs. For this to happen, however, they need to be planned and operated together as one. Strong incentives should be put in place encouraging underwriters of the modified macro- program to invest as well in micro-level distribution infrastructure. For example, Fava et al. (2021) suggest that full subsidies should be allocated proportionally to the number of micro-level policies sold, thus incentivizing the private sector to invest in developing infrastructure for micro-level sales.

Clear graduation and a financial sustainability framework should be agreed in advance. Both KLIP and SIPE are struggling to ensure the longer-term sustainability of full premium financing. While each is considering becoming a fully commercial IBLI program with no or partial premium subsidies, no definitive decisions have been made. However, given the major challenges over sustainability faced by the non-subsidized micro-level IBLI programs in Kenya and Ethiopia, the decision to reduce premium subsidies to say 50% and to then rely on micro-level IBLI in its current form does not seem like a sustainable option, either. For future programs, financial contributors should plan for the longer term from the beginning. If the plan is for the modified macro-level program to lead into a commercial micro-level program, linkages to such micro-level IBLI should be strengthened.

Insurance contracts should be concluded on a multiyear basis to encourage private sector investment. Given the current one-year government tender and revolving insurance structure of KLIP, insurers cannot be confident about investing in distribution and awareness creation networks (thus also aiding micro-level IBLI sales). Future programs should consider providing insurers with longer contracts. One interviewed insurance company suggested that a period of three to five years would be much more appropriate. Here it should be noted that in response to this concern, GoK has issued a three-year contract to pool coinsurers for 2020/21.

To the greatest extent possible, beneficiary selection and claims handling should be done using digital tools. Beneficiaries should be registered in electronic databases and receive insurance payouts directly into mobile money bank accounts. This approach not only will facilitate administration but will also strengthen accountability, support financial inclusion, and (when sharing databases) enhance alignment with related initiatives. While many pastoralists still do not have access to mobile money bank accounts, their share is shrinking rapidly. Any potential future initiative could also consider investing in large-scale pastoralist registration and/or providing them with mobile banking access.

Source: Lung et al. 2021.

5.6.4. Paraguay

In Paraguay, a large-scale modified macro-level disaster risk insurance program was designed by the World Bank in 2022–2023 to protect the Government of Paraguay's DRFI contingent liability for approximately 265,000 family farmers, which is currently financed exclusively through ex post disaster relief payments. There is a major funding gap between the average annual expected losses experienced by family farmers, which amount to nearly US\$50 million

per year, and the financial resources available for the government to fund these losses, which are approximately US\$7 million per year. The World Bank has proposed a layered disaster risk financing approach involving the following instruments:

- **Modified macro-level vegetative index insurance, termed Agricultural Vegetation Index Coefficient (CIVA) coverage**, which would trigger approximately once in seven years, and which is targeted at approximately 176,000 family farmers in the eastern region who have no access to financial or insurance services (Box 10)
- **An underlying annual fund of about US\$7 million** to finance more frequent and less severe losses than are covered by the index insurance cover
- **A line of contingent credit of US\$30 million** to cover more extreme intermediate events

Box 10. Paraguay CIVA modified macro-level program for family farmers

The CIVA policy is based on the NDVI and uses NASA MODIS data produced at 16-day intervals from 2002 to 2020. An analysis of the deviations in NDVI and the reductions in staple crop production and yields showed a high degree of correlation.

The unit area of Insurance (UAI) is defined by the agricultural areas in each of the districts (administrative level 3) that have more than 2,500 cultivated hectares in the departments located in Paraguay's eastern region. The classification of agricultural areas within each district is carried out according to the classification in the Global Food Security Support Analysis Data (GFSAD) Crop Mask 2010 Global 1 km (GFSAD1KCM.001) data set.

The policy is a 12-month cover and is divided into 22 16-day NDVI calculation periods. A payout is triggered if the actual NDVI value in any UAI over two consecutive NDVI calculation periods falls short of the one-in-seven-year threshold trigger, and payouts continue to be made each 16-day NDVI calculation period until the actual NDVI values return to normal in the UAI.

The sum insured per family farmer (beneficiary) is based on livelihood needs and is calculated at US\$60 per NDVI calculation period for a maximum payout liability of US\$1,200 per year. The total sum insured (maximum insurance payment) amounts to US\$211 million, corresponding to 176,037 beneficiaries.

The estimated technical premium for this coverage is about US\$11 million (5.2% of the sum insured), to which would be added loadings for other insurer expenses (administrative, operational).

The proposed register of family farmers who will be the beneficiaries of the large-scale index-based disaster risk insurance program is based on the register used by the government to make emergency payments to vulnerable households during the COVID-19 pandemic under the Pytyvõ Program. (See Section 7.5.2 for further details of the Pytyvõ registration system).

Under the large-scale disaster risk CIVA coverage, insurance payouts to beneficiary family farmers can be made in two ways: (i) direct payments from the insurers to the beneficiaries, and (ii) payments from the insurers to a trust fund appointed to make these payments to the beneficiaries. In the case of the Pytyvõ Program, it is estimated that 70% of the informal beneficiaries received payments in electronic wallets.

Source: World Bank 2023.

The CIVA coverage program designed for Paraguay contains many features that are similar to the proposed program for NCA countries. Potential applications of the layered DRFI approach to funding Paraguay’s disaster-related contingent liability should be studied further if this feasibility study leads to Phase II, design and planning of a large-scale disaster risk insurance program for family farmers in NCA countries.

5.7. Recent developments with index-based insurance programs for vulnerable livestock producers in Sahel countries of Africa

In response to the experiences with index-based livestock insurance in Kenya and Ethiopia—both at the micro level (IBLI) and at the modified macro level (KLIP and SIIPE)—African governments in the Sahel region have expressed interest in developing similar national or regional programs with the support of donors and development partners. These initiatives are briefly summarized below.

Starting in 2020, the World Bank contracted the International Livestock Research Institute (ILRI) to assess the feasibility of implementing index-based financial protection against drought for pastoralists in four Sahelian countries (Burkina Faso, Niger, Mali, and Senegal). The feasibility studies showed that the introduction of index-based livestock insurance against drought was technically, operationally, and financially viable in all four countries. However, because the agricultural insurance markets were undeveloped in all countries except for Senegal, any programs would need to be accompanied by major capacity building for the insurance sector. To date, decisions over the launch of IBLI programs are pending in these countries.

Between 2020 and 2021, research was conducted under the DIRISHA study on large-scale drought risk financing and insurance solutions for pastoralists living in Intergovernmental Authority on Development (IGAD) countries in East Africa.⁹¹ This study concluded that drought index insurance was a suitable mechanism for governments to offer pastoralists as part of their drought risk financing and resilience-building programs. However, given previous experience, it seemed unlikely that a regional IBLI program focused only on the micro level would be successful. The study therefore recommended building on the modified macro-level approaches of KLIP and SIIPE. The study also highlighted the potential benefits of regional cooperation between IGAD countries in implementing such a drought index insurance program (Lung et al. 2021). See Box 11 for further details.

Box 11. Benefits of regional cooperation in index insurance programs

There is a strong rationale for pursuing a regional IBLI approach or program in the IGAD region. The approach offers several potential benefits: It allows countries to share technology, lessons, and experience from the first-generation micro-level and macro-level IBLI products and programs that have been launched in Kenya and Ethiopia. It also lowers costs by developing a standardized IBLI product for adoption in all countries and through the use of shared operating systems and procedures (shared satellite NDVI database system for the entire IGAD region; shared educational materials for promoting financial literacy and IBLI awareness among pastoralists, government, and private sector stakeholders; standardization of enrollment and registration procedures and databases; development of a single web-based IBLI application and system for underwriting and claims settlement). Finally, regionalization allows each country to pool its IBLI drought risk and to purchase pooled reinsurance, which should lower the costs of reinsurance and therefore lower the costs of premiums charged to pastoralists.

Source: Lung et al. 2021.

91 IGAD countries include Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda.

Building on the above experiences, in 2022, the World Bank launched the DRIVE program in four countries (Djibouti, Ethiopia, Kenya, and Somalia). DRIVE aims to protect pastoral communities from the impacts of drought, promote adaptation to climate change, and better connect pastoralists to markets in order to increase value from livestock trade. Up to 1.6 million pastoralists and their dependents in 250,000 households, including households headed by women, are expected to benefit from the project (World Bank 2022a). In Djibouti the program has facilitated a five-year sovereign policy against drought and flood issued by ARC for a total premium of US\$2 million (Relief Web, 2023). DRIVE has switched from a modified macro-level approach to a group-based micro-level approach that provides an integrated package of financial services, consisting of voluntary index insurance, a digital transaction account, a savings account, and education to promote financial literacy. Pastoralists contribute a small share—between 10% and 20%—toward the costs of their insurance premiums to foster the program’s sustainability. The program was launched in the 2023 long rains season in Somalia, Kenya, and Ethiopia following several years of severe drought that killed millions of livestock animals. Pastoralists were offered a one-off financial incentive of US\$50 for joining a savings group and committing to the purchase of heavily subsidized drought index insurance. These factors contributed to extremely high demand for index insurance: there were more than 170,000 policy sales covering over 760,000 livestock units, premiums of over US\$20 million, and total sum insured of over US\$104.5 million in Year 1. Integrating financial services and distribution through partnership between insurers and banking institutions is reported to have also contributed to strong uptake.⁹²

DRIVE adopts a regional approach that aims to enable scale and sustainability, and participating countries have appointed ZEP-RE as the implementation agent.⁹³ ZEP-RE is tasked with developing a platform for countries to share insurance infrastructure. This includes product development, capacity building and awareness, last-mile distribution channels, risk pooling for reinsurance, a digital financial services platform, data investments and management, and private sector engagement. ZEP-RE works with the leading IBLI insurers in each country who distribute and underwrite the product, pools the risk across the three countries, provides reinsurance, and retrocedes a significant share of the reinsurance to leading international reinsurers. Planet, a leading satellite data provider involved in many index insurance programs around the world, has been contracted to provide the underlying NDVI data for the DRIVE drought index insurance program; and Acre Africa, a leading index insurance service provider based in Nairobi, has been appointed to act as the independent calculation agent for DRIVE.⁹⁴ The US\$327.5 million project is funded by the World Bank and includes premium financing. This funding is complemented by a US\$28 million grant from the Global Shield Financing Facility for premium subsidies, product development, and program costs.⁹⁵

92 Interviews and reports shared by the DRIVE project team and articles on the Financial Protection Forum <https://www.financialprotectionforum.org/news/16-million-pastoralists-in-the-horn-of-africa-to-benefit-from-a-regional-scheme-to-protect-0>

93 ZEP-RE (PTA Reinsurance Company) is a leading reinsurer in Africa and a specialized institution of the Common Market for Eastern and Southern Africa (COMESA). See the company’s website at <https://zep-re.com>.

94 For Planet, see the company’s website at <https://www.planet.com>. For Acre Africa, see <https://acreafrica.com/about-us/>.

95 See report DRIVE PROJECT available <https://zep-re.com/drive-project/drive-reports/>

6

DRFI Solutions for NCA: Technical Design Options and Challenges

Box 12. Key takeaways from Chapter 6

- **Reliance on ERA5, a rainfall data source used to generate the drought and excess rain indexes of the Guatemala MAGA Seguro Colectivo Paramétrico program, may increase the product's basis risk.** Technical analyses have found that the product's coarse spatial resolution (0.25° x 0.25°) and rainfall estimation methodology may lead to inconsistent observations, particularly in tropical regions with complex topography.
- **Additional satellite rainfall data sets have been used in the tropics and subtropics to improve the accuracy of data on extreme weather events, particularly drought.** For instance, CHIRPS data have been applied in Mexico and Paraguay for various applications—to characterize rainfall, assess drought conditions, monitor droughts, design a drought index for macro-level index-based insurance, and identify regions registering water stress conditions.
- **To improve drought severity assessment across different regions of NCA, further technical analysis in Phase II should validate the effectiveness of a composite drought index based on CHIRPS historical rainfall data.** Corroborating whether the same drought indexes (simple or composite) can be used to accurately identify and assess excess rainfall is also advisable.
- **The rules of operation governing the Basis Risk Fund of the Seguro Colectivo Paramétrico, which the GoG is planning to implement to mitigate the impact of basis risk and reduce potential conflicts between the government and beneficiaries, requires further review.** The fund appears to be structured to respond to claims at specific geographic points (i.e., farms) instead of regions. Given data constraints at the household level, this approach may result in the depletion of the Basis Risk Fund if farmers (beneficiaries) complain that the compensation received is insufficient.
- **The risk unit measurement for the Seguro Colectivo Paramétrico could also be improved for designing and implementing a large-scale disaster risk index insurance program in NCA.** The background material reviewed indicates that a downscaling method was introduced to enhance the spatial resolution of the ERA5 rainfall data set, moving from 0.25° x 0.25° (or approximately 27 km x 27 km) spatial resolution to a pixel of 2 km x 2 km for the purpose of calculating the claim payout. This approach may compromise the accuracy and reliability of the data set and have negative implications

for the expected probability of insurance payouts. To mitigate these issues, the risk unit should be the same as the size of the pixel of the rainfall data set used to assess drought and excess rainfall risks.

- **The insurance cover period of the Seguro Colectivo Paramétrico includes months where extreme rainfall events are unlikely to hurt the economic sectors of rural areas.** The Pacific Basin of Central America has a seasonal dry period (November to early May). Consequently, year-round coverage for excess rainfall seems unnecessary in this context.

6.1. Introduction

This chapter identifies potential areas for improving MAGA’s Seguro Colectivo Paramétrico program that are relevant for designing and implementing a large-scale index insurance program in NCA. This analysis follows a review of the key features of the MAGA program (see Table 25); international best practices in successful agriculture insurance programs targeting family farmers were outlined in Chapter 5.

Table 25. Key features of MAGA’s Seguro Colectivo Paramétrico program for family farmers

Feature	Description																		
Type of cover	Modified macro-level index-based insurance product.																		
Insured and policyholder	GoG, represented by MAGA.																		
Insurable interest	The insurance contract offers protection against interruptions in the continuity of the insured’s productive activity caused by the occurrence of insured risks in the covered area. The program aims to promote the resilience of small-scale family farmers in the face of catastrophic climatic events that put their assets at risk and prevent their productive activity from being maintained or enhanced.																		
Target population (beneficiaries)	Family farmers who produce for self-consumption and are linked to the School Feeding Program, with production on plots ranging from 1 manzana (0.7 ha) to 4 manzana (2.8 ha). Excess rain and drought are covered. A payout for excess rain is triggered when the amount of rainfall over two consecutive days exceeds the limit established in each pixel, as described in the following table:																		
Risks covered	<table border="1"> <thead> <tr> <th>Intensity level</th> <th>Force parameter</th> <th>Payout as share of the sum insured</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>Level 1 + 100%</td> <td>100%</td> </tr> <tr> <td>4</td> <td>Level 1 + 75%</td> <td>75%</td> </tr> <tr> <td>3</td> <td>Level 1 + 40%</td> <td>50%</td> </tr> <tr> <td>2</td> <td>Level 1 + 20%</td> <td>25%</td> </tr> <tr> <td>1</td> <td>Rainfall (in mm) by location (return period of 8 years)</td> <td>10%</td> </tr> </tbody> </table>	Intensity level	Force parameter	Payout as share of the sum insured	5	Level 1 + 100%	100%	4	Level 1 + 75%	75%	3	Level 1 + 40%	50%	2	Level 1 + 20%	25%	1	Rainfall (in mm) by location (return period of 8 years)	10%
	Intensity level	Force parameter	Payout as share of the sum insured																
	5	Level 1 + 100%	100%																
	4	Level 1 + 75%	75%																
	3	Level 1 + 40%	50%																
	2	Level 1 + 20%	25%																
	1	Rainfall (in mm) by location (return period of 8 years)	10%																
	A payout is triggered based on the number of consecutive dry days in a 60-day window, subtracting 10 days from the canícula (a dry spell within the rainy season). See the following table.																		
	<table border="1"> <thead> <tr> <th>Intensity level</th> <th>Force parameter</th> <th>Payout as share of the sum insured</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>Level 1 + 20%</td> <td>100%</td> </tr> <tr> <td>2</td> <td>Level 1 + 50%</td> <td>50%</td> </tr> <tr> <td>1</td> <td>Number of dry days by location (return period of 8 years)</td> <td>10%</td> </tr> </tbody> </table>		Intensity level	Force parameter	Payout as share of the sum insured	3	Level 1 + 20%	100%	2	Level 1 + 50%	50%	1	Number of dry days by location (return period of 8 years)	10%					
	Intensity level	Force parameter	Payout as share of the sum insured																
3	Level 1 + 20%	100%																	
2	Level 1 + 50%	50%																	
1	Number of dry days by location (return period of 8 years)	10%																	
Underlying index and data source	ERA5/ECMWF (0.25° x 0.25° spatial resolution).																		
Risk unit	Although it is not explicitly mentioned in the Seguro Colectivo Paramétrico concept note (MAGA 2023), the risk unit is the ERA5 pixel of 0.25° x 0.25°.																		
Sum insured (US\$) and insurance cover period	US\$390 (Q 3,000) per beneficiary for the first season, Temporada 1 (May 1 to August 31), and a further US\$390 per beneficiary for the second season, Temporada 2 (September 1 to April 30). This is US\$780 per beneficiary (Q 6,000) per year in total. It is worth highlighting that the excess rainfall cover period is all year (MAGA 2023, 11).																		
Basis Risk Fund (FONDO)	If payouts are not triggered for at least five insured (beneficiary) farmers, a US\$390,000 (Q 3 million) fund can be used to address basis risk.																		

Note: ECMWF = European Centre for Medium-Range Weather Forecasts; GoG = Government of Guatemala; MAGA = Ministry of Agriculture, Livestock and Food.

6.2. Potential areas for improving Seguro Colectivo Paramétrico

The analysis conducted as part of this study suggests that the following steps could be taken to improve the Seguro Colectivo Paramétrico in a second-phase technical accompaniment: (i) identifying a satellite rainfall data set different from ERA5 to improve risk assessment and

reduce basis risk; (ii) assessing the level of basis risk and reviewing the Basis Risk Fund's rules of operation; (iii) clarifying the risk unit; and (iv) clarifying the insurance cover period.

6.2.1. Identifying a data set different from ERA5 to improve risk assessment and reduce basis risk

Seguro Colectivo Paramétrico uses ERA5 data to define the indexes that establish the insurance payouts for excess rain and drought. However, this data source faces challenges in microclimate zones, both because its spatial resolution is low ($0.25^\circ \times 0.25^\circ$) and because it tends to have high error rates in tropical areas. Recent studies in China have found that ERA5 overestimates light precipitation events and underestimates moderate and heavy precipitation events (Lei et al. 2022). Another study found that ERA5 is more helpful in identifying areas that recorded precipitation than in determining maximum precipitation values, and its application is recommended in extra-tropical zones rather than in the tropics (Lavers et al. 2022).

CHIRPS is a free-of-charge satellite precipitation data set that could substitute for ERA5 precipitation measurement in Guatemala, Honduras, and El Salvador.⁹⁶ The CHIRPS data set has been available since 1981 at various temporal levels;⁹⁷ it is useful for robust weather risk assessments because its precipitation values are marked by global consistency and a higher spatial resolution ($0.05^\circ \times 0.05^\circ$) than ERA5.

Although CHIRPS tends to underestimate rainfall over mountainous and coastal areas, recent experiences in Mexico and Paraguay have shown that CHIRPS is a reliable method of measuring average precipitation. In addition, this data set accurately reflects the seasonality of the rainy season, can track the transition from the rainy to the dry season, and can pinpoint dry months and drought events throughout the rainy season (World Bank Group, 2023b). In Mexico, CHIRPS has had multiple applications. In 2019, it was used to design a macro-level index-based insurance product for family farmers in Nuevo León, San Luis Potosí, and Tabasco. It was also used in monitoring drought conditions as part of the effort to ensure more effective use of resources for indemnity insurance field inspections in Aguascalientes, San Luis Potosí, and Guanajuato. Other uses include the generation of climatic perspectives in Aguascalientes, Querétaro, Tabasco, Tlaxcala, and San Luis Potosí and the identification of crop-producing areas experiencing residual soil moisture problems. In Paraguay, CHIRPS was used to monitor drought: in collaboration with the World Bank, the Ministry of Agriculture and Livestock relied on CHIRPS to characterize rainfall patterns and determine agricultural areas under water stress conditions.⁹⁸

There is an opportunity to improve the measurement of drought risk in index-based insurance schemes at a macro level. The number of dry days is used to measure the insurable event (drought) in existing index-based insurance programs in NCA countries. Nevertheless, drought is a progressive peril that takes time to develop and is ideally identified and characterized by measuring additional variables (i.e., precipitation, temperature, transpiration, and evaporation, among others). To this end,

96 CHIRPS is a quasi-global (50S–50N), land-only rainfall data set with a range of temporal and spatial resolutions depending on the region and the period. Data can be found at 0.05° or 0.1° resolution and at six-hourly to seasonal time scales. The data set begins in 1981 and extends to the near present. The data set integrates several data sources, including station measurements and satellite data. See NCAR Climate Data Guide, “CHIRPS: Climate Hazards InfraRed Precipitation with Station data (version 2),” <https://climatedataguide.ucar.edu/climate-data/chirps-climate-hazards-infrared-precipitation-station-data-version-2#:~:text=Climate%20Hazards%20Group%20InfraRed%20Precipitation,region%20and%20the%20time%20period>. Insurance and risk financing practitioners can access to CHIRPS historical calibrated and validated data at Hazards Climate Center, “Data Sets,” <https://www.chc.ucsb.edu/data>.

97 Since 2014, the University of California at Santa Barbara has disseminated precipitation data on a monthly, 10-day (decadal), 5-day (pentadal), and daily basis. In general, these data present better performance (Pearson correlation coefficients) than other satellite precipitation products (Paredes-Trejo et al. 2019).

98 Measuring drought is a complex task. It depends on the variables used to determine the socioeconomic or environmental impact and the concept applied. Meteorological drought, for instance, is defined as the lack of precipitation values compared to its average, and its occurrence is associated with increases in evaporation and transpiration values and a decrease in infiltration values, runoff, and aquifer recharge. Agricultural drought, on the other hand, is associated with a shortage of soil moisture, leading to a reduction in biomass and crop yields. Lastly, hydrological drought is associated with low water supply, which reduces flows and decreases water bodies such as reservoirs, lakes, and rivers. More information is available at <https://www.drought.gov/what-is-drought/monitoring-drought>.

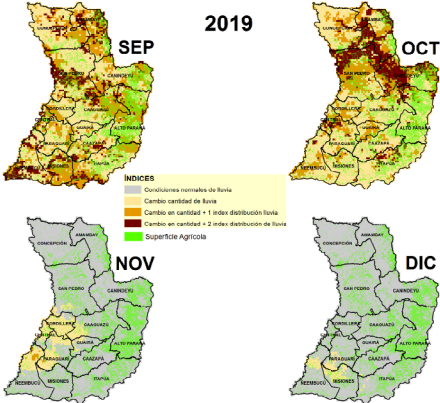
Mexico and Paraguay have adopted a composite agricultural drought index (Índice de Sequía Agrícola Compuesto [ISAC]) to characterize droughts and to use as the basis for activating compensatory payments in index-based insurance schemes.

The construction of the ISAC in Mexico and Paraguay considered the combined measurement of three indexes whose exceptional deviation in a specific time window is related to agricultural activities: (i) the Standardized Precipitation Index (SPI), which measures the variation in the amount of rainfall; (ii) the index of rainy days (EvLL), which measures the distribution of humidity; and (iii) the index of consecutive days without rain (EvDist), which measures the continuous lack of humidity.

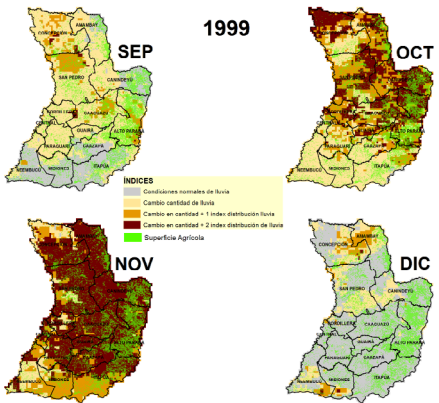
In Paraguay’s case, drought events were determined when two out of three indexes reached a predefined threshold successively in two two-month periods (September–October, October–November, November–December) and when this condition affects over 50% of the agricultural area in December (see Figure 38).

Figure 38. Drought characterization in the eastern region of Paraguay, considering the composite agricultural drought index (ISAC) measurement

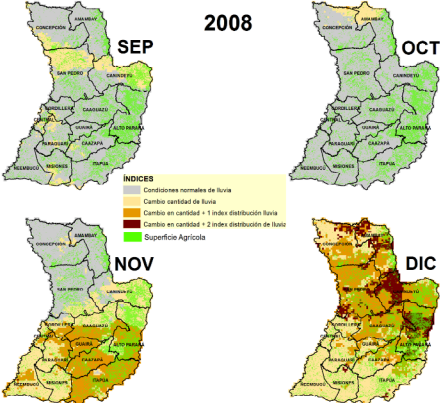
Panel A. The 2019 drought characterized by the ISAC, integrated by three drought indexes, and the layer of the agricultural area of GCE 1 km



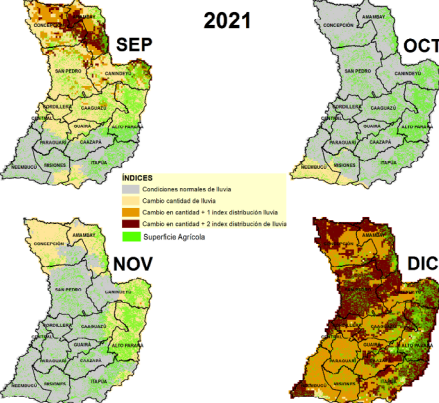
Panel B. The 1999 drought characterized the ISAC, integrated by three drought indexes, and the layer of the agricultural area of GCE 1 km



Panel C. The 2008 drought characterized the ISAC, integrated by three drought indexes, and the layer of the agricultural area of GCE 1 km



Panel D. The 2021 drought characterized by the ISAC, integrated by three drought indexes, and the layer of the agricultural area of GCE 1 km.



Source: World Bank Group 2023b.

Note: The green color shows agricultural areas. The gray color shows regions facing normal precipitation conditions. The beige color shows regions experiencing below-normal precipitation conditions. The light brown color shows regions experiencing below-normal precipitation conditions at the same time that one rainfall distribution index is recorded. The dark brown color shows areas under extreme drought conditions; they are experiencing below-normal precipitation conditions and two rainfall distribution indexes are registered. GCE = Global cropland extent, DIC = December.

Although the composite agricultural drought index was designed to determine dry conditions, it can also identify excess precipitation conditions by an opposite reading of the drought scale (e.g., positive SPI value, greater humidity distribution, and fewer consecutive days without rain). Phase II of this study should validate this assumption about ISAC and the effectiveness of other indexes (simple or composite) to determine the risk of drought and excess rainfall in NCA countries.

6.2.2. Assessing the level of basis risk and reviewing the rules of operation of the Basis Risk Fund

Further analysis is needed to estimate the level of basic risk inherent in the design of Seguro Colectivo Paramétrico. The rules of operation for Tejutla's drought cover, San Marcos, indicate that the policy triggers a payout when 23 or more dry days are registered consecutively or separately in a 60-day window. This definition may not capture catastrophic events, however, particularly when dry days counted are not consecutive. A good rainfall distribution through a given rainy season can ensure (for instance) adequate soil moisture to support plant growth and thus would not have adverse effects on (for instance) crop production.

There has been limited international experience with complementary funds that aim to mitigate the impact of basis risk on index-based insurance programs and to provide coverage for losses when payouts are not triggered. But one example is well known: the basis risk fund established by the R4 program in the Tigray and Amhara regions of Ethiopia to compensate the severe financial losses experienced by crop producers in the 2015 extreme drought (1-in-50-year or greater event) when the level of early-season payouts was inadequate to cover the near-total crop failure experienced by insured farmers (Osgood 2016). This fund was created to ensure that farmers were properly compensated for their crop losses when the policy did not trigger accurate payouts, and to maintain farmers' trust and confidence in the insurance providers. Research suggests that index-based products with low performance may lead farmers to cancel coverage or reduce their insurance participation (Lichtenberg and Iglesias, 2022). One study in India further found that the interest in index insurance rises when basis risk diminishes (Giné, Townsend, and Vickery, 2008; cited in Clement et al. 2018).

The existence of a complementary fund that lacks clear rules of operation can diminish the credibility of well-intended tools designed to limit basis risk. The Basis Risk Fund of Seguro Colectivo Paramétrico was conceived to mitigate the impact of basis risk and reduce potential conflicts between the government and beneficiaries, who expect to be compensated when a payout is not triggered. A basis risk event is defined as one in which a minimum of five insured (beneficiary) farmers in an insured location have incurred losses to their productive enterprises, but have not received a payout. Although it is relevant to have a methodology to quantify the magnitude of basis risk related to an index insurance product, such an approach should not focus on assessing catastrophic weather events at a specific geographic point. This is partly because of the inadequate availability of farm-level data.⁹⁹ Without this information, it becomes challenging to determine accurate loss distribution curves for these points, and endless claims from individuals who believe they should also be compensated could exhaust the fund (Global AgRisk 2010). In this context, it should be noted that to date MAGA's insurance steering committee has not approved the Seguro Colectivo Paramétrico Basis Risk Fund, and it has therefore not been implemented.

In the absence of information of catastrophic weather events at a specific geographic point, the net positive rate analysis (tasa de verdaderos positivos) can be considered by MAGA

⁹⁹ The indexes established for macro-level products need to approximate (for instance) rainfall in a region, not at a specific location within that region. Because it is easier to estimate regional values than to estimate the value at a farm level, data constraints for macro-level products assessing risk at the regional level are less binding (Global AgRisk 2010).

and supporting institutions to assess the effectiveness of the Seguro Colectivo Paramétrico program. In 2023, this methodology was applied by the World Bank in Paraguay to compare the simulated payouts of a macro-level index-based insurance instrument (CIVA) with the performance of aggregate production data of selected crops (i.e., soybean, maize, wheat, rice, sugar cane, beans, cassava, groundnut, and sesame seed). Regions below 75% effectiveness were excluded from the insurance portfolio of Paraguay, so it was necessary to design other risk financing tools to mitigate losses caused by extraordinary events.

Nevertheless, the limitations of production data imply a challenge in conducting the net positive rate analysis for MAGA's Seguro Colectivo Paramétrico. In terms of series length, data continuity, and spatial scale (i.e., administrative divisions), crop production statistics differ from one country to another in NCA. The official statistical data sources for Guatemala and Honduras are insufficient to establish a correlation between an index and negative crop yield variations,¹⁰⁰ whereas longer production records at the departmental level (2022–2021) are available in El Salvador.¹⁰¹ Given this data constraint, a second-phase technical accompaniment could potentially model historical crop yields for each risk unit, or calibrate the proposed index based on the historical crop yield data sets available from neighboring countries with similar agro-climatic conditions (i.e., state of Chiapas in México). Alternatively, a high-quality data set obtained through interactions with local experts and beneficiaries could shed light on the relationship between the index and consequential losses—i.e., asset losses, losses in off-farm labor opportunities, and others beyond crop yield losses (Global AgRisk 2010).

Regardless of the preferred method for overcoming production data constraints in order to calibrate the underlying index, it is advisable to introduce additional analyses to determine whether the proposed risk transfer instrument is appropriate from a financial point of view. For instance, the feasibility analysis should estimate the insurance leverage (number of insured from the insurance premium). In this sense, the higher the insurance leverage, the better for the insured and vice versa.

6.2.3. Clarifying the risk unit

MAGA's Seguro Colectivo Paramétrico policy has similar key features to Seguro Productivo, a micro-level index-based insurance program in Guatemala. The similarities relate to the insurance risks cover description (drought and excess rainfall) and the use of ERA5 (0.25° x 0.25° or approximately 27 km x 27 km spatial resolution) for underlying index construction. The Seguro Productivo policy wording indicates that the insured individual's productive areas, called covered area, are linked to 2 km x 2 km pixels called calculation location (ubicación de cálculo), and these to n referenced populated places (lugar poblado). Given the similarities between these two insurance products, it is assumed that Seguro Colectivo Paramétrico also works with the same pixel size (2 km x 2 km) for the insurance payout calculation. Consequently, both instruments should have applied a downscaling technique to address the difference in size between the pixels used to determine payment activation (calculation location) and the pixels of ERA5 (27 km x 27 km). If the above assumption is correct, the selected downscaling method could have introduced additional bias (i.e., overestimation or underestimation) into the ERA5 precipitation data, resulting in erroneous assessments of risks. To avoid this issue, the risk unit should be equivalent to the pixel of the rainfall data set used for the underlying index construction.

100 In Guatemala, production databases exist at departmental and municipal level only for those years in which agricultural surveys were conducted (2007–2008 and 2019–2020). In Honduras, basic grain statistics are available at the department level for 2008–2017. Honduran Ministry of Agriculture and Livestock, “Agri-Food Production” [in Spanish], <http://sisem.sag.gob.hn/PSME/H24DM.php#contenidofinal123>.

101 See the Salvadoran Ministry of Agriculture and Livestock website at <https://www.mag.gob.sv/servicios/estadisticas-agropecuarias/>.

When designing the modified macro-level index-based insurance, performing a vector cross-analysis between the underlying index's pixels and the agricultural surface's layers is advisable.

As information on agricultural land in Guatemala, Honduras, and El Salvador is limited, it may be helpful to use the layers of the Global Map of Agricultural Coverage (GCE 1 km Multi-Study Crop Mask) from the Global Food Security-Support Analysis Data (GFSAD30) project, a macro-level modified index-based insurance design. This analysis is expected to provide stronger correlations between the selected index and the impact on the livelihoods of rural populations. In the same way, this analysis would allow the validation of aggregate agricultural area values and/or changes registered from the latest official records, and the estimation of the exposure values for different administrative units (i.e., municipalities, departments, others).

6.2.4. Clarifying the insurance cover period

The Seguro Colectivo Paramétrico insurance cover matches the two main crop seasons and rainfall peaks in the Central American Pacific Basin. The rainfall peaks during the first (Primera) and second (Postrera) seasons are registered in May and June and in September and October, respectively (UCR 2001). Although the drought cover period (May 1 to November 10 of each year, according to region) was designed to work during the two critical periods (Primera and Postrera) for agricultural and nonagricultural activities, the Seguro Colectivo Paramétrico concept note (MAGA, 2023) does not clarify whether the insured is paying premiums for regions where there is no Postrera season. Further, the insurance cover period includes months where extreme excess rain events are unlikely to hurt the economic sectors of rural areas.¹⁰² In this sense, some regions may not require drought or excess rainfall coverage twice because their agro-climatic conditions permit only one production cycle. Similarly, areas with two productive cycles (Primera and Postrera) do not need annual coverage for excess rainfall during the seasonal dry period (November to early May). These technical aspects are relevant for structuring a macro-level index-based insurance portfolio and for avoiding premium payment for risks that do not exist.

Just as the cover period and the insurance exposure definition should be appropriate for the agricultural context, it is recommended that the sum insured be defined for each crop season.

Although this may result in higher costs than an annual coverage product, it will ensure fair and accurate coverage. Moreover, involving government authorities in defining producers who are eligible for compensatory payments under a modified macro-level product can help offset any possible cost increases. This would also make it possible to adjust exposure values and the total amount needed to implement this product. Furthermore, it would allow a more strategic approach to defining the target population for the proposed insurance scheme, but without discouraging segments of family farming from purchasing existing insurance policies.

What would be the appropriate amount for the sum insured in a modified macro-level insurance plan? The amount of insurance coverage depends on the objectives established and the resources available for each program's implementation.

For instance, the CADENA program in Mexico, which insured against catastrophic events, set the insured amount at US\$1,500 per beneficiary (US\$75/ha of annual crops for a maximum of 20 ha/beneficiary) in 2019 (Section 5.5). Although CADENA aimed to protect the federal and state governments from financial losses resulting from an insured event, the coverage provided to farmers was based on the average amount required to restore agricultural activities after catastrophic crop damage in the insured regions.

Another interesting example is the Garantia Safrá program in northeastern Brazil, which works much like insurance at the macro level. Compensation is calculated at R\$850 per household producer, which is equivalent to 64% of the 2023 minimum wage. This amount was established

102 The Pacific Basin of Central America has a seasonal dry period from November to early May (UCR 2001).

to ensure minimum living conditions for producers and their families if production losses exceeded 50% of the expected yield caused by droughts or excessive rainfall.

In Guatemala and El Salvador, index-based insurance programs have various values for the sum insured. For vulnerable populations, the average range is from US\$104 to US\$780 per insured. Meanwhile, for producers with credit access, the range is from US\$889 to US\$1,334 per insured (refer to Chapter 4 for more information). To illustrate, Chapter 8 of this report establishes a total annual sum insured of US\$1,000 per beneficiary for excess rain and drought risks during the crop seasons of Primera and Postrera: this illustrative sum insured is well below the annual minimum salaries for agricultural labor in all NCA countries, but needs to be viewed in the context of what is affordable under the proposed fully financed large-scale index-based disaster risk livelihoods insurance program for family farmers. In Phase II, a special study should be commissioned to assess the levels of financial protection that should be offered to family farmers in NCA.

6.3. Suggestions for additional studies on technical product design (Phase II)

- **Implementing a macro insurance scheme could address challenges related to low crop production, insufficient meteorological data, and the expenses associated with responding to various hazards.** However, further research is necessary to determine the availability of data that can effectively assess and characterize the risks at a regional level and is free of charge. Additionally, it is important to evaluate the feasibility of using complex indexes versus simpler ones when measuring these risks. While complex indexes can provide more accurate risk assessments, simpler ones may be easier to understand and incorporate into insurance agreements.
- **To create a successful modified macro-level insurance tool, it's crucial to involve government officials, insurance companies, and agricultural experts such as extensionists, technicians, and researchers.** This is especially important in countries like Guatemala, Honduras, and El Salvador, which have complex agro-climatic conditions that impact the number of productive cycles and the likelihood of their success. Since agriculture plays a critical role in the well-being of rural populations, national experts' knowledge is crucial for accurate risk assessment and for designing an instrument that effectively reduces potential government spending on disaster relief, optimizes public resources, and avoids potential disincentives.
- **Political discipline is critical for the eventual implementation of a modified macro-level insurance scheme, and for the continuous improvement of this instrument.** Although there are technological alternatives to overcome limitations related to a lack of information, implementing a risk transfer scheme requires time for improvement. However, prioritizing the insurance program politically (and budget-wise) requires a communication strategy that emphasizes the benefits and cites supporting evidence. When designing a modified macro-level insurance scheme, therefore, it is important to estimate the residual risk, disaster financing gap, and opportunity cost of using insurance compared to other tools.

7

DRFI Solutions for NCA: National Policy, Legal, Institutional, and Operational Considerations

Box 13. Key takeaways from Chapter 7

Any new large-scale modified macro-level index-based disaster risk insurance initiative for NCA countries should be carefully planned and aligned with existing national policies and strategies related to DRM, DRFI, agricultural development, social protection, and financial inclusion. A new program should be carefully aligned with (i) other DRFI programs for family farmers in each NCA country, and (ii) the existing micro-level index-based insurance programs in El Salvador and Guatemala to ensure that these are not crowded out.

The proposed index insurance program would be primarily targeted at the 1.9 million family farmers in the three NCA countries, of whom 0.35 million (18% of total) are located in El Salvador, 1.2 million (59%) in Guatemala, and 0.43 million (22%) in Honduras. These are best estimates based on available data and will require updating in the planning phase of the proposed project according to the classification of family farmer used in each country.

Currently there is no specific index insurance legislation in any of the NCA countries, but if the large-scale disaster risk index insurance initiative is approved and proceeds to Phase II, the detailed planning and design stage, it may be appropriate to appoint an index insurance legal specialist to work with the insurance supervisors in each NCA country. This team would assess whether any change in or strengthening of the legal and regulatory environment is required to accompany the introduction of this program.

If governments in the three NCA countries are to support modified macro-level index-based disaster risk insurance for up to 1.9 million family farmers, they will likely need to establish some form of public-private partnership framework and to work closely with the private commercial insurance sectors. In both Guatemala and Honduras, the private insurance associations have signaled their keen interest in supporting a large-scale index-based disaster risk insurance program through an appropriate coinsurance or pool arrangement; this would allow the operating costs of the program to be shared and would enable the coinsurers to retain higher levels of risk and purchase common account reinsurance at the individual-country level.

A critical task in each NCA country will be to identify suitable rural farmer-centric organizations to act as distribution channels for the index-based insurance product.

Such organizations must know and be trusted by their client base of family farmers. In Guatemala, MAGA is already working with the national agricultural extension network to manage implementation of the Seguro Colectivo Paramétrico program. In Honduras, the large caja rural network could offer potential as a distribution channel. In El Salvador, existing MAG farmer outreach programs that distribute free fertilizers and seeds could be leveraged.

To better understand the unique needs of women farmers and adapt the proposed product and program design to ensure equity in access, an in-depth study should be carried out.

Distributors/risk aggregators must perform four key tasks for the proposed index insurance program:

1. **Targeting and registration of family farmers who will be the beneficiaries of the program.** Currently there are no comprehensive family farmer registers in any of the NCA countries, and this is a priority task for Phase II planning.
2. **Opening of individual bank accounts and/or other means of receiving direct payouts from the insurer(s) for beneficiaries.** Experience gained from the current index insurance programs shows that SMS tokens can be sent to beneficiaries and redeemed at the nearest ATM or bank branch. For family farmers without mobile phones, other forms of payouts need to be considered.
3. **Educational materials and programs to promote financial literacy and index insurance awareness among beneficiary farmers.** Each index insurance program uses its own network to provide farmer awareness and training. In Guatemala, the MAGA extension officers are responsible for educating family farmers on the Seguro Colectivo Paramétrico policy, and this model could be adopted in Honduras.
4. **Distribution of individual beneficiary certificates at inception and at each renewal.**

Other operational considerations for the proposed large-scale index insurance program for family farmers include the appointment of a calculation agent and the design of an M&E system to address scheme performance, issues relating to basis risk, and the ability of payouts to stabilize family farmers' incomes, consumption, and farming systems.

7.1. Overall government policy and role of large-scale agricultural insurance initiative in DRFI framework

Any new large-scale index-based disaster risk insurance initiative for NCA countries must be carefully planned and aligned with existing national policies and strategies related to DRM, DRFI, agricultural development, social protection, and financial inclusion programs in these countries. Chapter 3 showed that there are a range of existing DRM/DRFI products and programs in each country: in the planning of any new national index-based insurance cover, several key areas will need to be addressed to ensure the programs are aligned, that they complement each other, and that they adopt a long-term horizon:

- **Prioritizing risks.** Important issues to be addressed include defining the target population and who will be protected, which perils will be insured, and who will pay.¹⁰³
- **Ensuring alignment of the new insurance program with the existing DRFI programs.** This will avoid overlapping programs and cases where beneficiaries are receiving compensation and relief from multiple sources (i.e., double indemnities).
- **Ensuring complementarity of programs.** DRFI instruments should strengthen one another. This is often not the case, as they are designed in isolation. But if free government disaster relief compensation programs and agricultural insurance are not carefully planned, the tendency is for farmers not to buy insurance, but rather to wait for free disaster compensation.
- **Ensuring integration in long-term planning and policy.** It often takes time for DRFI instruments to develop their full potential. This is particularly applicable to agricultural insurance, which may take 10 to 20 years to reach scale and sustainability. Where government elects to support premium subsidies or purchase insurance cover and fund premiums on catastrophe products that are designed to pay out infrequently on big events, their commitment to premium subsidies and/or premium financing needs to be for the long term. (See Lung 2020 for further discussion).

7.1.1. Determining which farmers, which perils, and who pays

A potential large-scale index insurance program would be primarily targeted at resource-poor vulnerable family farmers in the three NCA countries, according to the classification of a family farmer used in each country. However, policy makers in NCA countries may also want to extend coverage to small-scale semicommercial farmers to promote access to agricultural credit from financial institutions; credit allows farmers to adopt improved seed and fertilizer technology and achieve higher yields and incomes. Policy makers may also wish to include microentrepreneurs involved in other productive enterprises, as is done by several of the current micro index insurance programs in El Salvador and Guatemala (Section 4.4). Section 7.5.2. addresses issues relating to the definition of family farmers and how to identify and register these farmers for the proposed large-scale index insurance program.

In the start-up phase of a new large-scale index insurance program for family farmers in NCA, it is recommended to focus on the two key climatic perils—excess rain and drought—and to consider additional indexable perils over time. Chapter 2 identified excess rain (leading to flooding and/or waterlogging of growing crops) and drought as the major perils faced by family farmers in NCA, and Section 4.4 showed that these are the two main index perils in the current range of index insurance programs, including the MAGA large-scale program. Chapter 6 highlighted some of the key technical issues and challenges facing the current excess rain and drought index insurance programs and identified possible areas for strengthening the design of these products in Phase II of this program.

A major issue facing policy makers and planners in NCA countries is who should fund insurance premiums in the proposed project and post-project phases: family farmers are very unlikely to be able or willing to finance their premiums, and therefore governments, donors, and other development partners will need to consider how to finance the premiums in part or in whole (100% subsidies). International experience shows that most agricultural insurance programs that have achieved scale and sustainability are those where governments provide high levels of

¹⁰³ Some countries forbid state aid in case of crisis or disaster if the risk could have been insured. This is the case for Spain, Austria, Portugal, Greece, Sweden, Turkey, and Italy for subsidized insurable risks, and in France if insurance has reached a significant diffusion level (Bielza et al. 2006).

premium subsidy support (Mahul and Stutley 2010). In this context, the approach of the GoG is worth noting: it provides fully funded (100% subsidized) climate risk index insurance to family farmers under the Seguro Colectivo Paramétrico program. Premium financing considerations are dealt with in Section 8.2.

7.1.2. Ensuring alignment and complementarity of insurance and other disaster risk financing and compensation programs for farmers

It is very important that any new large-scale modified macro-level index insurance scheme for family farmers in NCA countries is carefully aligned with existing insurance initiatives in each country, as well as with the MAGA Seguro Colectivo Paramétrico program in Guatemala. Careful planning of both the institutional and operational framework for the large-scale program will be required to distinguish wherever possible between on the one hand the family farmers who are being targeted in the three NCA countries, and on the other hand the target client base of the existing crop credit insurance programs and the WFP micro-client programs that focus on female farmers and entrepreneurs. Most importantly, it will require aligning the premium subsidy regimes of the various programs in order to avoid crowding out those programs that do not carry any subsidies or that are adopting smart premium subsidies. (See Chapter 8 for further discussion of premium subsidy strategies.)

It will also be important to carefully align this large-scale index insurance initiative with other DRFI programs for small farmers in each NCA country; the aim is to ensure that each program complements the other, rather than competes with it or doubles up the indemnities/compensation paid to some farmers while paying out nothing to other affected farmers. Chapter 3 showed that currently the national natural disaster prevention, mitigation, and response programs in each NCA country have very limited budgets for providing farmers with post-disaster compensation, and this also applies to the additional disaster compensation funds provided by line ministries such as agriculture and livestock.

International experience shows that government provision of free disaster compensation acts as a disincentive and discourages farmers from purchasing voluntary and often heavily subsidized agricultural insurance. In the 1990s, in an attempt to induce farmers in the US to purchase crop insurance and to reduce the burden on federal government ad hoc disaster compensation programs, the US Federal Crop Insurance Program (FCIP) significantly increased premium subsidy levels; in addition, legislation was enacted that required farmers to purchase a minimum level of 50% crop insurance coverage, termed Minimum Catastrophic Risk Protection (CAT), in order to be eligible for government disaster compensation. Unfortunately, this measure did not succeed in reducing the costs of free ad hoc disaster aid: since 2017, US\$60 billion in ad hoc disaster assistance has been distributed through the Market Facilitation Program, Wildfire and Hurricane Indemnity Program (WHIP), WHIP Plus, Coronavirus Food Assistance Program, and, most recently, the Emergency Relief Program (NSAC 2023). In Spain, the AGROSEGURO program specifies that subsidized agricultural insurance is available to every Spanish farmer on a voluntary basis, but if farmers decline to purchase crop insurance cover, they are not eligible for any free natural disaster compensation payments (ENESA 2020).

7.2. Legal and regulatory considerations

7.2.1. Agricultural insurance legislation

Guatemala is the only NCA country that has drawn up specific agricultural insurance legislation (Agricultural Insurance Law, Registration No. 5032 of 28 April 2016),¹⁰⁴ but the law has never been enacted and refers only to indemnity-based crop and livestock insurance; it does not specifically address index-based insurance. Key features of this law include the following:

- Multi-risk insurance would be provided for damage caused by insured perils to the insured crops and livestock (including poultry). In other words the law considers only conventional indemnity-based insurance.
- MAGA would be the insurance applicant and the insured policyholder responsible for payment of the premium to the appointed insurer.
- The beneficiaries would be family farmers or indigenous communities who must be registered to a cooperative, association, or peasant group and registered with the appropriate authorities.
- Government would subsidize 70% of the costs of the agricultural insurance premium, and the beneficiary would be responsible for paying the 30% unsubsidized portion of premium.
- Where credit and insurance are linked, the insurance payment would offset the amount of loan, and the 30% of premium due by the beneficiary would be deducted from the claim amount.

Key features of the government-subsidized agricultural insurance program outlined in the draft 2016 Agricultural Insurance Law have subsequently guided the design of the MAGA Seguro Colectivo Paramétrico excess rain and drought index insurance cover for family farmers. The key differences are (i) the Seguro Colectivo Paramétrico policy is a disaster risk index insurance cover and not a traditional indemnity-based product; and (ii) MAGA has agreed to fully fund (100% subsidize) the index insurance premiums of the benefiting farmers, rather than provide partial premium subsidy support. This draft Agricultural Insurance Law with suitable modifications to include index-based insurance could form the legal framework for the proposed large-scale index-based disaster risk insurance program for family farmers in Guatemala.

7.2.2. Index insurance legislation

As NCA countries express growing interest in index insurance as a mechanism to manage the disaster risks faced by family farmers and microentrepreneurs, insurance regulators in these countries may need to consider how these products fit into the existing legal and regulatory framework and whether new legislation is required to authorize this new class of insurance business. Such a need arises because current insurance legislation and regulations have been drawn up to address indemnity insurance alone. Index-based insurance cannot, however, be treated as indemnity insurance, as under a typical index contract the payment made to the insured on the currency of the insured risk is not dependent on any valuation or assessment of the insured individual's loss, but instead on the sum insured, the threshold trigger, and the exit and tick (amount of payout per measured value of the index). Global AgRisk (2012) argues strongly

¹⁰⁴ The full name of the law is the Agricultural Insurance Law and Debt Forgiveness for Agricultural Cooperatives, Indigenous Communities dedicated to the cultivation of the land and Small Peasants who enjoy credit assistance (*Ley del Seguro Agropecuario y Condonación de Deuda para Cooperativas Agropecuarias, Comunidades Indígenas dedicadas al cultivo de la tierra y Pequeños Campesinos que gocen de asistencia crediticia*).

that when a new index insurance product is first designed in any country, the insurance regulator should be involved in assessing the legal and regulatory risks associated with the product and whether any change in or strengthening of insurance legislation and/or regulations is required to accompany the new product's introduction.

If approval is given for this large-scale disaster risk index insurance initiative to proceed to Phase II, detailed planning and design, it may be appropriate to appoint an index insurance legal specialist to work with the insurance supervisor in each NCA country in order to assess whether any changes or strengthening of the legal and regulatory environment is required to accompany the program's introduction.

7.3. Public-private partnership options and potential roles

Agricultural insurance markets in developing countries often suffer from market inefficiencies, including information asymmetries, lack of data infrastructure, limited outreach to family farmers, and limited access to reinsurance among insurers; international experience shows that support is required from governments if these programs are to achieve scale and sustainability (Mahul and Stutley 2010; IFAD and WFP 2010; World Bank 2015c). This section summarizes the international experience with the roles of the public and private sectors in large-scale sustainable national agricultural insurance programs.

If governments in the three NCA countries are to achieve the goal of providing index-based disaster risk insurance for up to 1.9 million family farmers, they will likely need to establish some form of PPP framework to work closely with the private commercial insurance sector; this is certainly true in El Salvador and Honduras, where there are no public sector insurers.

International experience suggests that the most successful agricultural insurance programs are based on some kind of PPP, which is often backed up by carefully researched and drafted legislation in the form of national agricultural insurance acts. Many countries with major national agricultural insurance PPPs, including the United States, Canada, Spain, and Turkey, have drawn up and enacted special agricultural insurance legislation to govern the operations of the PPP stakeholders and to approve government financial support in the form of premium subsidies (Mahul and Stutley 2010). In the short term, NCA countries may not need to introduce any insurance legislation to permit the launch of a large-scale disaster risk index insurance program, but in the medium to long term, it may be useful to commission a legal specialist to conduct a study at individual-country level of the need or otherwise for some form of agricultural insurance act.

It is very important to specify the roles that the public and private sectors will play under a PPP agreement. International experience shows that the private sector is best placed to assume responsibility for product design and rating decisions, for risk acceptance decisions and underwriting (in most cases), and for claims adjusting and settlement.¹⁰⁵ Governments can set policy, promote a legal and regulatory framework, raise farmers' awareness and provide education programs, and finance premiums (Mahul and Stutley 2010; World Bank 2015c). Table 26 provides further information on the roles and responsibilities of the private and public sectors.

¹⁰⁵ Concerning risk acceptance decisions, under the large-scale modified macro-level program, governments as the insured policyholders will be responsible for identifying and registering the beneficiaries they wish to participate in the program.

Table 26. Roles of private and public actors in developing and implementing a large-scale index insurance program for family farmers in NCA

Private (and state) insurance companies	Public sector	Joint activities
<ul style="list-style-type: none"> • Risk modeling/data analysis • Product design, actuarial, and rating • Risk acceptance and underwriting • Claims reporting, adjusting, and settlement • Decisions over risk retention and reinsurance strategies • Additional data collection • Marketing and distribution of the insurance products through risk aggregators and value chain actors • Monitoring of product performance (basis risk) 	<ul style="list-style-type: none"> • Policy for agricultural insurance • Specification of target commodities and farmers • Legal and regulatory framework and consumer protection • Decisions on types of fiscal support to agricultural insurance and allocating annual budget • Registration of farmers • Disbursement of premium subsidies (and auditing of subsidies) • Collection of data on crops/livestock/weather to support risk assessment and rating; collection of financial data (costs of production and prices for valuation purposes) • Acting as a reinsurer of last resort 	<ul style="list-style-type: none"> • Annual and long-term planning of agricultural insurance business plan and budget • Awareness creation and farmer education • Support for product distribution through public sector aggregators • Support for field loss assessment activities • Monitoring of scheme performance and impact evaluation

Source: World Bank 2023.

In NCA countries, insurance markets and infrastructure are poorly developed for servicing large numbers of family farmers. NCA governments can play an essential role by investing in an enabling environment that promotes agricultural insurance and by providing financial support to these programs, particularly in the start-up phase of the new PPP programs in each country. Some of the specific areas where government support can be usefully provided are listed below and shown in Figure 39.¹⁰⁶

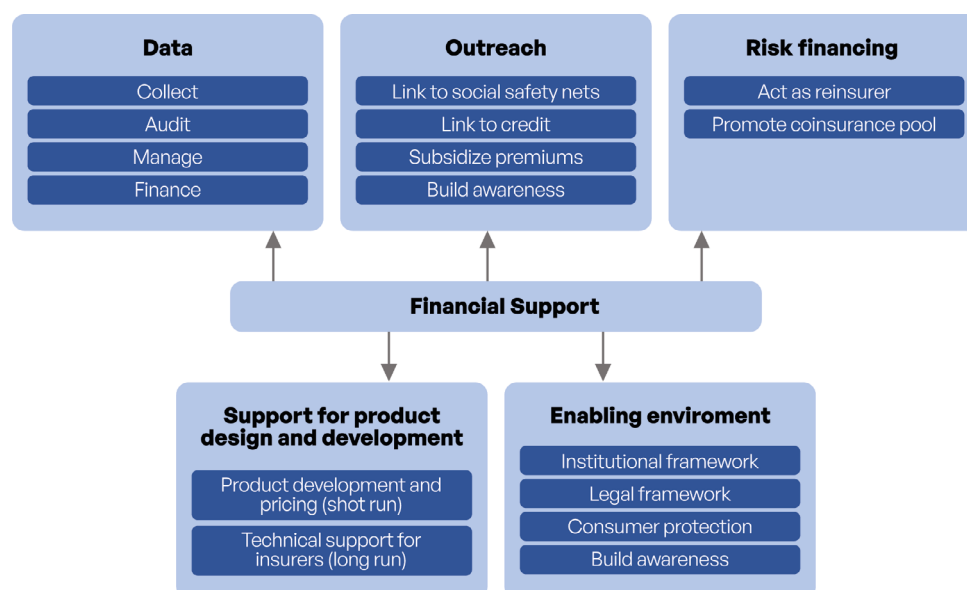
1. **Providing an enabling legal and regulatory environment.** Governments can often usefully support the introduction of agricultural insurance by creating an enabling legal and regulatory environment. In the case of index insurance, changes to conventional insurance legislation may be required to permit this class of business to be underwritten by the local insurance market. Legal and regulatory issues should therefore be addressed right at the start of the process of designing any WII product (Global AgRisk 2012).
2. **Enhancing agricultural insurance infrastructure and data and information systems.** Governments in NCA countries could invest in upgrading the national meteorological weather stations in order to introduce WII and to back up remote sensing climate imagery. If NCA governments wish in the future to introduce AYII, it will be necessary to strengthen seasonal crop area, production, yield estimation, and survey procedures. Finally, governments can help the insurance sector enter this class of business by providing it with access to fairly priced time-series meteorological weather data, crop production and yield data, and damage and loss statistics.
3. **Supporting product research and development.** Few of the private insurance companies in NCA countries have any experience with the design and rating of traditional crop insurance products or new crop weather index products. Local governments could usefully support specialist technical assistance from international sources to help their insurance associations design, rate, and prepare policy wordings for these new agricultural insurance products.

106 See also Mahul and Stutley (2010) and World Bank (2015c) for further details.

Currently, such technical assistance is mainly funded by the international development agencies and nongovernmental organizations (NGOs) and conducted by specialist risk modeling companies such as MiCRO or Blue Marble.

4. **Providing education, training, and capacity building for farmers, distributors, and insurers.** Governments in NCA could also play a key role in supporting farmer awareness and education programs, capacity-building workshops, and technical training programs for key agricultural insurance staff. They could also support insurance company staff with needed specialist training in product design, actuarial and rating, underwriting and claims administration, and loss assessment systems and procedures. Similar training also needs to be provided to staff in banks, MFIs, input suppliers, and government ministries if these organizations are involved as delivery channels/agents.
5. **Supporting smart premium subsidies.** To enable NCA governments to reach the majority of their poor vulnerable farmers, donors may be willing and able in the short to medium term to shoulder the major burden of fully subsidizing premiums of the proposed large-scale index insurance solution. However, in the long term, local governments may need to accept responsibility for financing smart premium subsidies as part of their climatic and natural hazard risk management strategies. By actively involving government in the design of these risk transfer programs, there is a much stronger likelihood that they will be willing to fund premium subsidies targeted at their poorest and most vulnerable populations.
6. **Providing catastrophe risk financing/reinsurance.** In about one-third of the agricultural insurance schemes reviewed in a 2008 World Bank survey (Mahul and Stutley 2010), governments intervened to support agricultural insurance either through a national reinsurer or by assuming part or total responsibility for settling excess claims. In NCA countries, local insurers are already actively working with international specialist index reinsurers, and intervention by the NCA governments should be considered only as a last resort if capacity constraints apply.

Figure 39. Potential public sector roles for governments in NCA countries to support index-based disaster risk insurance for family farmers



Source: World Bank.

Chapter 8 of this report presents various illustrative five-year insurance uptake scenarios, with fiscal costings for premium subsidies and other support costs, that NCA governments and development partners can consider as they decide whether to invest in this large-scale index-based insurance initiative for family farmers. Chapter 8 also presents insurance and reinsurance structuring options.

7.4. Disaster risk finance and insurance institutional framework

The subsections below present possible DRFI frameworks for the proposed insurance initiative, with advantages and disadvantages of each.

7.4.1. Option 1. Government appoints a single insurer to underwrite the program

NCA governments could appoint a single company to underwrite the proposed disaster risk index insurance program in each country. For example, in Guatemala this could build on the existing MAGA Seguro Colectivo Paramétrico program, which is underwritten by the insurance department of Banco CHN, the state bank. In El Salvador and Honduras, governments could also use a tender process to appoint a single company to insure the program.

Advantages

- Ease of implementing government policy through a single entity, adopting a single policy, and imposing uniform premium rates
- Ease of administering the premium subsidy regime

Disadvantages

- No promotion of private sector agricultural insurance, and possibility of crowding out the existing micro-level disaster and climate risk index insurance programs being implemented by local insurers in El Salvador and in Guatemala and other initiatives in the pipeline for Honduras
- Unlikely that a single insurer could retain the significant risk associated with the product
- Very unlikely that a single insurer has the staffing, systems, and procedures to register/enroll, open bank accounts for, and provide insurance education for the very large number of family farmers

7.4.2. Option 2. Government promotes open market competition

NCA governments could promote open market competition by any interested public and private sector non-life or general insurance companies that are authorized by the insurance regulator to offer agricultural insurance products and services. These insurers would compete for agricultural insurance business on an individual basis, and the government would provide these companies with legal and regulatory, technical, logistical, and financial support (typically subsidies on premiums, on operating and loss assessment costs, and/or on reinsurance). This is the most popular model among the large PPP agricultural insurance programs in the United States, Mexico, Brazil, Chile, Italy, Portugal, China, and India. In some markets, the operations of competing insurers are highly regulated; for the FCIP, for example, the US government has created a Risk Management Agency (RMA) that approves standard crop and livestock insurance policies and uniform farmer-level premium rates for each county and sets standards for loss assessment and reinsurance. Similarly, under India's Pradhan Mantri Fasal Bima Yojana (PMFBY), insurers have to tender for business with the state governments mainly on the basis of price. Other markets, such as Brazil's, are less regulated.

Advantages

- Promotion of open market competition and crowding in of interested insurers to develop and underwrite a large-scale disaster risk insurance program for family farmers
- Competitive pricing of disaster risk index insurance products by competing companies

Disadvantages

- More complex to implement government policy through multiple insurance companies
- More difficult to ensure quality of the index insurance products offered and the premium rates unless a single uniform policy and uniform premium rates are agreed to
- More complex to administer and audit the premium subsidy regime with multiple participating insurance companies in each NCA country

7.4.3. Option 3. Government promotes a coinsurance pool

NCA governments could promote the formation of an agricultural coinsurance pool in each NCA country to underwrite the disaster risk index insurance program for family farmers, and invite both public insurers (CHN in Guatemala) and private insurers in the three NCA countries to join their respective country-level coinsurance program.

Advantages:

- Potential to crowd in insurance companies that would otherwise not be willing to incur the start-up costs of creating their own independent crop or livestock insurance department
- Ability to retain a much higher share of risk in the pool, reducing reliance on international reinsurance markets or government backstopping
- Economies of scale resulting from the creation of a single centralized agricultural managing underwriter unit to underwrite the program on behalf of the pool members
- Cost savings in purchasing reinsurance protection arising from effects of risk pooling
- Ease of channeling PPP support programs to a single pool entity instead of several private insurance companies

Disadvantages

- Reduced competition between individual companies
- Loss of identity for individual companies that have invested heavily in their own agricultural insurance programs up to now

Further advantages and disadvantages of pools are listed in Box 14.

Box 14. Benefits and limitations of coinsurance pool arrangements

BENEFITS

Pools create economies of scale by operating as a single entity with shared (pooled) administration and operating functions; costs savings arise due to

- Reduced staffing requirements (fixed costs)
- Shared costs of product research and development, actuarial, and rating
- Reduced costs of underwriting, claims control, and loss adjustment

Pools offer cost advantages because they purchase common account (pooled) reinsurance protection and don't require each company to place its own reinsurance program. Advantages arise due to

- Stronger negotiating position with reinsurers
- Larger and more balanced portfolio and better spread of risk
- Reduced costs of reinsurance due to pooled risk exposure
- Reduced transaction costs (reinsurance brokerage, etc.)

Pools avoid competition on rates in a soft market and are able to maintain technically set rates. Most pools operate as the sole insurance provided or as a monopoly (e.g., Austria, Senegal, Spain, Turkey), and there is therefore no competition on pricing.

Pools are able to maintain underwriting and loss adjustment standards. Under a pool monopoly arrangement, the pool manager can ensure that common and high standards are maintained in the underwriting of crop and livestock insurance and in the adjusting of claims. Where companies are competing against each other for standard crop insurance business, the problem of varying loss adjustment standards often occurs.

Coordinating government support to a pool under a public-private partnership simplifies coordination of national agricultural insurance policy and planning and specific support functions (e.g., provision of premium subsidies, research and development, education and training). Dealing with individual insurance companies that may have very different priorities for agricultural insurance is much more difficult.

LIMITATIONS

Where a pool acts as the sole agricultural insurer, competition in the market is eliminated:

- There is no alternative to the range of products and services offered by the monopoly pool underwriter.
- The range of insured perils is limited.
- The regions where agricultural insurance is offered and the types of farmer insured are limited.
- There is a lack of competitiveness in premium rates charged by the pool.

Source: Mahul and Stutley 2010.

It is important to note that in the conduct of this feasibility study, the insurance associations in both Guatemala and Honduras expressed their firm preference for some form of coinsurance (pool) structure to underwrite the proposed large-scale disaster risk index insurance program for family farmers in their respective countries. Their reasons for preferring a pool program centered on the advantages listed in Box 14.¹⁰⁷

NCA insurance companies might wish to consider the following legal coinsurance or pool structures in conjunction with their insurance supervisors in Phase II of this study:

1. A simple coinsurance agreement
2. Formation of a consortium and creation of a small underwriting unit/managing underwriter to insure the business and settle claims on behalf of consortium members
3. Formation and incorporation of a new specialist agricultural insurance pool company that would comply with the minimum capital and other requirements for a new non-life insurer in each of the NCA countries

Key features of these three coinsurance or pool structures are presented in Annex 2.

7.5. DRFI for NCA: Operational considerations

7.5.1. Insurance distribution channels

The potential large-scale disaster risk insurance program for family farmers could build on the existing distribution channels for family farmers in each country and crowd in new risk aggregators-distributors over time. The key existing distribution channels and some possible new distribution channels are shown in Table 27. It will be important to ensure that distribution options consider the distinct needs of women regarding access points, duration and times of access, and types of institutions providing access. Studies on micro-level index insurance show that women often need distinct distribution mechanisms related to their level of trust in institutions (Akter et al. 2016).

Table 27. Main distribution channels for index insurance in NCA countries

Channel	El Salvador	Guatemala	Honduras
Commercial banks			
Agricultural development banks	BFA	BANRURAL	BANADESA
Other financial institutions (MFIs)			
Development organization clients	WFP	WFP, Heifer International	WFP/Blue Marble
Municipality governments		Yes	
Government extension agents	Budling with MAG’s free input distribution program for small farmers	MAGA agricultural extension service	
Digital channels/mobile phones			
Farmer associations, producer cooperatives, savings and credit cooperatives (<i>cajas rurales</i>)		Coffee producer associations	<i>Cajas rurales</i> , coffee producer associations
Other distributors		Nespresso (Café Seguro)	Nespresso (Café Seguro)

Source: World Bank based on 2023 feasibility study in NCA countries
 Note: Blue shading represents an existing channel; green shading represents a potential new channel. BANADESA = National Bank for Agricultural Development; BANRURAL = Rural Development Bank; BFA = Banco de Fomento Agropecuario; MAG = Ministry of Agriculture and Livestock; MAGA = Ministry of Agriculture, Livestock and Food; MFIs = microfinance Institutions; WFP = World Food Programme.

107 To date it is not known whether the insurance association in El Salvador would also be interested in such a proposal.

In Guatemala, the MAGA extension service has demonstrated its potential to act as a primary distribution channel for insurance; however, no such extension services currently exist in Honduras or El Salvador. In Guatemala, where there is an agricultural extension officer in each of the 340 municipalities, these staff identify and register farmers for the Seguro Colectivo Paramétrico program, providing their details (including name, address, location, and mobile phone number) as applicable to Banco CHN's insurance department. The extension officers are also involved in providing insurance awareness and education and in explaining the claims payout process; when payouts are triggered, extension officers can assist Banco CHN in advising those farmers who are due an indemnity in each municipality and population center (*lugar poblado*). Alternative approaches will need to be identified in Honduras and El Salvador given that neither has such extension services (although Honduran authorities have indicated their intention to relaunch such a program).

Financial institutions already play an important role in distributing credit-linked index insurance in both El Salvador and Guatemala, and they could be considered for a role in the large-scale disaster risk index insurance program for family farmers. In El Salvador, Banco de Fomento Agropecuario is playing a leading role in distributing Futuro Seguro's Produce Seguro microinsurance policy to its loanee farmers and entrepreneurs, and in Guatemala BANRURAL is doing the same for the Seguro Productivo index insurance program. Here a note of caution is warranted: few family farmers currently have access to seasonal production credit, and thus the potential to use banks to distribute the large-scale index-based disaster risk insurance cover to poor family farmers may be limited. However, the potential of expanding credit-linked insurance to the segment of family farmers who are less poor but still vulnerable should be considered.

In Honduras, authorities are highly committed to leveraging BANADESA as the primary conduit of agricultural credit, which will be distributed through the country's large network of *cajas rurales* (rural credit and savings banks). This approach, in turn, may offer the potential to distribute the large-scale index-based disaster risk insurance program to family farmers through the *caja rural* network. These *cajas rurales* serve as an alternative financing mechanism for populations without access to formal financing and could become agents to financial and nonfinancial account operators (see Box 15).

Café Seguro, the ASSA/Blue Marble/Nespresso excess rain and drought cover, is being distributed in Guatemala and Honduras by producer associations and cooperatives. WFP also adopts a group-based approach to its index insurance programs in El Salvador and Guatemala and targets women's producer associations. Given their very large numbers, small-farmer producer associations and cooperatives in the three countries could act as important distributors of the large-scale index insurance program in future.

In El Salvador, MAG is implementing a major small-farmer free seed and fertilizer distribution program aimed at increasing crop production, crop yields, and farmers' incomes, and this might offer an opportunity to bundle insurance and input supply under the proposed large-scale index insurance program. According to MAG, this program is targeting small-scale producers of maize and beans, and in 2023 has registered upward of 500,000 small maize farmers who are eligible to receive the free certified seed and fertilizer package for 1 manzana of crop production. The program is being managed and implemented by MAG in collaboration with the extension agencies of the National Center for Agricultural and Forestry Technology (CENTA), which has offices in all the main departments and regions of the country. One option for policy makers in El Salvador would be to explicitly link the fully subsidized excess rain and drought index insurance programs with MAG's distribution program of free seeds and fertilizers, thereby protecting farmers' adoption of improved seed and fertilizer technology against catastrophic climatic shocks. See Box 16 for further details of MAG's free input distribution program for small farmers.

Box 15. *Cajas rurales* and FUNDER: An alternative financing system in Honduras

The *cajas rurales* are community enterprises created to improve the quality of life of rural men and women through income generation, savings and loan services, and the promotion of solidarity. They are an alternative way for rural families to save and to access funds for their productive activities, and they offer them better financial conditions than other institutions. The *cajas rurales* are managed by their members, and their capital comes from members' contributions. Loans are made both to members and nonmembers (though the latter are subject to background evaluation and may be required to offer collateral).

Efforts to strengthen the *cajas rurales* are being carried out by Fundación para el Desarrollo Empresarial Rural (FUNDER), a private, not-for-profit Honduran organization that targets small and medium-size producers. Created in 1997, its mission is to “promote participatory processes for rural business development, through efficient and effective training services, technical assistance and financing for the formation and strengthening of *cajas rurales*, microenterprises, agribusiness and renewable energy initiatives, which improve the quality of life of their target population in a sustainable manner.”

FUNDER is providing training and advice to the *cajas rurales* via three mechanisms:

- Technical assistance. The content of the service varies depending on the stage of development of the *caja rural*.
- Training. The focus of training is on managers.
- Loan provision with funds owned by FUNDER and/or through linkages with formal financial institutions. The *caja rural* must exhibit good financial and institutional performance and have a defined investment portfolio, good credit history, legal profile, and eventually bank guarantees.

Source: FUNDER, “Cajas Rurales y Emprendimientos,” <https://funder.org.hn/cajas-rurales/>

Box 16. MAG's free crop input distribution program for small maize farmers, 2023

El Salvador's Ministry of Agriculture and Livestock announced in April 2023 that it would soon begin distributing “Agricultural Inputs Packages” to more than half a million small farmers. The aim is both to support this population and ensure the supply of corn. The packages contain 25 pounds of seed (which has been treated to withstand pests and diseases) as well as fertilizer. Mayors' offices are collaborating in distributing the packages, and over 250 delivery points will be available. The packages and the delivery process have both been improved, according to the MAG, which states that with Good Agricultural Practices (GAP), farmers can increase their productivity by up to 20%.

Source: MAG 2023

Distributors/risk aggregators for the proposed large-scale index insurance program will need to perform at least four tasks:

- Targeting and registration of family farmers who will be the beneficiaries of the program
- Opening of individual bank accounts or provision of other means of receiving direct payouts from the insurer(s)
- Promotion of financial literacy and index insurance awareness, education, and training for beneficiary farmers
- Distribution of individual beneficiary certificates at inception and at each renewal

These key tasks are reviewed in the sections below.

7.5.2. Targeting and registration of family farmers

In the absence of comprehensive up-to-date national census data or farmer registries, there will need to be major investment to identify, classify, and register the targeted family farmers. There is also a need for clear targeting and definition of family farms; as discussed in Section 2.1.3, the definitions appear to vary by NCA country (Table 4). While Guatemala's definition uses quantifiable data (a family farm may be up to 4 manzanas in size), Honduras and El Salvador define family farm in terms of a way of life (a family farm is one based primarily on family labor). Given the open-ended nature of these definitions, clear guidelines will have to be given to the field enumerators responsible for identifying and registering family farmers for the large-scale index insurance program. It is easier to identify and register farmers on the basis of their landholding size, especially where the bulk of farmers have been registered for land title purposes, than on some other basis.

In defining and targeting the family farmers who will be beneficiaries of the large-scale index insurance program, it is very important that a gender framework be applied. International experience shows that under many development programs, women are vulnerable to being excluded or even further disadvantaged. Ensuring that the agricultural credit and insurance program reaches women is especially necessary: in many households men take financial decisions, and even in female-headed households women may be averse to exploring insurance options because they are less financially literate and less self-confident in financial decision-making.

Farmer registries in NCA

Farmer registries in the NCA countries are not suitable to serve as the basis for definitions in different support programs: they have only limited coverage of agricultural producers (small, medium, and large) and their sources of income (on-farm and off-farm), and they do not frequently update data. Since the region as a whole exhibits relatively low levels of digitalization, existing farmer registries have limited scope in terms of the typology of producers included; they rely on manual/in-person data collection through the agricultural extension services staff or community volunteers. El Salvador is the exception in this regard. Some features of the existing farmer registry systems in each country are presented below.

- **Guatemala.** In 2022, with technical assistance from FAO, MAGA created a registry of 40,000 farmers who sell their produce to the school food program (Programa de Alimentación Escolar) to grant them insurance against climate threats. In 2023, MAGA is enlarging the database to include family farmers with small surpluses for sale in local markets and expects to offer insurance to around 300,000 family farmers under the Seguro Colectivo Paramétrico program. The data collection process is done by the 2,500 agricultural extension staff and community volunteers, and will follow the same data format used in 2022

- **El Salvador.** MAG has built a registry for family farmer beneficiaries of the Programa de Entrega de Paquetes Agrícolas. In March 2022, MAG launched an initiative to create a national Single Registry of Agricultural Food Producers (Registro Único de Productores Agroalimentarios, RUPA) and made a call to producers of basic grains (maize and beans) to register online. Farmers who register obtain a digital identity card that allows access to benefits such as technological packages under MAG programs. The information in RUPA, together with field visits, complements the information on beneficiaries in the Programa de Entrega de Paquetes Agrícolas database, with the objective of quantifying the number of productive units that will receive in-kind technological packages (for example, certified seeds and fertilizers). The program does not provide conditional cash transfers. According to officers from MAG, the registry has 500,000 maize beneficiaries. The registry has been digitalized: beneficiaries can go online to find their status and date/center where the technological package will be delivered, and government officers can confirm in the field the identity of the beneficiaries.
- **Honduras.** Honduras has no farmer registry. However, the SAG’s Bono Tecnológico program has been extended to 270,000 producers with farms less than 5 manzanas in size. The Dirección de Ciencia y Tecnología Agropecuaria (DITCA) at the SAG is reinstating the agricultural extension service in partnership with municipalities and had planned to create a georeferenced farmers registry beginning in March 2023. Additionally, SAG had planned to launch the agricultural census in March 2023 (the last one had been carried out in 2003). Furthermore, in 2022, the Government of Honduras issued decrees establishing the mandate for the Sistema de Información del Registro de Beneficiarios de Honduras (SIRBHO), housed at the Secretaría de Desarrollo Social (SEDESOL), to collect socioeconomic data from specific groups in the country to be used by different social programs and updated every five years; data from a 2007 census of villages covering 387,243 households is publicly available. Section VIII of the Ficha Socioeconómica Unica used to collect the data refers to “Agriculture/Livestock Production,” and a quick review of the data reveals the following: (i) 167,671 households cultivate the land or raise animals; (ii) 118,124 households report farms of less than 2 manzanas, and 34,662 households between 2 and 5 manzanas; and (iii) 143,834 households reported temporary production—maize is cultivated by 138,902 households and beans by 103,886 households, while sesame, a cash crop, stands out with 103,834 households.¹⁰⁸

Existing registries are not dynamic. Access to registration is not open and continuous, and does not combine on-demand applications with active outreach to vulnerable populations; registries operate with fixed lists of beneficiaries (Leite et al. 2017). All four registries described above rely on registration campaigns with census-type features launched at defined frequencies (Guatemala’s MAGA is updated once a year for insurance policy acquisition; the Dirección de Ciencia y Tecnología Agropecuaria within SAG in Honduras is open in 2023 for updates; and SIRBHO in Honduras will be updated every five years). The experience of Paraguay in building the beneficiaries’ registry for the conditional monetary transfers during the COVID-19 pandemic (Programa Pytyvõ) could provide a baseline or guidance for the NCA countries’ design of digital registries for family farmers (Box 17).

108 Sedesol, “Systems Inventory” [in Spanish] (accessed 2023), <http://redatam.ods.sedesol.gob.hn/redbin/RpWebEngine.exe/Portal?lang=esp>.

Box 17. Implementing a beneficiary registry: Lessons learned from the Pytyvõ Program in Paraguay

Lessons learned from the Pytyvõ Program highlight a set of fundamental characteristics for the implementation of an effective digital registration program—one with low levels of fraud, medium to high levels of know-your-customer and anti-money laundering standards, and adequate data and identity protection. Four key lessons are listed below.

1. **Activate a platform for open self-registration of beneficiaries** to obtain a broad database that, based on the selection criteria established for the program, allows the construction of a nominal database and identifies potential fraudsters. The self-registration procedure consists of an electronic affidavit (app or website) to establish the digital identity through personal data, a selfie, and an admissible photo of the front and back of the national identity card, as well as the geolocation at the time of registration; this last requirement allows a first validation of the potential beneficiary's geographical location.
2. With the data collected via the self-registration platform, **conduct crosses or validations with other existing registries to verify compliance of candidates with the targeting criteria of the program.** This step will allow (for example) better identification of family farmers who meet the targeting criteria (e.g., family farmers dependent on both on-farm and off-farm livelihoods, who would require assistance from an agricultural insurance program for their subsistence after a climate threat materializes), and avoid duplicating public efforts (i.e., duplicating compensation for same group of beneficiaries). Suggested database crossings (among others) are public sector employees, prison population, deceased, pensioners, beneficiaries of other social programs, subscription to electric service to confirm geographical location, and payers of income tax.
3. With the validated database (clean match database), **identify beneficiaries who own deposit accounts in the financial system and/or at an electronic money provider (i.e., electronic wallets) to avoid opening additional accounts.** This step also helps validate the geographical location and contact information of the beneficiary.
4. **Require self-registered candidates for whom digital validation is not feasible to visit an office** (in the case of family farmers, a local office of the Ministry of Agriculture and Livestock, for example) **to verify their identity.**
5. As a social control mechanism, **make information on beneficiaries public and available to all citizens.** When the program is announced, it must clearly state the consequences of committing economic crime or fraud against the government. If reports of false data being provided by beneficiaries are received and confirmed, those beneficiaries must be penalized. In the context of the Pytyvõ Program, random validations were carried out, and fraud cases were exposed in the media, driving people who improperly registered to the program and received the conditional monetary transfer to return the benefit received.
6. Make the system **auditable.**
7. **Make payments traceable; daily conciliation of payments** should be mandatory as well as the **return of payments** for which the account to be credited does not exist.

7.5.3. Insurance payment systems: Opening of payment accounts for beneficiaries

Existing agricultural insurance programs in El Salvador and Guatemala either make payouts to individual bank accounts belonging to the insured farmers and microentrepreneurs, or more commonly provide SMS tokens that the beneficiary then converts into cash at an ATM (Table 29). The use of deposit accounts at banks and other financial service providers should be promoted under any future large-scale index insurance program in NCA and the intention should be to move away from cash distribution (which raises security concerns and entails high operational costs). As time progresses, the adoption of digital accounts would substitute the use of traditional deposit accounts.¹⁰⁹

Table 28. Payment mechanisms used by existing agricultural index-based insurance programs

Country/institution or program	Payment channels in use
El Salvador	
Banco de Fomento Agrícola (BFA): Produce Seguro	Payment is deposited to beneficiary's account at BFA (what is left after repaying outstanding loan balance). SMS is sent to beneficiaries to inform them of activation of payout.
World Food Programme (WFP)	Beneficiary can cash out at Seguros Futuro branches (3) or 135 points of service of FEDECACES (Federation of Savings and Credit Cooperative Associations of El Salvador).
Guatemala	
Banco de Desarrollo Rural (BANRURAL): Esfuerzo Seguro	Payment is deposited to beneficiary's account at BANRURAL (what is left after repaying outstanding loan balance). Beneficiaries can cash out at BANRURAL's <i>cajas rurales</i> and branches, ATMs (5B network). Payment is deposited to beneficiary's bank account. Crédito Hipotecario Nacional (CHN) generates an automatic, online token, which is sent by SMS to the mobile phone number registered for each beneficiary; the payout amount is included in the SMS.
Ministerio de Agricultura y Ganadería (MAGA)	Beneficiary can cash out at the nearest ATM (5B network) with identification card (DPI, Documento Personal de Identificación), and soon at CHN's branches (80 branches in the country out of 2,733 for the whole banking system) (SIB 2022). Withdrawal cost at ATM is Q 2.60 per transaction (US\$0.35); cost is covered by CHN (no cost for the beneficiary).
World Food Programme (WFP)	Payment is deposited to beneficiary's bank account Token linked to beneficiary's identification card (DPI) is sent by SMS. Payment is transferred directly to bank branches and beneficiary can cash out.

Source: Virtual and in-person meetings with BFA, Seguros Futuro, Aseguradora Rural, MAGA, WFP, and CHN.

A large-scale risk transfer/risk financing instrument requires a low-cost and timely digital payment system with the participation of public and private actors. Currently, the following mechanisms could be prioritized: (i) deposits to basic, simplified requirement accounts or virtual accounts for individual beneficiaries with an associated physical or virtual debit card or electronic wallet to facilitate withdrawal at ATMs or purchases at businesses with point of service (POS);¹¹⁰ (ii) deposits to aggregators' bank accounts (for example, *cajas rurales* in Honduras) for withdrawal and further distribution to members; (iii) token or QR code sent by SMS to individual beneficiaries

109 For Guatemala, approval of the law regulating electronic money will pave the way to regularize and supervise non-banking mobile transfer systems.

110 Banco de Guatemala would have to issue a regulation allowing supervised deposit-taking financial intermediaries to open, manage, and close basic or simplified requirement savings accounts as a means to promote financial inclusion.

or aggregators to be used to cash out the risk transfer compensation payout at a physical service point (financial service provider branch, ATM, bank/financial agent, service kiosk); (iv) physical or virtual prepaid cards allowing individual beneficiaries who do not own a bank account to withdraw funds from ATMs or purchase goods at businesses with POS; (v) use of the national identity document as card for purchases at businesses with POS or withdrawals from ATMs; and (vi) massive payment systems in Guatemala and Honduras in the style of Transfer365. For beneficiaries who have subscribed to a mobile money account, this option should be preferred for transferring the payouts in all three countries.

7.5.4. Family farmer insurance awareness and education

As with all financial services, insurance is sustainable only if clients have sufficient financial literacy and capability to judge which types of products would benefit them, understand how these products work and their potential downsides (such as basis risk), and are aware of their consumer rights and responsibilities (Schaefer and Waters 2016). Financial literacy and insurance education and training are therefore a vital component of any insurance program for family farmers—one that is especially important in the case of new index insurance programs using satellite imagery to trigger excess rain and drought payouts. In El Salvador and Guatemala, the World Food Programme and its partners are investing heavily in developing insurance training materials and programs for their client base. By themselves, insurance companies are often reluctant to invest the necessary resources in farmer communication, training methods, and media (awareness creation via radio, advertising, marketing and promotional print material, and farmer training programs, etc.).

One of the key lessons from the KLIP program in Kenya was that in the early years, insurers and government had insufficiently emphasized the importance of awareness, education, and training of pastoralists. As the evaluators noted: “When designing similar schemes in the future, it is critical to introduce smart subsidized coverage early in the rollout of the product, coupled with adequate budget provision to cover the costs of awareness creation and capacity development, using innovative techniques (such as e-learning and m-learning), workshops, and educational initiatives. This need for strengthening capacity at all levels is foundational and requires sufficient resources for such schemes to achieve sustainability” (Fava et al. 2021).

Investments in financial literacy and inclusion should be treated as a public good; and governments, insurance regulators, donors, development partners, and NGOs can all play a vital role in developing farmer insurance awareness and training materials and then in executing these programs. Chapter 8 presents estimates of the funding support required for farmer insurance education and training under this large-scale index insurance program for family farmers.

Experience also shows that in order to create trust in financial service providers, the risk transfer/risk financing instrument must be accompanied by targeted and permanent financial and digital literacy programs. The program design and development should consider the characteristics and needs of different segments of financial service consumers, and should respond to specific behaviors, biases, and vulnerabilities of each segment by means of an adapted communication and educational strategy.

7.5.5. Gender-informed product development and marketing

Amidst noticeable progress in efforts to extend insurance products to small producers and to rural areas, there are substantial gender gaps in the access to, use of, and demand for agricultural insurance. Products are generally designed without paying attention to gender differences; a notable exception is the work of BASIX, a large MFI in India, which provides weather insurance to women self-help groups in drought-prone areas (World Bank 2005). The extent to which women access insurance products is unclear (Quisumbing et al. 2014). A range of factors limit access,

such as gender norms limiting women's mobility and women's more limited access to information and land documentation (FAO 2023).

Women often weigh risk differently from men, and this difference has implications for choosing between insurance, savings, credit, and other financial and risk management instruments and services. Compared to their male counterparts, female farmers tend to have a lesser preference for insurance, particularly single-peril cover. One explanation for this may be that females face more, and more varied, risks than do men, and they therefore perceive a single-peril product as less useful to them (Delavallade et al. 2015).

Given different risks faced by women and the different burden of climate-related shocks for women, gender-targeted and gender-sensitive product development is crucial. Women should be consulted before and during the product-design process; instruments being developed should consider women's risk management needs; gender-sensitive marketing messages should be developed for insurance instruments; and the number of female agents marketing/selling insurance instruments should be increased. Other gender-sensitive approaches include considering the possibility that women farmers grow different crops from males and employ different nonfinancial risk management practices.

Evidence from IBLI programs shows mixed results regarding rates of uptake and level of cover among women. Jensen, Barrett, and Mude (2015) found no significant gender effect on demand. In Ethiopia, roughly 20% of purchasers are women, which corresponds to the proportion of households that are female-headed. Meanwhile, Takahashi et al. (2014) found that being female is associated with a greater likelihood of IBLI purchase, but a lower total insured herd value. However, studies suggest that the drivers of IBLI purchase are different for men than for women depending on levels of risk aversion and social insurance. Bageantg and Barret (2015) found that among women, high risk aversion is associated with a 36 percent increase in IBLI coverage, relative to equally risk averse men, yet moderate risk aversion is associated with a 41 percent decrease in IBLI coverage by women, as compared to equally risk averse men. Overall they found that controlling for assets, education and a host of other factors, simply being female increases the probability of IBLI purchase by 31-55 percent (Bageant and Barrett 2015).

Field research suggests that purpose-based marketing is essential to increase uptake by women farmers. For example, a study for the DRIVE project found "family insurance" (World Bank 2024) resonated far more with women than "livestock insurance" as a name for the product, which is understandable since the product is used to protect families from adopting negative coping strategies in times of drought (World Bank forthcoming). Indeed, in Kenya, a new type of drought insurance called "Family Insurance" has been introduced; it covers "family units" (rather than livestock units, as under IBLI) and has been sold by Takaful Africa, with payouts made to women through the SIM card-based banking system M-Pesa. According to the most recent insurance sales data, the Family Insurance approach led to a 20% increase in the number of families who bought insurance (Russell 2022). Arteaga et al (2023) study the effect of reframing a livestock insurance contract to directly addresses women's risk and to be sold in units that are commensurate with women's expenditure responsibilities amongst pastoralist communities in Kenya. Twenty-four percent of households purchased insurance under the reframed offer compared to only 13% offered insurance under the standard insurance offer.

Protecting women, their assets and those who depend on them will require a combination of smart subsidies and gender-intentional insurance contract design. An in-depth study to better understand the unique needs of women family farmers, as well as the most essential design features, most effective distribution and payment mechanisms for them, should be undertaken during the design phase of the proposed large-scale index insurance program.

7.5.6. Capacity building and training for local insurers, distribution channel and value chain actors, and government stakeholders

Capacity building and training should be provided to insurance companies that are recruited to underwrite the proposed large-scale disaster risk index insurance program, whether they are acting individually or as a coinsurance pool. This training should complement and build on the training already provided by the key stakeholders for the five index insurance programs already under implementation in El Salvador and Guatemala.

Under a large-scale index insurance program, the distribution channel actors and their staffs should be provided comprehensive capacity building and training in the targeting and registration of farmers, the operations of the index insurance product, the payout procedures, and so on. A budget should also be established for providing capacity building and training to these distributors (risk aggregators).

In addition, index insurance capacity building and training should be provided to public sector organizations in NCA that are involved in the program, including the Ministries of Agriculture and the extension services.

7.5.7. Role of the independent calculation agent

Currently in NCA countries, MiCRO is performing a very important role as the calculation agent: using its proprietary index insurance platform to download and process real-time satellite rainfall data, it calculates if the index triggers are hit, and if so the amount of the payouts due to the insured individuals. If a decision is taken in Phase II to appoint MiCRO to design and implement the large-scale modified macro-level program for family farmers, one option would be to contract MiCRO to also serve as the calculation agent in all three NCA countries. However, the role of calculation agent (which monitors the index during the contract period and is responsible for declaring triggered payouts) may be seen as posing a conflict of interest for MiCRO as the entity designing and rating the index insurance contract. In this case, stakeholders may wish to appoint a separate and independent calculation agent. This agent could usefully collaborate with the meteorological agencies in each country (Meteorology Department of the Ministry of Environment in El Salvador; INSIVUMEH in Guatemala; and the National Meteorological Agency [SNM] in Honduras) with the twin aims of providing capacity building and training to the agencies on contract design and monitoring, and also ensuring that an independent party monitors and reports on the index results to government.

Under any regional index-based disaster risk insurance initiative for family farmers in NCA countries, private and public stakeholders will need to appoint a third-party specialist entity to act as an independent calculation agent. The roles of the calculation agent include obtaining the required remote sensing/satellite data on a regular basis (e.g., ERA5 or CHIRPS) for all unit areas of insurance; processing and standardizing the data according to the excess rainfall and drought index insurance contract terms; determining insurance payouts in accordance with the index contract parameters; issuing monthly, end-of-season, and end-of-year reports to key stakeholders; and advising on backup satellite sources in the event the primary data source breaks down (Lung et al. 2021).

The tasks of the calculation agent are very important and must be conducted by an independent specialist entity to avoid potential conflicts of interest between the various stakeholders. It is recommended that the identification and selection of the calculation agent should be carried out by the ministry or ministries appointed to coordinate the program in each NCA country, in agreement with underwriting insurance companies, and also that insurance supervisors from the region be involved in this process to ensure compliance with insurance regulations. It is also likely that the lead reinsurer will want to approve the identified calculation agent.

7.5.8. Monitoring and evaluation systems/procedures and impact evaluation studies

Chapters 4 and 5 highlighted the importance of building an M&E capability in each of the NCA countries to monitor the effectiveness of the index insurance program, to evaluate impact on the people covered by insurance, and to assess how effective the insurance has been at rehabilitating their productive enterprise and in enhancing their resilience to climate shocks.

After each major climate event, monitoring should establish how the contract has performed in terms of payouts to affected beneficiaries and the extent of upside or downside basis risk. Impact studies should measure the effectiveness of insurance in reducing poverty and strengthening farmers' livelihoods.

Transparent monitoring of performance can be communicated to key stakeholders to ensure (i) informed purchase decisions regarding the product; and (ii) continuous improvement. This could be supported with a certification or quality assurance program, in conjunction with the respective insurance regulators. Given that index insurance contracts can be complex and their value difficult to observe ex ante, such a system can bring significant value.

The project designers should also include gender as a component in their M&E frameworks for the proposed index insurance program in NCA countries. Incorporating gender-specific analysis and reporting into the M&E system will be useful to measure the extent to which the index insurance program is attending to the climate risk transfer needs of women and benefiting them.

8

DRFI Solutions for NCA: Uptake Projections and Financial Considerations

Box 18. Key takeaways from Chapter 8

In order to reach up to 1.9 million family farmers, a large-scale disaster risk insurance program in NCA will require major long-term financial commitments from national governments and donors. Indicative uptake scenarios and fiscal costings have been modeled over a five-year period for (i) a low-uptake scenario, in which of 35% of total family farmers (0.66 million beneficiaries) are covered by Year 5; (ii) a medium-uptake scenario of 60% (1.14 million beneficiaries) by Year 5; and (iii) and a high-uptake scenario of 95% (1.80 million beneficiaries) by Year 5. The medium-uptake scenario is perhaps the most realistic level of coverage of family farmers that could be achieved in a five-year period.

Significant premium financing will be required to scale such DRFI solutions, and under the baseline assumptions used in the financial analysis in this chapter, it is assumed that governments and/or donors will finance 100% of the premiums for the family farmers over five years. Experiences within the subregion demonstrate that, without significant premium subsidies, a large-scale DRFI solution for family farmers is unlikely to achieve rapid scale-up and adoption; small farmers lack the financial ability to fund premiums. In Guatemala, a 100% premium subsidy funded by MAGA has enabled the rapid scaling and significant coverage of the Seguro Colectivo Paramétrico program.

Indicative medium-uptake and medium-pricing projections suggest the annual cost of premium financing could reach US\$114 million in Year 5 of full program implementation to protect about 1.14 million farmers and their families (equivalent to an average annual premium cost to government of US\$100 per beneficiary). The cost of premium subsidies over five years would amount to US\$360 million.

International experience shows that if agricultural insurance is to be sustainable in the long term, governments can also usefully invest in other areas, such as farmer insurance awareness and education programs. Under the financial costings presented in this chapter, it is assumed that government provides financial support to the insurers in three main areas: (i) targeting and registration of family farmers, (ii) farmer insurance awareness and

education, and (iii) opening of payment accounts for the family farmers (beneficiaries). In Year 5, the cost of this additional financial support is estimated at US\$5.1 million, or a total of US\$24.3 million over five years for the medium-uptake/medium-pricing scenario.

Under the medium-uptake/medium-pricing projections, the total cost over five years of government financial support for each NCA country would be about US\$70 million in El Salvador, US\$228 million in Guatemala, and US\$86 million in Honduras.

Ideally, over time, premium subsidies could be reduced somewhat, but it is unlikely that subsidies could be removed entirely, given the socioeconomic condition of the target beneficiaries. Under its micro-level programs in NCA countries, WFP is adopting a smart premium subsidy approach that starts with 100% premium subsidies in Year 1 and then gradually reduces the premium subsidies over time as farmers gain experience with and trust in the index insurance program. Using WFP's smart premium assumptions, whereby premium subsidies are reduced to 50% by Year 4, would reduce the overall costs of premium subsidies by about 20% over five years, or a cost savings of US\$70 million under the medium-uptake/medium-pricing scenario.

There are, however, significant implications of moving from a macro-level fully funded policy to a micro-level scheme, in which the family farmers are required to contribute toward the costs of their premiums, and these implications would need to be carefully considered. Under the modified macro-level approach, farmers do not pay premiums, do not have a direct insurance interest in the policy (as this is taken out by government), and are treated as beneficiaries. If farmers are required to pay toward their premiums they will need to be considered as insured policyholders, and the cover would revert to a micro-level scheme.

To meet the need for more substantial reinsurance capacity, the program implementers would need to work closely with reinsurance partners to analyze the risk and leverage available data and expertise from the private sector. Regulatory interventions like capital relief of parametric insurance solutions could be explored to help unlock additional risk capital.

To ensure a cost-effective, sustainable solution, the program would need to adopt a risk-layered approach, possibly including alternative risk finance for the high-frequency/low-severity risk layer as well as regional collaboration for risk pooling and other technical functions like index and product design and review.

This chapter presents some illustrative physical uptake scenarios and insurance financials, along with the indicative costs of government support to premium financing, start-up, and implementation, for a five-year project to support large-scale disaster risk index insurance for family farmers in NCA countries. The aim of this section is to provide the three NCA governments and development partners with guidance on the likely costs to introduce and implement this large-scale livelihoods protection program over a five-year period. This section also considers some of the financial implications of this potentially very large regional program for the insurance and reinsurance sectors, which will be invited to underwrite it.

8.1. Physical and financial uptake scenarios under a five-year project

8.1.1. Key assumptions used in budgeting exercise

The following assumptions and limitations apply:

1. Population of family farmers in NCA countries (target group) and uptake rates over five years

This report has noted the major difficulties in obtaining accurate, up-to-date estimates of the numbers of family farmers in each NCA country. It has noted as well the challenge posed by the varying definition of a family farmer across the three countries. However, with these drawbacks in mind, the uptake projections are based on the following best estimates of the number of family farmers, totaling 1.9 million (Table 29):

Table 29. Number of family farmers for index-based disaster risk insurance uptake scenarios

Item	El Salvador	Guatemala	Honduras	Total
Number of family farmers	345,000	1,125,000	425,000	1,895,000
Percent distribution	18.20%	59.40%	22.40%	100.00%

Source: World Bank based on total farmer numbers presented in Catholic Relief Services (2015).

Three uptake scenarios have been modeled: low uptake, where at Year 5 one-third (35%) of all family farmers are assumed to be beneficiaries of and protected by the large-scale index insurance cover; **medium uptake**, where slightly less than two-thirds (60%) of family farmers are covered by Year 5; and finally a **high-uptake** scenario, where 95% of all family farmers are covered by Year 5. The major differences in the three uptake scenarios relate to the priorities and degree of commitment of NCA governments, development partners, and private sector stakeholders for investing in the implementation of this program, and the levels of interest shown by family farmers in signing up for it.

It is stressed that it will take at least five years to scale up this large-scale insurance program and to reach full uptake/full implementation; this is because the program requires identifying, registering, and educating up to 1.9 million targeted beneficiaries, opening bank accounts for them, and (on the part of insurers) establishing underwriting systems and individual-farmer claims payments procedures and systems in the three NCA countries. The three take-up scenarios are presented bearing these challenges in mind over this five-year period.

2. Sum insured per beneficiary

Chapter 4 of this report showed the wide range in the average sums insured that are offered on the various small-farmer index insurance programs in NCA countries. They range from a low of just US\$104 per insured under the El Salvador *Emprende Seguro* program, to a high of US\$1,335 per insured under the *Aseguradora Rural/BANRURAL* crop credit insurance programs for semicommercial farmers; in between, at US\$780 per beneficiary, is the Guatemala *MAGA* program targeted at small-scale family farmers that aims to cover the costs of replanting staple crops in the two cropping seasons (see Section 4.4).

This budgeting exercise uses a fixed sum-insured value of US\$1,000 per beneficiary farm family per 12-month cover period across all three NCA countries, but this could equally be set higher or lower. This sum insured is well below the minimum salary levels for agricultural workers in the three countries (see Table 30), but as the aim of this program is to reach and protect the maximum number of beneficiaries, this is probably the maximum sum insured that is affordable for a catastrophe livelihoods protection insurance program.

Table 30. Minimum annual (12-month) salary in agriculture in NCA countries

Country	GDP/capita (US\$) (2021)	Agriculture minimum salary (US\$/month) (2023)	Agriculture minimum salary (US\$/year) (2023)
El Salvador	4,551	243	2,922
Guatemala	5,026	421	5,051
Honduras	2,773	330	3,960

Source: El Salvador: Ministry of Works and Social Security); Guatemala (Ministry of Works and Social Security); Honduras (Ministry of Labour and Social Security)

Note: GDP = gross domestic product; NCA = North Central America.

3. Index payout frequency and target commercial premium rates

The actual premium rates being charged by index insurers in NCA countries currently vary from an average low of 4.2% on the Aseguradora Rural Esfuerzo Seguro program linked to credit, to a maximum of 8.4% on the CHN MAGA program for family farmers: these premium rates would respectively allow a maximum payout of 100% of the sum insured in roughly 1 in 25 years and 1 in 12 years. A core principle of microinsurance for small-scale households is to balance the need to provide relatively frequent payouts to protect livelihoods and consumption against the need to maximize the efficiency of insurance by responding to only the more severe events. This study therefore maintains that under the proposed large-scale index insurance program, the coverage provided must be more comprehensive if it is actively to address issues of climate change, farmers' loss of livelihoods, and migration out of agriculture both internally and externally. For these reasons, the illustrative costings are modeled for target commercial premium rates of 5% (1-in-20-year total payout); 10% (1-in-10-year total payout); and finally 15% (1-in-6.7-year total payout).¹¹¹ Premium rates higher than 15% suggest that alternative DRFI mechanisms may be more cost-effective.¹¹²

4. Premium subsidy levels

Under this modified macro-level program, it is assumed that NCA governments and/or development partners will finance 100% of the premiums of the enrolled family farmers, at least during the five-year initial phase of the program, and as per the main costings presented below. However, in the next section, which considers the sustainability of premium financing and smart premium subsidies, estimates are presented for different levels of premium subsidies.

5. Other program support costs

Insurance companies will require government support toward the start-up and implementation costs in three key areas: (i) identification and electronic registration of the target family farmers (which is a one-off activity per farming household);¹¹³ (ii) insurance awareness and education (which is a continuous process with yearly training budgeted for); and (iii) the establishment of payment accounts, such as bank accounts, mobile money accounts, etc. (which is again a one-off cost for each enrolled household). The indicative costs of these tasks per farm household are presented in Table 31; however, these costings will require validation in the planning and design carried out during Phase II.

¹¹¹ It is stressed that these are purely illustrative commercial premium rates and are not presented as calculated premium rates. All pricing decisions will be made by insurers and their reinsurers in conjunction with the entities responsible for the funding of premium subsidies.

¹¹² Further analyses should be carried out in Phase II to assess the most efficient insurance return periods and alternative DRFI mechanisms.

¹¹³ Since migration is an issue in this region, it might be necessary to introduce a system of annual verification of active family farmers who are beneficiaries of the large-scale index-based disaster risk insurance program.

Table 31. Large-scale insurance program for family farmers in NCA: Key assumptions used in physical and financial uptake projections over five years

Key assumption	Year 1	Year 2	Year 3	Year 4	Year 5
1. Total Number of Family Farmers in NCA and beneficiary uptake rates by year (% of total farmers)	1,895,000	1,895,000	1,895,000	1,895,000	1,895,000
Low uptake rate	5%	10%	15%	25%	35%
Medium uptake rate	10%	30%	40%	50%	60%
High uptake rate	20%	40%	60%	80%	95%
2. Sum insured per beneficiary (US\$ per year)	1,000	1,000	1,000	1,000	1,000
3. Target commercial premium rates					
Low payouts (1 in 20 years total payout)	5%	5%	5%	5%	5%
Medium payouts (1 in 10 years total payout)	10%	10%	10%	10%	10%
High payouts (1 in 6.7 years total payout)	15%	15%	15%	15%	15%
4. Premium subsidy levels (% commercial premium)	100%	100%	100%	100%	100%
5. Other program support costs (subsidies)					
Electronic registration of beneficiaries (US\$/HH)	5	5	5	5	5
Opening of bank accounts for beneficiaries (US\$/HH)	10	10	10	10	10
Farmer awareness, education, training (US\$/HH/Year)	2	2	2	2	2

Source: World Bank.

Note: HH = household; NCA = North Central America.

8.1.2. Key results of the analysis

Table 32 shows the costs of premium subsidies at full-scale implementation in Year 5 for three uptake scenarios and three payout-frequency/commercial premium-rate scenarios for the three NCA countries. Table 33 shows the total costs of the program over five years.

The total costs of government premium subsidies and other support would grow to US\$118.8 million in Year 5 under the medium-uptake and medium-premium rate scenario: a total of 1.14 million family farmers across the three NCA countries would be enrolled under the program by Year 5 (full-scale implementation). With an average sum insured of US\$1,000 per beneficiary per year, the total sum insured would amount to US\$1.14 billion in Year 5. With an average premium rate of 10% across all countries, the cost of premiums would amount to US\$113.7 million in Year 5. The cost of premiums per benefiting family farmer would amount to US\$100 per year. Under the assumption of 100% premium financing, the costs of premium subsidies would amount to US\$113.7 million by Year 5; additional program support costs would amount to a further US\$5.1 million, increasing the total support costs including subsidies to US\$118.8 million in Year 5 of assumed full-scale implementation (Table 32).

The total costs of premium financing would mount to US\$360.1 million over the five years of the program under the medium-uptake and medium-premium rate scenario. With the addition of start-up and implementation costs, the total five-year cost of government support to this program would be about US\$384.3 million. If, however, the scenario with the lowest uptake (35% of all farmers) and lowest premium rate (5.0%) is considered, the total financing requirements of the program over five years would amount to only US\$98.6 million. At the other extreme, under the scenario with high uptake (95% of all farmers) and highest premium rate (15%), the total financing requirements of the program over five years would amount to a very significant US\$876.7 million (Table 33).

Table 32. Insurance program uptake and costs at Year 5

Target 5% premium rate: Maximum payout approximately 1 in 25 years

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$, millions)	663.3	1,137.00	1,800.30
Total premium (US\$, millions)	33.2	56.9	90
100% premium subsidies (US\$, millions)	33.2	56.9	90
Other program costs (US\$, millions)	4.2	5.1	7.9
Total support costs (US\$, millions)	37.3	62	97.9

Target 10% premium rate: Maximum payout approximately 1 in 12.5 years

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$, millions)	663.3	1,137.00	1,800.30
Total premium (US\$, millions)	66.3	113.7	180
100% premium subsidies (US\$, millions)	66.3	113.7	180
Other program costs (US\$, millions)	4.2	5.1	7.9
Total support costs (US\$, millions)	70.5	118.8	187.9

Target 15% premium rate: Maximum payout approximately 1 in 7.5 years

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$ million)	663.3	1,137.00	1,800.30
Total premium (US\$ million)	99.5	170.6	270
100% premium subsidies (US\$ million)	99.5	170.6	270
Other program costs (US\$ million)	4.2	5.1	7.9
Total support costs (US\$ million)	103.7	175.7	277.9

Source: World Bank analyses.

Note: Low uptake = 35% of farmers by Year 5; medium uptake = 60% of farmers by Year 5; high uptake = 95% of farmers by Year 5.

Table 33. Total insurance program costs over five years**Target 5% premium rate: Maximum payout approximately 1 in 25 years**

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$, millions)	1,705.50	3,600.50	5,590.30
Total premium (US\$, millions)	85.3	1,800.30	279.5
100% premium subsidies (US\$, millions)	85.3	180	279.5
Other program costs (US\$, millions)	13.4	24.3	38.2
Total support costs (US\$, millions)	98.6	204.3	317.7

Target 10% premium rate: Maximum payout approximately 1 in 12.5 years

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$, millions)	1,705.50	3,600.50	5,590.30
Total premium (US\$, millions)	170.6	360.1	559
100% premium subsidies (US\$, millions)	170.6	360.1	559
Other program costs (US\$, millions)	13.4	24.3	38.2
Total support costs (US\$, millions)	183.9	384.3	597.2

Target 15% premium rate: Maximum payout approximately 1 in 7.5 years

Scenario/item	Low uptake	Medium uptake	High uptake
No. beneficiaries per year by Year 5	663,250	1,137,000	1,800,250
Total sum insured (US\$, millions)	1,705.50	3,600.50	5,590.30
Total premium (US\$, millions)	255.8	540.1	838.5
100% premium subsidies (US\$, millions)	255.8	540.1	838.5
Other program costs (US\$, millions)	13.4	24.3	38.2
Total support costs (US\$, millions)	269.2	564.3	876.7

Source: World Bank analyses.

Note: Low uptake = 35% of farmers by Year 5; medium uptake = 60% of farmers by Year 5; high uptake = 95% of farmers by Year 5.

The costs of financing the program in each country over five years are illustrated in Table 34 for the medium-uptake scenario (60% uptake of all family farms by Year 5) and medium target commercial premium rate (10%). The analysis assumes that the uptake rates are the same for each country in Years 1 to 5; however, the uptake rates can be varied at the request for stakeholders, for example to reflect the fact that in Guatemala, over 150,000 farmers may already be insured by MAGA at the time the program is launched, while index insurance may not yet have been launched in Honduras. Given that Guatemala has by far the largest population of family farmers, it has the highest costs of premium subsidies and other program supports, at US\$228.1 million over five years; El Salvador has the smallest farming population, and its total financing requirements would be considerably lower, at US\$70.0 million. For all three NCA countries, the total financing requirements over five years amount to US\$384.3 million (Table 34).

Table 34. NCA country-level insurance uptake and costings over five years (medium-uptake scenario, 10% indicative commercial premium)

Item/year	Year 1	Year 2	Year 3	Year 4	Year 5	Total
El Salvador						
Uptake rate (percentage of farmers)	10%	30%	40%	50%	60%	
Number of insured farmers	34,500	103,500	138,000	172,500	207,000	655,500
Total sum insured (US\$ million)	34.5	103.5	138	172.5	207	655.5
Indicative commercial premium (US\$ million)	3.5	10.4	13.8	17.3	20.7	65.6
Costs of government support						
Premium financing (subsidies)	3.5	10.4	13.8	17.3	20.7	65.6
Other support costs (US\$ million)	0.6	1.2	0.8	0.9	0.9	4.4
Total costs government support (US\$ million)	4	11.6	14.6	18.1	21.6	70
Guatemala						
Uptake rate (percentage of farmers)	10%	30%	40%	50%	60%	
Number of insured farmers	112,500	337,500	450,000	562,500	675,000	2,137,500
Total sum insured (US\$ million)	112.5	337.5	450	562.5	675	2,137.50
Indicative commercial premium (US\$ million)	11.3	33.8	45	56.3	67.5	213.8
Costs of government support						
Premium financing (subsidies)	11.3	33.8	45	56.3	67.5	213.8
Other support costs (US\$ million)	1.9	4.1	2.6	2.8	3	14.4
Total costs government support (US\$ million)	13.2	37.8	47.6	59.1	70.5	228.2
Honduras						
Uptake rate (percentage of farmers)	10%	30%	40%	50%	60%	
Number of insured farmers	42,500	127,500	170,000	212,500	255,000	807,500
Total sum insured (US\$ million)	42.5	127.5	170	212.5	255	807.5
Indicative commercial premium (US\$ million)	4.3	12.8	17	21.3	25.5	80.8
Costs of government support						
Premium financing (subsidies)	4.3	12.8	17	21.3	25.5	80.8
Other support costs (US\$ million)	0.7	1.5	1	1.1	1.1	5.4
Total costs government support (US\$ million)	5	14.3	18	22.3	26.6	86.2
Total NCA countries						
Uptake rate (percentage of farmers)	10%	30%	40%	50%	60%	
Number of insured farmers	189,500	568,500	758,000	947,500	1,137,000	3,600,500
Total sum insured (US\$ million)	189.5	568.5	758	947.5	1,137.00	3,600.50
Indicative commercial premium (US\$ million)	19	56.9	75.8	94.8	113.7	360.1
Costs of government support						
Premium financing (subsidies)	19	56.9	75.8	94.8	113.7	360.1
Other support costs (US\$ million)	3.2	6.8	4.4	4.7	5.1	24.3
Total costs government support (US\$ million)	22.2	63.7	80.2	99.5	118.8	384.3

Source: World Bank analyses.

8.2. Premium financing considerations during and after the project

8.2.1. International experience with agricultural insurance premium subsidies

Governments around the world typically promote micro-level individual-farmer agricultural insurance by providing premium subsidies to make cover more affordable and accessible to farmers and especially resource-poor farmers. There is a lengthy history of public sector subsidized agricultural insurance dating back 100 years to the creation of the US Federal Crop Insurance Program, which is the largest subsidized agricultural insurance program in the world: it insures about 2 million US medium-size and large commercial farmers, who receive about US\$10 billion a year in premium subsidies. A 2008 World Bank survey showed that approximately two-thirds of countries with some form of agricultural insurance were supported by government premium subsidies, typically a 50% subsidy on the cost of the premium (Mahul and Stutley 2010).

A notable feature of agricultural insurance premium subsidy provision is that with very few exceptions, once governments have elected to finance premium subsidies, they do not withdraw or reduce premium subsidies over time; rather, the tendency is to increase them.

In the US, Congress elected to incentivize farmers to purchase crop insurance by increasing premium subsidy levels under the 1990 and 1994 reforms of the FCIP, and the premium levels and overall bill to taxpayers have increased year by year ever since: in 2015 the direct premium subsidies paid to farmers amounted to US\$6.01 billion, but by 2022 they had jumped to US\$11.63 billion, leading to concerns over the sustainability of these subsidy levels (NSAC 2023). Over the past decade, governments in developing countries, especially those in Asia, have tended to increase their premium subsidy levels to between 85% and 100%. Countries that have significantly increased premium subsidy levels include China and India, which have the second and third largest subsidized agricultural insurance programs in the world. Countries offering free or fully subsidized microinsurance for resource-poor farmers include the Philippines, Thailand, and Vietnam (GIZ 2022).

Since 2015, the global community has increasingly recognized the need to help developing countries access more resources for response to and recovery from natural disasters and climate shocks.

In 2015, G7 country governments launched the G7 Initiative on Climate Risk Insurance, also known as the InsuResilience Global Partnership, to increase access to direct or indirect insurance coverage against the impacts of climate for up to 400 million people in developing countries by 2020.¹¹⁴ In 2018, the World Bank launched the Global Risk Financing Facility to embed risk finance instruments in World Bank lending projects.¹¹⁵ At COP27 in 2022, in partnership with the Vulnerable Twenty Group (V20), the G7 launched the Global Shield against Climate Risks as a centralized mechanism to increase the impact of the global risk finance architecture for climate adaptation and resilience (V20 Finance Ministers 2022; InsuResilience Global Partnership 2022). One of the main aims of the Global Shield is to build domestic, regional, and international markets that deepen financial protection against climate-related losses and damage. In 2022, the World Bank launched the Global Shield Financing Facility (World Bank 2022b) to support and finance the Global Shield through technical advisory services, integrated financial packages, and strategic partnerships.¹¹⁶

As macro-level and modified macro-level index insurance programs for small-scale farmers have developed, they have been fully financing the premiums of the beneficiary farmers. For example, the former CADENA program in Mexico was fully financed by central and state governments in a ratio of about 85% to 15%; KLIP in Kenya was 100% financed by the GoK; and SIPE in Ethiopia has been fully financed by WFP and partners. For SIPE, WFP has been seeking gradually to reduce the levels of premium subsidies over time; the hope is that as beneficiaries build resilience and graduate to higher levels of income, they are able to afford drought risk insurance.

8.2.2. Contribution of family farmers toward premiums: Advantages and disadvantages

Guatemala demonstrates two different strategies for premium financing: the MAGA program envisages fully funding the insurance premiums of beneficiaries for the foreseeable future, while the WFP program aims under its smart premium subsidy strategy to gradually reduce premium subsidy levels. Starting in Year 2 (2022/23) of the Seguro Productivo program, nearly 20% of the insured people contributed 10% (Q 25, or US\$3.25) toward the costs of their premiums

114 G7 and non-G7 countries pledged US\$420 million to cover climate risk insurance for 180 million people.

115 The Global Risk Facility mobilized a total of US\$380 million between 2018 and 2022.

116 The other financing structures are the Global Shield Solutions Platform (<https://global-shield-solutions.org/>) and the CVF & V20 Multi donor fund (<https://www.v-20.org/fund>).

(WFP 2022d); the plan is to increase their contributions to 30% in 2023 and to as much as 60% in 2024/25 (WFP 2022a).

Using these WFP smart premium subsidy principles, an analysis was carried out assuming that each individual farmer faces the following premium subsidy regime:

- Year 1: 100% premium subsidy
- Year 2: 90% premium subsidy (at the first renewal the farmer pays 10% of premium)
- Year 3: 70% premium subsidy (at the second renewal the farmer pays 30% of premium)
- Year 4: 50% premium subsidy (at the third renewal the farmer pays 50% of premium)
- Year 5 and future: 50% premium subsidy (farmers pay 50% of their premium)

Under the WFP’s smart premium subsidy program, which reduces the amount of premium subsidy each time a farmer renews his or her cover, there would be significant costs savings in the premium subsidy budget. Table 35 shows that for the scenario with medium uptake and medium (10%) premium rate, the introduction of a smart premium subsidy regime would save US\$70 million, or 19% of the total costs of premium subsidies, over five years.

Table 35. Saving in cost of premium subsidies under smart premium subsidy regime (medium uptake projections and medium premium rate of 10%)

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Uptake projections (percentage of farmers)	10%	30%	40%	50%	60%	
Number of Insured family farmers	189,500	568,500	758,000	947,500	1,137,000	3,600,500
Total sum insured (US\$)	189,500,000	568,500,000	758,000,000	947,500,000	1,137,000,000	3,600,500,000
Indicative commercial premium rate/premium (US\$)	18,950,000	56,850,000	75,800,000	94,750,000	113,700,000	360,050,000
Premium subsidy level/ premium subsidy (US\$)	18,950,000	56,850,000	75,800,000	94,750,000	113,700,000	360,050,000
Smart premium subsidies declining from 100% in Year 1 to 50% by Year 4 per insured	18,950,000	54,955,000	66,325,000	72,010,000	77,695,000	289,935,000
Savings in premium subsidies		-1,895,000	-9,475,000	-22,740,000	-36,005,000	-70,115,000
Percentage saving in costs of premium subsidies		3%	13%	24%	32%	19%

Source: World Bank analyses.

There are, however, major potential drawbacks and challenges in moving from a fully funded risk transfer program to a partial premium subsidy regime in this large-scale index insurance program for family farmers. The following would need to be studied very carefully in Phase II of this project:

- Family farmers who are required to contribute toward the premium costs of their index insurance cover can no longer be treated as beneficiaries of the program; they are rather “insured” persons who should be issued with individual insurance policies and certificates of insurance in response to their payment of partial premium.
- It would be necessary to switch from a semiautomatic approach to beneficiary targeting and enrollment to a voluntary insurance approach, one entailing major investment in promotion and marketing of the cover to farmers and/or their groups and associations to get their agreement to pay increasing contributions toward their premiums over time.
- Through the partial payment of premium, the family farmer would now have a direct insurable interest in the insurance cover provided by the policy, and according to local insurance legislation this change might require increased levels of consumer protection and minimization of basis risk.
- There may potentially be major practical difficulties in collecting partial premium payments from each insured family farmer, who would need either to (i) have a deposit account with a bank, or (ii) be part of a formal credit program whereby the lender can collect the premium on behalf of the insurer.
- Issues of willingness to pay and affordability to pay a share of the premium costs may lead many farmers to drop out of the program.¹¹⁷
- It would be much more expensive for the insurance company to issue individual policies and to process and collect partial premium payments from upward of 2 million family farmers across the three NCA countries, as opposed to issuing a master policy to each government, which would pay its premiums in a lump sum.

Governments, development partners, and other stakeholders should draw up a clear policy on the provision of premium subsidies as part of the planning and design of the proposed program under Phase II. There appears to be a clear need under a modified macro-level program to offer all benefiting households fully funded or free insurance for an agreed number of years while they gain confidence in and experience with the insurance cover. However, public and private sector stakeholders will need to consider very carefully the long-term sustainability of 100% premium subsidies. They should also understand that while the WFP’s smart premium subsidy strategy is very valid under a relatively small voluntary program, it would be exceedingly difficult to implement in a large-scale program covering up to 1.9 million family farmers.

It must also be recognized that many of the family farmers in NCA countries are so poor that they will not be able to afford the premiums once the proposed project has been completed. This means that donors should be prepared to provide long-term premium subsidy support to reach the poorest people, whom NCA governments and NCA private sectors cannot support alone.

¹¹⁷ In this context, it is noted that under the Phase I feasibility study, time and budgetary constraints prevented any assessment of family farmers’ interest in and demand for this large-scale livelihoods disaster risk index insurance program, or of their ability and willingness to contribute over time to the costs of their premiums. Such farmer-level studies will be critical if this project passes to planning and design under Phase II.

8.3. Insurance and reinsurance considerations

8.3.1. Existing and future reinsurance capacity requirements

To date, one international reinsurer, Swiss Re, has reinsured all five of the MiCRO index insurance programs in El Salvador and Guatemala, and in most cases Swiss Re reinsures 100% of program liability (total sum insured). Swiss Re is the sole reinsurer of the two Seguros Futuro index insurance programs in El Salvador, and it is also the sole reinsurer of the two index insurance programs insured by Aseguradora Rural in Guatemala.¹¹⁸ Swiss Re's dominance in the market is attributed to its model, which entails building internal underwriting capacity and establishing on-the-ground teams to understand the risk rather than relying on brokers. The current capacity requirements of these programs is relatively low, with a maximum sum insured liability (TSI) of slightly greater than US\$9 million in 2022: to date Swiss Re has been willing for the index insurers to front the business and to cede 100% of their liability to the reinsurer on the basis of a proportional quota share treaty. However, for the MAGA index insurance program insured by CHN, which insured a much larger number of farmers (40,000 beneficiaries) than the other programs in 2022, the total liability is correspondingly higher at US\$31.2 million; and in this case, Swiss Re has shared the reinsurance program of CHN with another international reinsurer.

Under the proposed large-scale index insurance program for family farmers in NCA, total liability would be significantly higher than existing programs, and it would be necessary to seek reinsurance capacity from a much larger group of international reinsurers. Under the medium-uptake scenario, total liability would increase from about US\$190 million in Year 1 (or about eight times the size of the MAGA program in Guatemala), to US\$1.14 billion in Year 5 (Table 36). Given the accumulation of catastrophe drought risk across all three NCA countries and the very significant requirement for reinsurance capacity, it would be necessary to place this risk with a far bigger panel of specialist agricultural index reinsurers and following market reinsurers from Europe, Bermuda, and the United States.

Table 36. Index insurance scheme: Total annual sum insured per year under low-, medium-, and high-uptake scenarios (US\$, millions)

Item/year	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Low-uptake scenario	94.75	189.5	284.25	473.75	663.25	1,705.50
Medium-uptake scenario	189.5	568.5	758	947.5	1,137.00	3,600.50
High-uptake scenario	379	758	1,137.00	1,516.00	1,800.25	5,590.25

Source: World Bank analyses.

Detailed technical and operational analysis on risk layering and reinsurance placement would be needed prior to implementation. The program administrators would likely need to work closely with the reinsurance partners to conduct detailed risk assessment and evaluate risk layering options, including use of alternative forms of risk finance for the high-frequency/low-severity risk layers. The agreed reinsurance program could be placed either separately for each NCA country or pooled for all three countries; the latter option offers potential cost savings for the three countries. Overall, there could be cost savings from economies of scale for operational procedures and technical expertise, as well as from effective risk layering.

¹¹⁸ It is worth mentioning that G&T, the agriculture insurance market leader in Guatemala with an 80% market share, has a strategic alliance with Mexican specialist indemnity agriculture insurer ProAgro, which provides G&T with reinsurance for a large share of its business written in this class.

8.3.2. Risk layering and risk transfer

Due to the significant amount of risk from the proposed large-scale index insurance program, there is a need to consider the most economically viable options for sustainable risk financing, in particular risk retention through budgetary instruments and risk transfer through market-based instruments. To ensure efficiency and contribute to sustainability, the program would need to cover the moderate-risk layer with lower-cost capital, such as donor capital; or NCA governments could act as reinsurer of first resort. Market-based options range from domestic insurance (potentially under a coinsurance pool) to international reinsurance, accessed either directly, via a broker, or via a regional risk-pooling arrangement (either through a dedicated captive, or with CCRIF as a risk carrier, which could effectively bring in capital from donors, too). For higher-risk layers, risk transfer to the capital markets through catastrophe bonds or swaps could be considered. To crowd in international reinsurers and potentially lower costs further, governments could initially act as reinsurer of last resort. Governments could finance their liabilities using contingent credit to avoid high opportunity costs of reserving large volumes of funds; see the example of the Mongolia index program in Box 19.

Given the current hard reinsurance market outlook, alternative (nontraditional) risk transfer mechanisms should be considered. According to estimates by AON, global reinsurers' capital declined by 17%, or US\$115 billion, to US\$560 billion over the nine months to September 30, 2022. This decline in reinsurance capital has put strong pressure on capacity during the renewals, hardening the market, for agriculture risks. However reinsurer capital increased by five percent, or \$30 billion, in the first quarter of 2023, as earnings were strong and catastrophe bond markets rebounded. While capacity has not returned to 2022 mid-year levels, reinsurers are showing a willingness to deploy capital in target areas.¹¹⁹ On the other hand, the catastrophe bond market grew year-on-year; issuances outpaced maturities by US\$2.2 billion, or roughly 7%. Beyond setting up the necessary special purpose vehicle structure, the implicit challenge of transferring the agriculture risks arising from the proposed large-scale index product would be to develop a sizeable enough book and to structure the product to make it attractive for the international capital market. See Annex 3 for more information on alternative risk transfer options.

Box 19. Mongolia index-based livestock insurance program

In 2001, the Government of Mongolia (GoM) approached the World Bank for assistance in developing an improved risk management framework, including livestock insurance to proactively protect poor herders against the impact of severe winters (dzuds). The droughts and dzuds during 1999–2002 led to deaths of 11.2 million livestock animals, leaving 12,000 herder families with no livestock. The total direct loss to the country's economy was Tog 333 billion. With technical assistance from the World Bank, GoM established the Index-Based Livestock Insurance Project (IBLIP) to reduce the impact of livestock mortality on herders' livelihoods and provide the GoM with a mechanism to transfer part of its fiscal exposure to reinsurance markets. An index-based insurance program using mortality rates by species and soum (i.e., county) was recommended, and IBLIP was launched in 2005 and implemented through a PPP approach.

IBLIP used risk pooling to minimize the risk of insolvency among participating insurers, given the immaturity of the insurance industry, and risk layering to cost-effectively

119 AON. 2023 Reinsurance Market Dynamics. January 2023 available <https://www.aon.com/insights/reports/2023/reinsurance-market-dynamics> and June and July 2023. <https://www.aon.com/getmedia/5bd28313-9c37-461c-b665-69a910bf0a6a/20230628-midyear-rmd.pdf>

meet the costs of claims. Domestic insurers participated in a pool, and the GoM covered the catastrophic risk layer. The risk pool was managed by the World Bank Project Implementation Unit (PIU). Insurers collected premium from herders and deposited the premium (net of administration expenses) in a Livestock Index Insurance Pool. Government provided stop-loss reinsurance or catastrophe coverage (attaching at 105% of premiums for the first insurance season). Insurers deposited a contribution for the government catastrophe coverage (Figure 40).

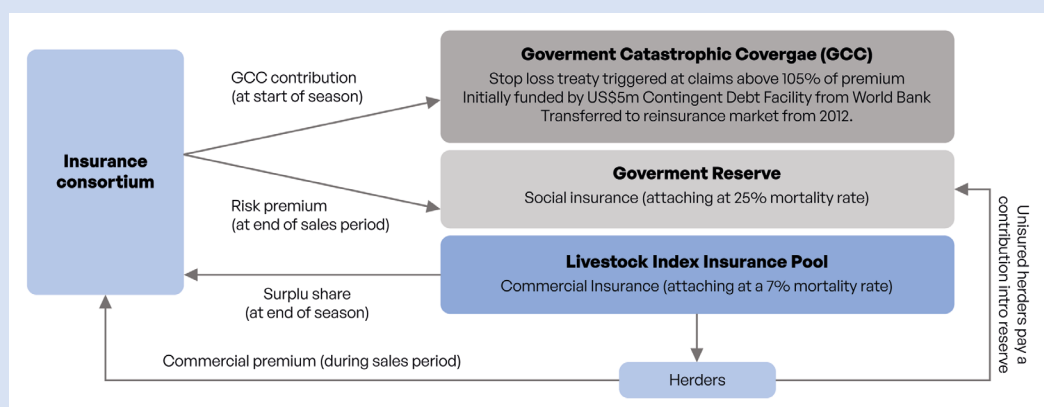
Insured herders received a payout if the sum mortality rate exceeded the preset threshold. Payments were made first from the Livestock Index Insurance Pool, and if this was exhausted, payments were made from the government reserve account. If funds were insufficient or claims exceeded 105% of the premium, then payments were made from the government catastrophe coverage, which was transferred to the reinsurance market in 2012. Initially, surplus from the Livestock Index Insurance Pool after claims settlement was distributed among the participating insurers.

Scale-up. The project was piloted in four areas between 2005 and 2009 and expanded to the remaining 21 areas over six years. Through project implementation between 2006 and 2015, a total of 93,804 households were protected by insurance cover for 16.5 million animals, with total insured value of Tog 251.25 billion (US\$87.9 million), total premiums of Tog 8.19 billion (US\$2.86 million), and claims of Tog 3.23 billion (US\$1.11 million).

Sustainability. International reinsurers were crowded into the market, the project transitioned into a program, and the PIU was converted to a national agricultural reinsurance company, which has since evolved into a multi-line reinsurer.

Enabling environment. A National Index Insurance Law was enacted in 2014. The capacity of the domestic insurance market and the National Statistics Office to conduct a national livestock census was strengthened.

Figure 40. Risk layering approach under IBLIP



Source: World Bank based on GoM 2016; Mahul and Skees 2006.

9

Conclusions and Recommendations

9.1. Traditional indemnity-based insurance is not a viable risk transfer solution for family farmers

The experience of nearly 20 years of traditional indemnity-based crop and livestock insurance in NCA countries shows that these products are not a viable solution for family farmers. Despite major investment by local insurers in Guatemala and Honduras and support from governments in the form of partial premium subsidies, traditional indemnity-based crop and livestock insurance have failed to achieve significant demand by medium and large farmers, and none of the programs has reached scale and financial sustainability to date (Chapter 4).

These products are not appropriate to implement with family farmers growing 1–2 ha of mainly subsistence food crops; the costs of field-based crop inspections and loss adjustment would be prohibitively costly on such small farm units.

9.2. Advances in satellite technology have permitted the introduction of index-based insurance solutions that are more suited to the risk transfer needs of small farmers

In Guatemala and El Salvador, MiCRO and its partners have achieved considerable success in introducing micro-level index-based disaster risk insurance products and programs designed for small-scale family farmers and microentrepreneurs. It is anticipated that Honduras will shortly start piloting similar products. The access to open source satellite imagery of increasing spatial granularity has enabled MiCRO to design a suite of micro-level index insurance covers that insure against excess rain, drought, and earthquake across NCA countries. MiCRO is constantly upgrading these products and programs as lessons are learned and experience is gained. International partners such as the World Food Programme are now working closely with MiCRO and local insurers in NCA to develop new index insurance products and programs (Chapter 4).

9.3. Most index insurance programs are in the pilot phase, and their effectiveness in stabilizing family farmers' consumption and incomes has not been evaluated

Most of the index-based disaster risk insurance programs have been operational for only one or two years, and it is too early to judge how effective these programs are in stabilizing the consumption and incomes of vulnerable family farmers in NCA countries. The one program that has had time to gain experience is the Esfuerzo Rural program in El Salvador, but this is targeted at semicommercial farmers with access to credit rather than vulnerable poor family farmers. The Esfuerzo Rural program has made frequent excess rain payouts over the past six years but has not yet been tested with a major regional drought event: the very small size of average payouts—US\$14—raises the question of how effective the program is at protecting loanee farmers' credit risk against severe excess rain and drought events (Chapter 4).

9.4. There has been little formal monitoring or evaluation of the payouts triggered under the existing programs, and issues surrounding basis risk have not been addressed or quantified

MiCRO has appropriately sought to develop business interruption cover rather than conventional crop WII products in the NCA countries (the reasons are set out in Section 4.4). However, to date, none of these micro-level individual-farmer index insurance programs has been evaluated for potential basis risk. The current spatial resolution of the ERA5 rainfall data used to trigger payouts may not be sufficiently accurate to pick up localized variations in the amount and intensity of rainfall, given the very varied mountainous and incised valley topography characteristic of NCA countries. A further issue is that excess rain is being used as a proxy for flooding that leads to interruption of the productive business, even though excess rain is not necessarily a good indicator of flooding in a particular location: excess rainfall often occurs in mountainous regions in the valley tracts of rivers, while riverine flooding occurs only downstream, in the floodplain areas where crops tend to be grown and where no excess rain event may have been triggered by the satellite (Lotsch, Dick, and Manuamorn 2010).

A World Bank analysis for MAGA in 2021 concluded that basis risk was a potential issue and that great caution should be exercised in offering ERA5 excess rain and drought index insurance cover under a micro-level individual-farmer MAGA program. The World Bank's concerns centered on the very low correlations between maize yields and the ERA5 excess rain and drought cover, and also on the lack of granularity of ERA5; in this instance, the World Bank suggested that MiCRO consider using CHIRPS satellite rainfall estimates because this data set is available at a higher spatial resolution. Because of the concerns over basis risk, the World Bank recommended that stakeholders consider a modified macro-level approach whereby government purchases insurance cover on behalf of targeted farmers (beneficiaries); this approach is able to absorb a much higher level of basis risk than one in which individual farmers purchase insurance. It is therefore very positive to note that MiCRO subsequently helped MAGA and CHN to design a modified macro-level approach (World Bank and MiCRO 2021).

9.5. A modified macro-level institutional and operating model shows promise

Four out of five of the index-based disaster risk insurance programs being implemented in El Salvador and Guatemala are micro-level programs. While there are many merits to micro-level voluntary insurance programs, they tend to suffer from two major drawbacks: (i) slow voluntary uptake and adoption, as it may take several years to gain farmers' trust and educate them in the benefits of purchasing an individual insurance policy; and (ii) very high operating overheads per insured, which often makes implementing these micro-level programs uneconomical.

A modified macro-level approach, such as that being adopted by the MAGA Seguro Colectivo Paramétrico, is an alternative to micro-level individual-farmer insurance that offers the potential for rapid scale-up and coverage of very large numbers of family farmers. This approach entails semiautomatic enrollment of farmers by the local agricultural extensionists located in every municipality in Guatemala. In Year 1 of full implementation, the program achieved coverage of 40,000 beneficiary farmers, and in Year two it scaled up to 100,000 farmers, or 9% of the family farm population of Guatemala. This report has highlighted the key features of a modified macro-level approach—summarized below—and recommends that it be adopted in all NCA countries.

- Government, usually through the Ministry of Agriculture, is the insured policyholder responsible for the payment of premium.
- Pre-identified and registered farmers are the named beneficiaries of the index insurance policy purchased by government. Beneficiaries are enrolled through a semiautomatic process, do not contribute toward the costs of insurance premiums, and are not insured policyholders.
- All beneficiaries should have a pre-identified bank account or alternative means of receiving payment (e.g., the redeemable token system that operates in El Salvador and Guatemala) whereby farmers can access and cash out their individual insurance payments.

This report concludes that the modified macro-level approach—promoted by the World Bank in South America and Kenya and by WFP in Ethiopia, and being adopted under the MAGA Seguro Colectivo Paramétrico program in Guatemala—should be explored further in Phase II of this study. This approach offers the potential rapidly to scale up and reach the majority of the 1.9 million family farmers in NCA countries over the next three to five years. This model merits special review and assessment, and it forms the basis of the recommended approach under this study (Chapter 5).

Under any form of PPP, the roles of the public and private partners should be clearly set out. The insurance sector takes the lead in insurance product design and rating, in risk selection and underwriting, and in claims settlement. The public sector can provide a suitable legal and regulatory framework, strengthen data and information, promote financial literacy and insurance awareness among farmers, and provide premium subsidy support (as detailed in Chapter 7). In this context, Guatemala’s MAGA has already taken major strides toward establishing a framework for implementing a large-scale index-based disaster risk insurance program for family farmers; it is suggested that further scale-up could be achieved if it were now actively to crowd in the private commercial insurance sector to coinsure the program with CHN’s insurance department.

9.6. Any new large-scale program for family farmers should be aligned with existing initiatives

In the insurance markets in the three NCA countries, the small-farmer index-based disaster risk insurance programs are at different stages of development, ranging from Honduras, where there are no index insurance programs under commercial implementation, to Guatemala with nearly a decade of index insurance research and development and three commercial programs that are being scaled up.

Any initiative to design a large-scale index-based disaster risk insurance program for the three NCA countries must respect the differences in the stages of insurance market development in each country, and especially the major differences in the status of index insurance market development for small-scale family farmers.

Local insurers and their partners are keen that any large-scale index-based disaster risk insurance solutions developed for NCA should build on and promote existing programs as they

scale up, rather than replace them. This is understandable given their heavy investment in these index insurance products and programs over time.

Any modified macro-level approach should therefore be carefully aligned with the existing micro-level programs already being implemented in El Salvador and Guatemala. Alignment should promote bank credit insurance programs as well as the group-based index insurance programs WFP is implementing with the most vulnerable sectors, including women farmers and microentrepreneurs.

The premium financing and premium subsidy guidelines that are established for a large-scale national index-based disaster risk insurance program should also be aligned with the premium subsidy regimes adopted for the existing programs wherever possible.

9.7. Insurance pooling represents an option to maximize private sector participation and capital

Given the small numbers of index insurers in each country that are willing to underwrite this class of business for small-scale farmers, and given the lack of local capacity to retain risk among individual companies, opportunities for crowding in the non-life insurance market under some form of coinsurance pooling arrangement should be explored further in each NCA country. In the context of this study, the insurance associations in both Guatemala and Honduras expressed their enthusiasm for some form of risk pooling by non-life private sector insurers in their respective countries; there are major potential economies of scale to be enjoyed under some form of pooling arrangement (Chapter 7). Regional cooperation could usefully assist in the design of the coinsurance pool agreements in each country.

9.8. Premium financing will be a crucial element of any large-scale program

Financial support in the form of premium subsidies and support for start-up and operating costs will be essential for the scalability and sustainability of this large-scale initiative for vulnerable family farmers in NCA. International experience shows that very few agricultural insurance programs in developing countries have scaled up unless governments, donors, or development partner assist with premium subsidies to make cover affordable to small-scale vulnerable farmers (Chapter 5; Chapter 7). Indeed, this study maintains that in the NCA countries, governments and donors should be committed to providing fully funded excess rain and drought index insurance to the 1.9 million target beneficiaries.

The indicative uptake projections and costings presented in Chapter 8 show that the cost of premiums could reach about US\$114 million in Year 5; this assumes a medium-uptake and medium-pricing scenario, whereby 1.4 million family farmers (60% of total family farmers; average premium rate 10%) are insured under the large-scale index insurance program by Year 5. In Year 5, the respective costs of premiums across the three NCA countries are estimated at US\$21 million in El Salvador, US\$67 million in Guatemala, and US\$25 million in Honduras. In addition, the budget includes a modest allowance for other program support costs, including one-off farmer digital enrollment/registration, opening of a bank account, and annual insurance awareness and education for the beneficiary farmers. Over five years, the total cost of the program—including premium subsidies and other support costs—would amount to about US\$385 million, with cumulative coverage of 3.6 million farmers. However, under the high-uptake scenario, in which 1.8 million family farmers (95% of all family farmers) are covered by Year 5, and the medium indicative premium rate, the costs of premiums would rise to about US\$180 million and the total costs over five years would amount to US\$597 million (see Annex 6 for full details). This report argues that the premiums of these farmers will need to be fully financed—in other words, 100% subsidized—for the foreseeable future.

These premium financing costs therefore represent a significant outlay for NCA governments, donors, and development partners during a five-year fully funded project. The hope is that this period of time will allow development of a medium- to long-term strategy for premium cofinancing by donors and governments, possibly one in which farmers over time also contribute a share toward the costs of their premiums.

9.9. Development of an effective insurance program must be supported by a package of interventions that go well beyond premium finance

Interventions such as farmer awareness and education, digital payment systems, and data infrastructure are fundamental to the success of insurance programs that support vulnerable households and farmers. NCA governments and donors must be willing to provide financial support to the local insurers, as the private sector alone cannot bear the full costs of these activities.

9.10. Resilience to climate and other shocks requires a broad package of financial services

A large-scale index-based disaster risk insurance program can be a critical component of resilience. Nevertheless, farmers need access to a range of services—such as bank accounts, payment systems, or (emergency) credit—to comprehensively manage their risks, smooth consumption, and access opportunities. Further, credit and insurance can be mutually supportive: insurance can unlock access to credit by de-risking borrowing, and credit can be bundled with insurance as a comprehensive package. Experience has shown that, where farmers in NCA gain access to credit, they are willing to pay for insurance that is reasonably priced at about 4% to 6% premium rates.

9.11. A number of options could strengthen index insurance contract design in NCA countries

Opportunities to improve the technical design of index-based disaster risk insurance products in NCA should be considered. For instance, the ERA5 rainfall data source used as an underlying index for the Seguro Colectivo Paramétrico under implementation by Guatemala's MAGA may lead to inconsistent observations. The ERA5 tends to underestimate or misrepresent rainfall values in regions with complex topography. The CHIRPS has been adopted in NCA, Mexico, and Paraguay for a series of applications; therefore, CHIRPS could potentially serve as an adequate alternative to ERA5 to assess weather risks, generate climatic perspectives, characterize rainfall patterns, design and implement drought monitors, determine agricultural areas under water stress conditions, and generally serve as a source of data for the operation of a macro-level index-based insurance instrument.

The adoption of a composite agricultural drought index and a reduced insurance cover period could be considered to improve the design of index-based disaster risk insurance in the region. Given the complexity of characterizing drought events and assessing and valuing this risk properly, Phase II of this study could validate the performance of a composite index whose deviation correlates with losses over an area due to the effects of drought and potentially excess rain. Phase II could also further explore limiting the insurance cover period to months when an insurance event is likely to hurt the rural economy. Seguro Colectivo Paramétrico has year-round coverage for excess rainfall, even though the Pacific Basin of Central America has a seasonal dry period (November to early May). In addition, as opposed to most of the agricultural productive areas in NCA, some areas have only one crop season, thus making it unnecessary for governments to pay premiums for 12-month coverage.

9.12. Transparent, coherent, and comprehensive targeting and registering of family farmers will be challenging but is key to any program's success

To implement a program for up to 1.9 million family farmers in the three NCA countries, a starting point must be to define which farmers constitute “family farmers” and will be the beneficiaries of this program, and then use existing registers where available to develop a unique farmer registry for insurance purposes in each country. This report has shown that Guatemala’s MAGA and its extension service are currently working with FAO to establish a new national farmer classification system and electronic register of all farmers in the country. Similarly, in El Salvador, MAG is establishing a national electronic register of farmers for the purposes of the subsidized crop inputs program, which was launched in 2023. In Honduras, ways of registering family farmers would need to be investigated further in Phase II of this study.

9.13. Distribution channels are critical to achieving scale on any index insurance program

To date, the index insurance programs in El Salvador and Guatemala are mainly adopting a micro-level voluntary distribution approach through development banks or farmer groups. The linkage or bundling of insurance and credit is a very effective and low-cost method for insurers to achieve scale in the sale of their index insurance products, as evidenced by the Produce Seguro (El Salvador) and Esfuerzo Seguro (Guatemala). The drawback of relying on banks to distribute index insurance in NCA countries is that very few of the targeted family farmers have access to formal credit; therefore, alternative/additional distribution channels will need to be identified to reach these farmers.

Evidence from WFP’s programs after two years is that the group-based marketing approach to producer associations seems to be working well, although uptake is relatively modest to date (Chapter 4; Chapter 5).

The proposed large-scale index-based disaster risk insurance program offers opportunities for implementation through a variety of nontraditional distributors (i.e., non-broker, sales agent, agent) and risk aggregators. More specifically:

- **In El Salvador,** there are opportunities to bundle insurance with the MAG subsidized inputs (seed and fertilizer) distribution program, as well as through financial institutions, including MFIs and farmer organizations.
- **In Guatemala,** scale-up could continue through MAGA agricultural extension officers in each municipality, as well as through financial institutions, including MFIs and farmer organizations.
- **Honduras** could carry out distribution through the national network or rural credit and savings institutions (cajas rurales) and could bundle insurance with credit provision through BANADESA; distribution is also possible through other financial institutions, including MFIs and farmer organizations (Chapter 7).

9.14. Cooperation between NCA countries on program design and implementation is possible and offers benefits, although some key elements will need a country-specific approach

There appears to be a major opportunity for regional technical cooperation among the NCA countries to introduce standardized index insurance technology and contracts, rating methods, wordings, etc. in the three countries. In addition, appointing a single remote sensing specialist and index insurance contract designer for the three NCA countries would lower costs.

Under this program, there are options to appoint a single regional calculation agent for the three NCA countries. This person or entity is responsible for the operation of the index during the contract period and for advising insurers and other key stakeholders if the index is triggered, leading to a payout. All remote sensing/satellite index insurance programs require the appointment of a calculation agent responsible for downloading and processing real-time satellite data. Currently, MiCRO is both the contract designer of all five weather index insurance programs in El Salvador and Guatemala and the appointed calculation agent. Alternative options should be considered in Phase II of this project.

Given concerns over basis risk in index insurance programs, a regional program of seasonal monitoring and evaluation could be designed and implemented to quantify the degree of basis risk and inform the development of measures to minimize basis risk. This program could also include the design of standard farmer impact studies over time using control samples in each country.

A large-scale index insurance program will require major reinsurance capacity as shown under the illustrative insurance uptake scenarios presented in Chapter 8. If the program is approved to move to planning and design in Phase II, it is recommended that international reinsurers be involved in the process of contract design and rating, that they assist in the structuring of the insurance and reinsurance programs in each country, and that they advise on options for some form of risk pooling at a reinsurance level across the three countries (Chapter 8).

In view of the very small number of international reinsurers that are willing to support index insurance for small farmers in NCA, Phase II of this project would do well to study ways of setting up some form of regional reinsurance facility. Chapter 8 set out some preliminary options and guidelines on reinsurance risk pooling among the three NCA countries.

9.15. Next steps

9.15.1. Short-term/2023—Phase I: Feasibility study and dissemination of study findings and recommendations

In October–November 2023, the Disaster Risk Insurance and Finance in Central America Consortium (DRIFCA) plans to hold a series of virtual workshops and seminars with public and private sector stakeholders in each NCA country in order to disseminate the findings and recommendations of the Phase I feasibility study. These meetings will share the key findings of the feasibility study and the options and recommendations coming out of this study, which center on the design and implementation of a modified macro-level climate risk index insurance program. As stressed in the conclusions and recommendations above, this initiative is designed to build on the existing market-based index insurance programs already being implemented in two of the countries and/or programs that are in the pipeline.

Subject to interest and approval by governments in one or more NCA countries and by development partners and the private sectors in each NCA country, this project would move to Phase II, planning and design of the large-scale modified macro-level index insurance program.

At this stage, interested NCA governments will need to decide whether to seek financial assistance from donors and development partners for a five-year funded project to develop and implement the proposed insurance program for family farmers.

9.15.2. Medium term/2024–2025—Phase II: Planning and design

As a starting point to Phase II preparation, it is recommended that each participating NCA country form both a steering committee and technical working group to plan and design the large-scale index insurance program. DRIFCA and other development partners could then formally link to these entities, whose composition and objectives are described below:

- The **steering committee** would comprise public and private sector stakeholders, including but not limited to the Ministry of Finance, Ministry of Agriculture, insurance superintendent, meteorological agency, private insurance association, and commercial banking sector. It would have a high level of responsibility and set a market-wide agricultural insurance policy, propose the legal and institutional framework, and define the role of the government's financial and other support to the private sector-led index insurance program.
- The **technical working group** would comprise public and private stakeholders. It would conduct and implement technical studies on insurance product design and rating and would design and put in place the necessary distributional and operating systems and procedures for the program.

The key design and planning tasks and activities in Phase II are summarized below and may take up to 12 months to prepare. The possible exception is Guatemala, where the MAGA Seguro Colectivo Paramétrico infrastructure is already in place and the proposed large-scale index insurance programs could be launched using this existing infrastructure.

- Prepare a five-year business plan and budget.
- Prepare an operating budget and secure funds for Phase II program planning and design.
- Establish government policy for agricultural insurance and confirm government support roles and sources of funding (e.g., premium subsidies, farmer registration, awareness creation and education, payment systems, etc.).
- Define roles and functions of PPP stakeholders and consider the need for legislation to back this initiative.
- To develop the institutional and operational framework, review options to form an agricultural insurance consortium or simple coinsurance agreement to underwrite and implement the program.
- Review and identify distribution channels and roles, as follows:
 - Undertake family farmer targeting and enrollment (registration), building wherever possible on existing farmer registry systems in each NCA country.
 - Review/design most cost-effective options for payment systems (opening of bank accounts versus tokens or mobile money).
 - Review most cost-effective options for farmer insurance awareness, education, and training programs.

- Undertake technical product design and rating. This may include additional technical studies, including assessment of risk versus poverty, livelihoods, and economic activity in the target regions and populations.
- Conduct farm-level studies in each NCA country to understand better the risk management strategies of family farmers, their risk transfer and insurance needs, and their willingness and ability to pay toward their insurance premiums; feed these findings into the design of the large-scale livelihoods disaster risk insurance program.
- Develop necessary operating systems and procedures.
 - Undertake farmer (beneficiary) registration.
 - Develop systems for enrolment and issuance of certificates of cover
 - Establish payment systems from insurer (pool) to each distributor/risk aggregator. and individual beneficiary account (or use of tokens).
 - Appoint the calculation agent.
 - Conduct monitoring and evaluation.
- Address financial, insurance, and reinsurance.
 - Assign government entity responsible for premium subsidy management and disbursements and other support funding.
 - Assess insurance and reinsurance planning.

9.15.3. Long term/2025–2029—Phase III: Launch cover and scale-up

The launch of the large-scale index insurance program may need to be staggered in each NCA country according to the current level of development of the small-farmer index insurance market; in any case, the rollout and buildup of the program will need to be gradual and to learn from experience over time. Given the need to develop farmer registries and payment systems in each NCA country, to provide insurance awareness and education to farmers, and to provide capacity building and training for delivery channels, the program should be launched with relatively fewer family farmers and then scaled up over the five years of the project. Chapter 8 provides indicative uptake scenarios over five years under assumptions of low, medium, and high uptake.

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Annexes

Annex 1. List of Stakeholders Consulted During the Preparation of the Study

Regional and Global

- United Nations World Food Programme (WFP)
- Partnership for Central America (PCA)
- United States Agency for International Development (USAID)
- German Agency for International Cooperation (GIZ)
- Caribbean Catastrophe Risk Insurance Facility (CCRIF)
- Inter-American Development Bank (IDB)
- Development Bank of Latin America (CAF)
- Central American Bank for Economic Integration (CABEI)
- Institute of International Finance
- Microinsurance Catastrophic Risk Organization (MiCRO)
- Blue Marble

Guatemala

- Ministry of Agriculture and Livestock (Ministerio de Agricultura, Ganadería y Alimentación; MAGA)
- Ministry of Public Finance (Ministerio de Finanzas Públicas; MINFIN)
- Superintendency of Banks (Superintendencia de Bancos; SIB)
- National Coordinator for Disaster Reduction (Coordinadora Nacional para la Reducción de Desastres, CONRED)
- General Secretariat for Planning and Programming (Secretaría de Planificación y Programación de la Presidencia; SEGEPLAN)
- National Institute for Seismology, Volcanology, Meteorology, and Hydrology (Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología, INSIVUMEH)
- Guatelvierte
- Banco Crédito Hipotecario Nacional (Banco CHN)
- Guatemala Insurance Association (Asociación Guatemalteca de Instituciones de Seguros, AGIS)
- Aseguradora Rural
- Seguros Columna
- Seguros G&T
- Fundación Genesis Empresarial

Honduras

- Ministry of Agriculture and Livestock (Secretaría de Agricultura y Ganadería; SAG)
- National Commission of Banking and Insurance (Comisión Nacional de Bancos y Seguros; CNBS)
- Central Bank of Honduras (Banco Central de Honduras; BCH)
- Permanent Contingency Commission (Comisión Permanente de Contingencias; COPECO)
- National Bank for Agricultural Development (Banco Nacional de Desarrollo Agrícola; Banadesa)
- Honduras Insurance Association (Cámara Hondureña de Aseguradores; CAHDA)
- Seguros ProAgro
- Seguros Atlantida
- Microfinance Network of Honduras (Red de Microfinancieras de Honduras; REDMICROH)
- National Federation of Farmers and Livestock Producers (Federación Nacional de Agricultores y Ganaderos de Honduras; FENAGH)

El Salvador

- Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería; MAG)
- Superintendency of the Financial System (Superintendencia del Sistema Financiero; SSF)
- Central Bank of El Salvador (Banco Central de Reserva; BCR)
- National System for Civil Protection, Disaster Prevention and Mitigation (Dirección General de Protección Civil, Prevención y Mitigación de Desastres)
- Ministry of Environment and Natural Resources (Ministerio de Ambiente y Recursos Naturales; MARN)
- Banco de Fomento Agropecuario (BFA)
- El Salvador Insurance Association (Asociación de Empresas de Seguros; ASES)
- Seguros Futuro
- Aseguradora Agrícola Comercial (ACSA)

Annex 2. Options for Forming a Coinsurance Pool in each NCA Country to Underwrite the Index-Based Disaster Risk Insurance Program for Family Farmers

Options include:

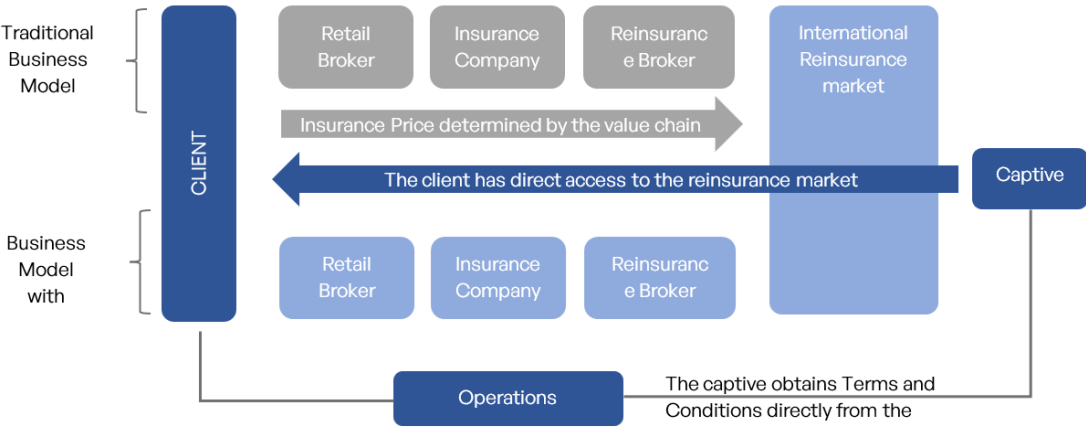
- 1) **A simple coinsurance agreement** between an interested group of insurance companies who elect one insurer to act as the **lead coinsurer**, usually because it has more experience and staffing and systems in underwriting the class of business. The lead coinsurer binds business on behalf of following coinsurers and issues policies to the insured client(s); it collects premium from the client and shares this with the coinsurers according to their pre-agreed share of the risk; arranges reinsurance on behalf of the coinsurers and manages claims adjusting while each coinsurer is responsible for settling their own share of the claims. The following coinsurers would agree to pay the lead coinsurer a management fee for its services out of the premium generated under the coinsurance book of business. The main function of the following coinsurers could be to promote and market the insurance cover to clients and they would earn a commission on each policy/risk that is bound under the coinsurance agreement. Such a coinsurance agreement would need to be approved by the Insurance Regulator and would probably be backed by a Memorandum of Understanding between the coinsurers. There are relatively few examples of such coinsurance agreements in agriculture in Latin America but one exception is a voluntary pool of several coinsurers in Medoza Argentina who coinsure hail in high value vinyards. The hail exposure is extremely high in Mendoza and no single company is willing or able to accept this risk exposure by itself: however with several insurers coming together and sharing the risk this makes the scheme viable.
- 2) **Formation of a Consortium and creation of a small underwriting unit/managing underwriter (MU) to insure the business and to settle claims on behalf of the consortium members.** Each Consortium member would contribute towards the fixed and variable costs of staffing, equipping and operating the MU. The best known example of such a program is the Spanish national subsidized AGROSEGURO scheme (*Agrupación Española de Entidades Aseguradoras de los Seguros Agrarios Combinados, S.A.*) The Spanish Combined Agrarian Insurance Scheme is underwritten by a pool of about 20 insurance companies – the coinsurers. At inception of the program in 1980, the PPP stakeholders formed AGROSEGURO which is a managing agent or managing underwriter which carries out all risk acceptance and underwriting and loss adjusting and claims settlement activities on behalf of the pool coinsurers. Over the past forty years AGROSEGURO has scaled up hugely and underwrites more than 450,000 crop, livestock, aquaculture and forestry producers in Spain and generates annual premium of about three quarters of a billion euros each year. **In NCA countries the initial needs of the MU would be to recruit a small team of agricultural insurance specialists** including an agricultural underwriter, an actuarial and rating specialist, a risk modelling and remote sensing specialist and data analysts to register farmers, process data and confirm claims payouts etc: as the programs grow and mature, the PPP stakeholders may opt for a larger MU presence.
- 3) **Formation and Incorporation of a new specialist Agricultural Insurance Pool Company which would comply with the minimum capital and other requirements for a new non-life insurer in each of the NCA countries.** TARSIM, Turkey is the best example of a pool program with a specialist agricultural insurance company which was formed in 2006: prior to the formation of the TARSIM Pool program, agricultural insurance in Turkey had been very fragmented and underwritten on a small scale by a handful of insurance companies; following the formation of TARSIM and agreement by government to fund 50% premium subsidies the program has grown hugely such that in 2018 it insured 1.8 million crop, livestock and aquaculture producers, with insured area of 2.5 million ha and generated premium of Euro 288 million. The long term loss ratio on the program is a respectable 65%. In NCA countries the minimum capital requirements to form a new non-life insurance company vary from a low in Guatemala of US\$1.14 million (Qz. 8.8 million); In El Salvador US\$ 1.45 million and finally in Honduras, US\$ 3.62 million (L 90 million) . Given these major capital requirements to incorporate a new insurance company, insurers may wish to adopt a much cheaper coinsurance agreement or to form a consortium while they gain experience before they decide whether or not to invest in a dedicated insurance pool company.

Annex 3. Alternative Risk Transfer Options

As an alternative to each country placing its own reinsurance requirements into the international reinsurance markets, the NCA stakeholders may wish to consider options for creating some form of captive reinsurer to pool their risk at the reinsurance level in order potentially to achieve some element of risk diversification as well as reducing the costs of reinsurance transactions on a larger pool of reinsurance premium. This section briefly describes the different form of insurance captive and then a possible captive reinsurance model for the NCA countries. Finally this section considers options for the formation of a Special Purpose Vehicle (SPV) to underwrite and transfer risk from the large-scale proposed index insurance program in the three NCA countries.

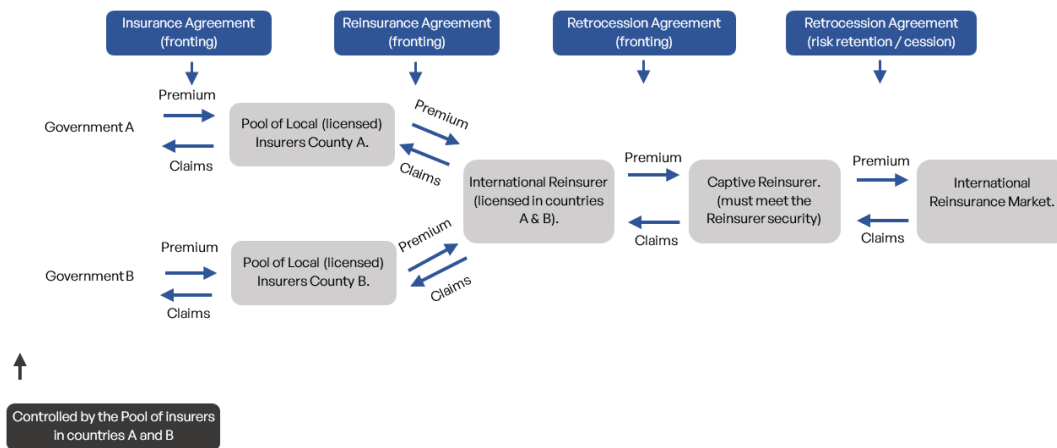
Captives are essentially a form of self-insurance whereby the insurer is owned wholly by the insured. They are typically established to meet the unique risk-management needs of the owners or members. Once established, the captive operates like any commercial insurance company and is subject to state regulatory requirements including reporting, capital, and reserve requirements. More than 70 jurisdictions have some form of captive regulation, being Bermuda and Cayman Islands the most important ones. Figure 72 provides a general description of the insurance business flows through using a captive company model compared with the traditional business model.

Figure 41. Traditional insurance business model compared with a captive insurance company



There are several forms of captives. The variety of captives provides options for each company’s needs and strategic plans. This diversity supports a company’s ability to finance its risk in a way that is conducive to its unique dynamics and structure. One captive of particular interest is the Group captives. Group captives are independently owned and operated insurance companies that provide insurance to, and are controlled by, their owners. A captive insurance company analyzes and underwrites the specific risks of its controllers and returns underwriting profits and investment income to them in the form of dividends. Unlike pure self-insurance, a captive allows companies to retain predictable losses while insuring catastrophic claims with other like-minded, safety-conscious businesses. Figure 73 schematically represents the risk transfer flow in the Captive model.

Figure 42. Group captive reinsurance model for NCA: Risk transfer scheme



The advantages of using group captives are multifold. One of the advantages of using a group captive is to make the risk placement process more efficient. This is because the original insurers, through their own captive company, have direct access to the reinsurance market and can get more influence on the risk pricing. Aside from granting direct access to the reinsurance market, the group captives enable the original insurers to pool risks enhancing the benefits of risk diversification and enabling them to perform an efficient risk layering and risk financing strategy. Finally, the engagement of an insurance company in a group captive allows it to, jointly with other participants, to build a sizeable portfolio that would increase their power of negotiation in front of the market.

Conforming Group captives might be a challenging process. Aside from the building trust and to align interests among the potential participants of the group captive, developing such structures would imply the insurers participating in the initiative to undergo complex due diligence processes which would involve the preparation of a business plan, signing confidentiality agreements, surrender of financial statements and other key financial reporting, to perform a feasibility analysis, make agreements with third parties (such as with the eventual fronters of the business), to meet regulatory and legal compliance.

The startup of a Group captive structure can be costly and time demanding. The captive startup cost varies according to the complexity of the structure to be set up and the negotiations of the fronting fees for the participants in the scheme, or in order of 10% to 15% of the captive gross written premium. On top of the cost issue, it should be considered that the startup process could take from 6 months to one year depending on the regulatory requirements.

Careful analysis of the tradeoffs of setting up Group captive for transferring the risk arising out from the DRFI mechanism for family farmers in El Salvador, Guatemala, Honduras is recommended. In this regards the benefits of pooling risks and the increase of power of negotiation that would be implicit in setting up the captive structure should be carefully assessed and benchmarked with the complexity and costs associated with the development of a group captive structure.

Special Purpose Vehicle (SPV)

The SPV is a special form of captive. An SPV is a licensed captive and designated as an SPV insurance company by the regulator. A SPV is a separate legal entity from its (their) parent (s) company (ies). The SPV is a distinct company with its own assets and liabilities, as well as its own legal status. SPVs can take several forms. Special purpose financial captives are limited to issuing only special purpose financial captive insurer contracts to provide reinsurance protection to the cedant/parent.

Special purpose reinsurance vehicles facilitate the securitization of one or more ceding insurers' risks as a means of accessing alternative sources of capital and achieving the benefits of securitization. These structures represent several benefits for reinsurers. An SPV allows the

reinsurer to raise funds in the capital markets for specific risks (e.g., catastrophe risk) at a cost to the reinsurer that might be cheaper than purchasing traditional reinsurance or through raising equity. An additional benefit of using an SPV is that it allows the issuing entity to reinsure the risk offer for a longer-term period than a normal 1-year reinsurance policy. First, as the SPV allows capital markets investors exposure to reinsurance risk without having to take on the solvency and credit risk of the main reinsurer, these instruments offer the reinsurers some regulatory capital relief which are key when dealing with catastrophic perils.

Likewise, it was already mentioned for Captives, in any potential reinsurance structure the captive controllers and board members will need to do their due diligence, especially with the use of an SPV. They will need to understand the underlying contractual language between the SPV and the investors and whether the SPV structure provides as good or better protection to the captive than a normal reinsurance contract. Another point to consider with the SPVs is that after some point in time, if a controller/ parent company wishes to take back its assets from the special purpose vehicle, then the controller/ parent company must bear huge transaction costs.

Alternative risk transfer mechanisms, such as catastrophe bonds issued through SPV, under the current market context could be an interesting option to traditional risk transfer. According to estimates made by AON corporation, the global reinsurers' capital declined by 17 percent, or \$115 billion, to \$560 billion over the nine months to September 30, 2022. This has put strong pressure during the renewals, hardening the market, for agriculture risks. On the other hand, the cat bond market grew year-on-year; issuances outpaced maturities by \$2.2 billion, or roughly 7 percent. The implicit challenge of transferring the agriculture risks arising from an eventual DRFI product for family farmers in El Salvador, Guatemala, Honduras would be, aside of setting up the SPV structure, to develop a sizeable enough book and to structure the product to make it attractive for the international capital market.

By way of conclusion, in Phase II of this project it is recommended that a special study be implemented to examine the potential benefits and costs of establishing some form of captive reinsurer to enable the three countries and their insurers to pool risk from the large-scale index insurance program for family farmers.