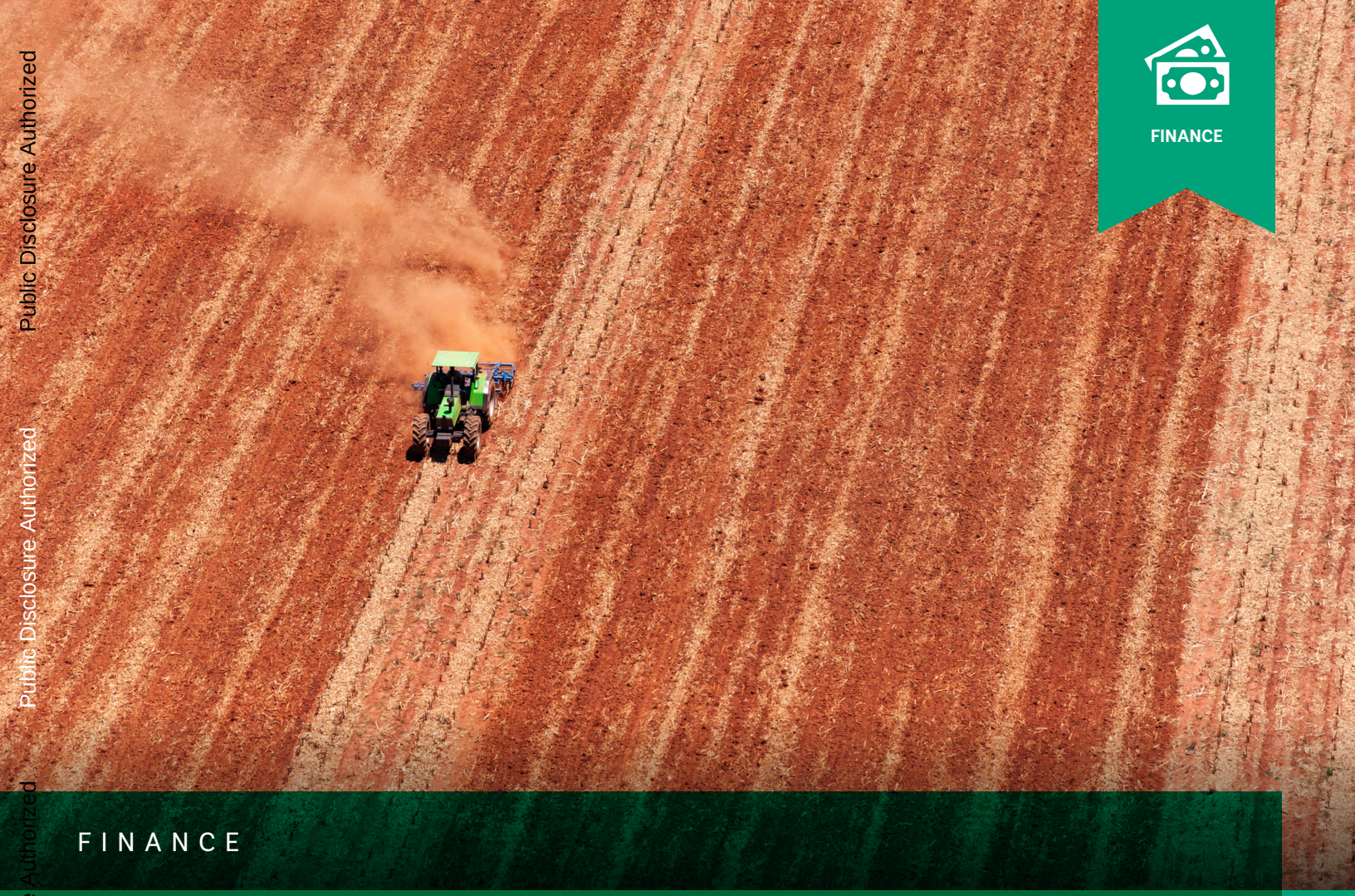

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Namibia Agriculture Disaster Risk Finance and Insurance Diagnostic

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Contents

Contents

Boxes

Figures

Figures

Tables

Acronymns

AMTA	Agro-Marketing and Trade Agency
ARC	African Risk Capacity
AYII	area yield index insurance
BoN	Bank of Namibia
DBN	Development Bank of Namibia
DRF	disaster risk finance
EIF	Environmental Investment Fund of Namibia
GRN	Government of the Republic of Namibia
M&E	monitoring and evaluation
MAWLR	Ministry of Agriculture, Water, and Land Reform
MoF	Ministry of Finance
MPCI	multiple-peril crop insurance
NAB	Namibia Agronomic Board
NAIP	national agriculture insurance program
NAM-FISA	Namibia Financial Institutions Supervisory Authority
NamibRe	Namibia National Reinsurance Corporation
NASRIA	Namibia Special Risks Insurance Association
NPCI	named-peril crop insurance
NPL	nonperforming loan
OPM	Office of the Prime Minister
PPP	public-private partnership
TWG	Technical Working Group
VCF	Veterinary Cordon Fence
WII	weather index insurance

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This report could not have been prepared without the contributions of several institutions in Namibia, including the Ministry of Finance; Ministry of Agriculture, Water, and Land Reform; Office of the Prime Minister; and Namibia Financial Institutions Supervisory Authority (NAMFISA). The Namibia Agronomic Board, Agricultural Bank of Namibia, and Namibia Meteorological Service shared data that informed the preparation of the report, and the report benefitted from extensive consultations with the insurance industry and from insights shared by all entities that were met as part of the diagnostic mission (see annex A for full list) and further consultations.

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Foreword

Namibia is highly vulnerable to climate shocks, particularly drought. These shocks have had a devastating effect on agriculture and infrastructure, and the frequency and intensity of these shocks have also been increasing. National states of disaster were declared in six of the last 20 years. Further, climate change is expected to further exacerbate Namibia's vulnerability to climate shocks. Thus, there is an urgent need for Namibia to assess our readiness to responding to this challenge. It is in this context that I requested the World Bank to undertake a diagnostic to inform the design and implementation of an index-based agriculture insurance program targeting small-scale farmers.

I would like to thank the World Bank management for accepting our request and the task-team that undertook the diagnostic for a thorough assessment and insightful recommendations. I welcome the expansion of the scope of the diagnostic to include a disaster risk finance assessment for the agriculture sector and the recommendations the report makes for Namibia to consider developing an national disaster risk finance policy and take actions to increase access to financial services for smallholder farmers. I also welcome the report's recommendation to support agriculture insurance within the framework of a national program structured as a public-private partnership.

I would also like to thank Namibia Financial Institutions Supervisory Authority for taking the lead in working with the World Bank on this initiative, the members of the Technical Committee for their contributions, and the wide range of public and private sector stakeholders who have contributed to the preparation of this report.

The Ministry of Finance looks forward to working with the Ministry of Agriculture, Water, and Land Reform, the Office of the Prime Minister, the Namibia Financial Institutions Supervisory Authority, and other public and private sector stakeholders in translating the recommendations in this report to policies and programs that can help Namibia more effectively respond to the challenge at hand.

Iipumbu Shiimi
Minister of Finance & Public Enterprises

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Executive Summary

Introduction and Country Context

This diagnostic report was prepared in response to a technical assistance request from the Government of the Republic of Namibia (GRN) to support the design and implementation of an index-based agriculture insurance program targeting small-scale farmers. Based on initial consultations with the Namibia Financial Institutions Supervisory Authority (NAMFISA), the nonbank financial regulator and lead counterpart, it was agreed to expand the scope of the diagnostic to include disaster risk finance (DRF), with a focus on the agriculture sector. There is increasing consensus that agriculture insurance programs, particularly those that aim to protect smallholders, are best designed within a broader framework of DRF since only smallholder farmers linked to the market can be reached effectively through micro-level or retail agriculture insurance programs, while subsistence farmers would need to be protected using macro-level instruments or other DRF mechanisms.

The diagnostic was undertaken in close coordination with key public and private sector stakeholders. Key public sector stakeholders consulted included the Ministry of Finance (MoF); Ministry of Agriculture, Water, and Land Reform (MAWLR); Office of the Prime Minister (OPM); NAMFISA; Development Bank of Namibia (DBN); Agricultural Bank of Namibia; Namibia Agronomic Board, Environmental Investment Fund, National Climate Change Commission, University of Namibia and Namibia Meteorological Service. Key private sector stakeholders consulted included Red Cross Namibia, select banks and insurance companies and farmers organizations.

Agriculture plays a major role in the Namibian economy. The agriculture sector provides direct and indirect livelihood to over 70 percent of Namibia's population. However, most farming activities are dependent on climate-sensitive subsectors, such as crop production and livestock farming. In 2021, the sector accounts for about 8 percent of GDP and employs about 23 percent of the workforce. The livestock and crop industry dominates the agriculture sector, accounting for 60 percent of agricultural GDP.

The agriculture sector is dualistic; a large number of smallholder and subsistence farmers coexist with a relatively small number of medium- to large-scale commercial producers. The smallholder and subsistence farmers mostly operate on nontitle deed land held under a communal tenure system, and traditional methods of production are still predominant. The

farming systems for these types of farmers are often mixed systems that include small fields of crops, vegetables, and livestock for domestic consumption. The commercial sector is dominated by commercial cattle and small stock (mainly sheep and goats) farming.

Namibia has a well-developed financial system, but smallholder farmers have limited access to finance. Namibia's domestic credit to the private sector, at nearly 70 percent in 2021, is significantly higher than the average for Sub-Saharan Africa (37 percent). Commercial banks are the largest financiers of the agriculture sector, at N$5.8 billion in 2021, amounting to 5.5 percent of their loan portfolio. However, most of this credit is estimated to go to the large commercial agriculture sector and agribusinesses. It is also estimated that most of the lending of AgriBank, the state-owned agricultural bank, which stood at N$2.9 billion in 2021, goes to the commercial agriculture sector. Further, AgriBank's financial performance remains concerning; over a quarter of its loans were of nonperforming status in 2021.

That said, the increasing participation of smallholder farmers in the formal financial system presents an opportunity to increase access to financing for this segment. The World Bank's Findex data shows that between 2014 and 2021, the percentage of individuals receiving payment for sale of agriculture commodities through the financial institution increased from 12 percent to 54 percent, and the share of recipients who only used cash decreased from 71 percent to 23 percent.

Disaster Risk Finance: An Overview and Status in Namibia

DRF involves prearranging financial resources to ensure predictable and timely access to funding for disaster response and early recovery, which is critical for fostering resilient development. DRF aims to improve the effectiveness, and reduce the cost of disaster response by planning ahead where funds come from and how they will be implemented. This financial protection helps affected governments, businesses, farmers, households, and the most poor and vulnerable to cope with, and recover quickly from the impact of shocks, thereby increasing their financial resilience. A record number of countries across Sub-Saharan Africa are developing DRF strategies because of the increasing appreciation of the role of the government in providing and enabling financial protection for strategic assets and populations.

The current approach to DRF in Namibia relies fully on risk retention, without use of risk transfer instruments. This approach offers low financial protection and results in a critical funding gap for moderate to severe shocks. The National Disaster Fund is the main instrument used for the financial protection of farmers, while the food reserve is used to protect food-insecure households. The absence of risk-transfer instruments and a significant reliance on contingency financing from the budget means development plans across multiple sectors are at risk of being compromised when faced with disasters.

Further, fragmentation of instruments creates cost inefficiencies, and major constraints in operational capacity result in costly delays. Managing multiple funds for the same layer of risk duplicates costs and functions. Heavy use of in-kind support exacerbates the situation by creating high costs of logistics. The claims settlement process from the National Disaster Fund is manual, paper-based, and cumbersome. The emergency management units in MAWLR and OPM are severely capacity constrained and possess little to no surge capacity during times of shocks. Overall, it may take longer than two months for beneficiaries of the livestock marketing and fodders incentive programs to receive reimbursement.

Due to the absence of a comprehensive financial protection program, the agriculture sector faces a significant financial-protection gap. This diagnostic estimates the gap at about 95 percent. Between 2013 and 2019, GRN's drought relief and recovery programs are estimated to have covered only 5 percent of total losses in the crop and livestock sectors. Given the impact of climate change and limited alternative coping mechanisms, there is a compelling need for the development of robust financial-protection mechanisms for both commercial and communal farmers.

Scaling Up Agriculture Insurance for Smallholders in Namibia

Agriculture insurance is an important risk transfer instrument to manage climate and other production risks in agriculture. When delivered as part of a comprehensive risk management approach, insurance can improve economic welfare through incentivizing better risk management behavior and investments in higher yield production and smoothing of consumption.

Index-based insurance is the recommended approach for Namibian agriculture. Index insurance is designed to pay out with reference to an indicator that is intended to be a "proxy" for loss. In a smallholder context, index insurance tends to have many advantages over indemnity products, but it also has some drawbacks. The main shortcoming of index-based products is basis risk, which is the mismatch between the loss experienced by the farmer and the payout triggered by the insurance policy. Assessing the likelihood of basis risk events and defining how the consequences of such events will be handled are key prerequisites for determining whether and how a proposed index insurance product should be implemented.

Index-based agricultural insurance can be implemented at "micro," "meso," and "macro" levels. At the micro level, the insurance policyholders are farmers, while at the meso level, the policyholders are service providers, such as financial service providers, farmers associations, and input suppliers, who are indirectly exposed to agricultural risks through the farmers they serve. At the macro level, insurance is sold to governments or relief agencies in development and disaster management.

As for any other insurance product, high-quality data is a key element for the design and implementation of index-based agricultural insurance. Area Yield Index Insurance (AYII) requires the availability of appropriate time series of regional yield data and the possibility of implementing appropriate data collection procedures—usually based on in-field crop cuttings—while Weather Index Insurance (WII) requires time series of weather data of suitable quality and a network of weather stations located in the appropriate sites. Weather and atmospheric data collected through remote sensing devices (that is, satellites, aircrafts, and drones) is also increasingly being used in agricultural insurance.

Public sector support is critical for the initial market development and for scaling up access and usage. Initial support for market development includes setting up institutional structures that allow the public and private sector to collaborate effectively, providing financing for start-up costs, including product development and initial rollout, and providing premium subsidies for scaling up access and usage. Governments may also need to make agricultural insurance a condition to access other publicly funded services, such as agriculture credit by public sector banks, input subsidies, or disaster support.

In Namibia there is currently limited access to both indemnity and index-based agriculture insurance. Insurance is available only to commercial farmers and mainly for liability covers and for protecting assets (buildings, vehicles, and so on). However, interest in agricultural risk management is growing, and a range of insurance and other risk transfer options have been tested recently or are being considered. NamibRe, the state-owned national reinsurer, is developing a sovereign drought insurance solution. The Namibia Special Risks Insurance Association (NASRIA) is developing a micro-level livestock index solution based on rainfall measured by weather stations for drought and flood, and Hollard, a commercial insurer, has tested a livestock index cover against drought based on a vegetation index.

Recommendations

The diagnostic makes six recommendations to strengthen DRF in Namibia and support the introduction and scaling up of agriculture insurance for smallholder farmers. These recommendations are summarized below:

1. **Develop and adopt a risk-layered approach to DRF:** As a first step to developing a risk-layered approach to DRF, an in-depth review of existing risk finance instruments and operational procedures should be undertaken. This

will allow GRN to effectively harmonize, streamline, and strengthen the risk-financing instruments and claims settlement operational procedures in Namibia and thereby enhance their efficacy in providing financial support to vulnerable households when faced with disasters. GRN should also conduct a robust fiscal gap analysis to estimate the financing gap that the government is exposed to in financing disaster response. Lastly, GRN should consider developing a national DRF policy to provide policy coherence for its various DRF programs, including the National Agricultural Insurance Program (NAIP) recommended by this diagnostic. A national DRF policy can set out GRN's strategic priorities for financing disaster response. The policy would ideally highlight the segments of society whose support the government would prioritize in the event of future shocks; the current (and potentially new) financing instruments upon which it intends to draw to support these households; and the delivery mechanisms through which it intends to disburse funds.

2. **Support the expansion of access to financial services for smallholder farmers:** Access to a broad range of financial services is critical to help households optimally manage risks they are able to retain. Further, agriculture insurance often needs to be bundled with agriculture credit for it to be delivered at scale. Notwithstanding the increasing participation of smallholder farmers in the formal financial system through their use of accounts to receive payments, their access to agriculture credit remains extremely limited. The 2021 Country Private Sector Diagnostic makes several recommendations to help improve access to finance for smallholder farmers. These include establishing a window for agribusiness under the credit guarantee scheme managed by DBN, strengthening the availability of reliable data on smallholder farmers, and supporting the entry of fintech/agtech players to provide new financial products.

3. **Use differentiated approaches to protect smallholders and subsistence farmers:** Agricultural index insurance programs should focus on smallholder farmers who are linked to the market. The size of this group that can be feasibly reached would depend on available or potential channels for distributing the products developed. Such channels typically include agriculture finance providers and agriculture input dealers. The number of farmers that a program can reach would also depend on the farmer group segments targeted. Subsistence farmers should be protected using other DRF mechanisms—such as the National Disaster Fund—and potential macro-level insurance programs. The National Disaster Fund, the primary instrument currently being used to support subsistence farmers, could be strengthened by introducing a risk-based assessment in the annual budgeting process and obtaining macro-level insurance or catastrophe protection, to increase the level of protection offered to individual farmers and ensure sustainability of the fund. Further, the payouts from a macro-level insurance program could be integrated into the disaster relief activities of the government and distributed to the beneficiaries through already existing channels.

4. **Support the development of index insurance products for livestock and crops:** Index insurance products are recommended for Namibia to cover both livestock and crop-production risks. Products to be developed and tested include WII covers based on vegetation, soil-moisture, and evapotranspiration indices measured via remote sensing, and AYII based on ground measurements of yield. The initial crops to be targeted by index insurance products could be pearl millet and maize.

5. **Establish a national agricultural insurance program (NAIP):** Support for the development of agriculture insurance is best delivered within the framework of a comprehensive NAIP. Adopting a NAIP approach can be particularly useful in integrating public and private sector efforts, and this can be done effectively through a public-private partnership (PPP) structure. The NAIP should also have a well-designed communication strategy that clearly communicates not only the advantages of index insurance but also its risks, particularly basis risk. Pilot testing can greatly contribute to the assessment of the quality of the products and should be implemented in the areas in which the quality of data is the highest. Lastly, a robust monitoring and evaluation framework is necessary to track the performance and implementation progress of the NAIP and help mitigate key risks.

6. **Provide adequate fiscal support to the NAIP:** Public funding would be needed for both the start-up phase and the scaling-up phase of the NAIP. In the start-up phase, public funding will be needed to support product development, improve yield-data collection, strengthen infrastructure, and cover the operating costs of dedicated institutions and farmers' awareness raising and education. In the scaling up phase, the largest component of support needed is likely to be for premium cofinancing, which would be key in making insurance more affordable for farmers. The scenario analysis undertaken for the diagnostic estimates the costs for GRN for the start-up phase at approximately US$1 million and the costs for the scale-up phase to range between US$1 million and US$4.5 million per year at full rollout. The lower estimate relates to the program covering only communal smallholders with over 5 ha (approximately 31,000) and the premium rates being relatively low, while the higher estimate foresees communal smallholders with over 2 ha (approximately 95,000) being reached and premium rates that are relatively high.

Table 1 sets out the next steps that are suggested as a sequenced approach to operationalize the recommendations.

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Table 1: Next Steps to Operationalize Recommendations

Action	Responsibility	Timeframe
Disaster Risk Finance		
a. Establish technical working group (TWG) for DRF	MoF	Immediate
b. Conduct review of risk instruments and fiscal gap analysis	DRF TWG	Short term
c. Develop and adopt DRF policy	MoF	Medium term
d. Establish TWG to develop agriculture finance action plan.	MoF/BoN and MAWLR	Medium term
Agricultural Insurance		
a. Engage the insurance industry to plan for the development of agricultural insurance market	Agriculture Insurance (AI) TWG	Immediate
b. Secure budget allocation for start-up phase of program	NAMFISA, MoF, and MAWLR	Short term
c. Set up NAIP institutional framework	GRN/NAMFISA	Short term
d. Issue new regulation or modify the draft microinsurance regulation for index insurance and for potential aggregations of insurance companies (for example, co-insurance agreements)	NAMFISA	Short term
e. Define the process for developing selected index insurance products and support product development activity	AI TWG	Short term
f. Product testing and rollout plans	AI TWG	Medium term
g. Implement product testing	Industry	Medium term

Short term = 6 to 12 months. Medium terms = 12 to 18 months

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Introduction and Country Context

This diagnostic report was prepared in response to a technical assistance request from the Government of the Republic of Namibia (GRN) to support the design and implementation of an index-based agriculture insurance program targeting small-scale farmers. Based on initial consultations with the Namibia Financial Institutions Supervisory Authority (NAMFISA), the nonbank financial regulator and lead counterpart, it was agreed to expand the scope of the diagnostic to include disaster risk finance (DRF), but still with a focus on the agriculture sector. This was done given both GRN's interest in protecting both group of farmers and the increasing consensus that agriculture insurance programs, particularly those that focus on smallholders, are best designed within a broader framework of DRF. This is the case since only smallholder farmers linked to the market can be reached effectively through agriculture insurance programs, while subsistence farmers would need to be protected using other instruments. Further, even among smallholders who can be reached through agriculture insurance, some risks cannot be viably transferred to agriculture insurance markets.

The diagnostic was undertaken in close coordination with key public and private sector stakeholders. A World Bank Group team travelled to Windhoek from May 31 to June 8, 2022, to undertake stakeholder consultations for the diagnostic. Key public sector stakeholders consulted included the Ministry of Finance (MoF); Ministry of Agriculture, Water, and Land Reform (MAWLR); Office of the Prime Minister (OPM); NAMFISA; Development Bank of Namibia (DBN); Agricultural Bank of Namibia; and Namibia Meteorological Service. Key private sector stakeholders consulted included select banks and insurance companies and select farmers organizations. (See annex A for the full list.) The diagnostic also benefitted from an extensive review of documents and data shared by stakeholders.

This diagnostic is envisaged as the first phase of a potential two-phase technical assistance program. Building on the diagnostic, a second phase of support could potentially

support GRN to design specific interventions to strengthen in the agriculture risk–financing space and, as needed, implement policy reforms and institutional changes to this end.

The report is structured as follows: Chapter 1 presents an overview of the macro- and socioeconomic environment, financial sector, agriculture sector, and agriculture finance landscape in Namibia. Chapter 2 presents an overview of DRF, Namibia's exposure to disasters, particularly for the agriculture sector, and their impact and discusses Namibia's institutional framework and current approach to DRF. Chapter 3 presents an introduction of agriculture insurance, the agriculture insurance landscape in Namibia, and the diagnostic's findings. Lastly, chapter 4 presents the diagnostic's recommendations and suggested next steps.

Macro and Socioeconomic Environment

Namibia gained political independence in 1990, after more than a century of colonial rule, first by Germany from 1884 and then South Africa from 1915. Located in the southwestern part of Africa, Namibia is one of the least densely populated countries in Africa. It covers an area of 318,261 square miles, and its population is about 2.5 million (2017). It is bordered by Angola to the north, South Africa to the south, Zambia to the northeast, Botswana to the east, and the Atlantic Ocean to the west.

Since independence, Namibia has shown remarkable signs of political stability and prudent macroeconomic management, which helped the country achieve moderate economic growth and social progress. The annual real GDP growth rate from 2010 to 2015 was strong, averaging 5.4 percent. This robust growth was underpinned by sound macroeconomic policies and buoyant activity in the mining sector, government spending, and expansion of credit to the private sector. Income per capita increased gradually since independence through this period, largely due to mining, services, fishing, and commercial livestock farming, which fueled sufficient improvement in the GDP for Namibia to be reclassified in 2009 as an upper-middle-income country.

However, growth slowed considerably since 2016 due to weak performance in key sectors of the economy and government fiscal consolidation. In the period leading up to the COVID-19 pandemic in 2020, GDP growth averaged -0.2 percent, affected by fiscal adjustment as the government sought to rebalance public finances, severe drought, lower commodity prices, reduced investment, and weak growth in key trade partners (Angola, South Africa). The pandemic induced the steepest economic contraction since independence; real GDP declined by 8.1 percent. GDP rebounded over 2021 and 2022, growing by 3.5 percent and 4.6 percent, respectively, but output remains below pre-pandemic levels and the rebound was not broad based. The fiscal situation has deteriorated substantially over the last decade, reflecting expansionary policies over 2010–15, subdued growth in the years immediately prior to the COVID-19 shock, and the impacts of the pandemic, including lower receipts from the Southern Africa Customs Union pool in 2021–22. Public debt, including guarantees, has increased from about 27 percent of GDP in 2012 to 73 percent in 2022.

Most socioeconomic indicators have improved, but Namibia remains one of the most unequal countries in the world. When Namibia gained independence in 1990, the new government inherited a country characterized by high levels of poverty and income inequality, but the country has seen one of the fastest reductions in poverty in Sub-Saharan Africa, from 37.5 percent in 2004 to 28.8 percent in 2010 and further to 17.4 percent in 2016. In the early 1990s, income inequality as measured by the Gini coefficient was estimated at around 0.70. Progress in reducing income disparity has been steady since then, with the Gini coefficient gradually declining to 0.60 in 2004, 0.58 in 2010, and 0.56 in 2015 (Namibia Statistics Agency: NHIES Report 2015/2016). Despite this progress, Namibia remains one of the most unequal countries in the world. Deep underlying challenges persist, undermining the prospects for further advancement, and the pre-independence history of the systematic exclusion of the Black majority from full participation in economic activities continues to shape the economy, constraining the country's economic and social progress.

Namibia scores well in cross-country political comparisons. The World Governance Indicators rank

Namibia in the 76th percentile on the Political Stability/Absence of Violence indicator, the second-best position in Africa. The 2021 Ibrahim Index of African Governance ranks Namibia eighth among 54 countries on overall governance, with a score of 64.1, well above the continental average of 48.9. Namibia's lowest scores were in the Human Development and Sustainable Economic Opportunity indicators, where the country ranks eleventh and seventh, respectively, crystalizing Namibia's ongoing challenges to address income inequality and socioeconomic development.

Gender equality and the empowerment of women have been the cornerstones of Namibia's development agenda since gaining independence in 1990. At independence in 1990, the new government inherited a country characterized by a long history of discrimination not only based on race but also on gender. In the post-independence years, the government has made various efforts to strengthen women's rights by according gender equality the status of a constitutionally guaranteed fundamental right and by subsequently passing progressive gender-based laws in order to ensure full participation of women in all spheres of life, including full political representation. As a result of these initiatives, the literacy rate among females currently stands above 88 percent, and more girls are enrolled in all levels of education than boys. Women's representation in parliament has steadily increased. In 2021, women held over 44 percent of the seats in the National Assembly, up from 18 percent in 1994 and 26 percent in 2014.

Agriculture Sector

Agriculture plays a major role in the economy. The agriculture sector provides direct and indirect livelihood to over 70 percent of Namibia's population. However, most farming activities are dependent on climate-sensitive subsectors, such as crop production and livestock farming in 2022. The sector accounts for about 8 percent of GDP and employs about 23 percent of the workforce. The livestock and crop industry dominates the agriculture sector, accounting for 60 percent of agricultural GDP (NSA 2023). Local grain production includes maize, wheat, and pear millet. Horticulture products include grapes, cabbages, watermelons, potatoes, onions, and dates.

The agriculture sector, however, is dualistic: a majority of smallholder and subsistence farmers coexist with a relatively small number of medium- to large-scale commercial producers. Most smallholder and subsistence farmers operate on a nontitle deed land held under a communal tenure system, and traditional methods of production are still predominant. Table 2 presents the distribution of communal farming households from the 2013–14 agriculture census. Further, the Namibia Agronomic Board (NAB) subdivides communal farmers into "subsistence farmers," with farm sizes up to 5 ha, and "smallholder farmers," with farm sizes above 5 ha.[1] The farming systems for subsistence farmers are often mixed systems that include small fields of crops, vegetables, and livestock for domestic consumption. The subsistence sector suffers from poor-quality yields and land degradation, overgrazing, water scarcity, and an overall lack of investment in upgrading production, which contributes to low incomes and poverty.

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Table 2: Land-Use Area and Number of Communal Households by Size of Holding

Land Use Categories														
	Total		Annual Crop		Tree Crop		Fallow Land		Grazing Land		Woodland/Forest		Other Land	
Size of Holding	No. HH Reporting	Average Area per HH (ha)	No. HH Reporting	Average Area per HH (ha)	No. HH Reporting	Average Area per HH (ha)	No. HH Reporting	Average Area per HH (ha)	No. HH reporting	Average Area per HH (ha)	No. HH Reporting	Average Area per HH (ha)	No. HH Reporting	Average Area per HH (ha)
< 0.50	34734	0.09	10310	0.2	34	0.04	2442	0.21	750	0.07	132	0.22	21064	0.03
0.51 - 1.0	18382	0.75	14284	0.76	14	0.55	1885	0.72	816	0.79	189	0.75	1188	0.75
1.01 - 2.0	42710	1.5	35365	1.51	-	-	2431	1.42	2005	1.42	920	1.5	1982	1.48
2.01 - 5.0	72304	3.19	59595	3.16	-	-	1964	3.04	4209	3.4	1609	3.37	4911	3.4
5.01 - 10.0	27929	6.69	18481	6.54	-	-	919	6.97	4784	7.12	682	6.5	3029	6.94
10.01+	13354	27.64	3917	37.57	-	-	659	22.23	4491	19.69	690	22.7	3465	28.73
Total	**209244**	**4.13**	**141952**	**3.68**	**48**	**0.19**	**10301**	**3.14**	**17055**	**8.23**	**4223**	**6.41**	**35369**	**3.98**

Source: NSA (2019), table 3.5.

1. Personal communication from the NAB, November 2022.

The commercial sector is dominated by cattle and sheep farming, particularly south of the Veterinary Cordon Fence (VCF)[2] while the communal sector is dominated by cattle farming (figure 1). Notably the goat herd size has increased while the sheep herd size has decreased over the last two decades, likely due to drought as goats are hardier than sheep. The commercial sector is export oriented, productive, and more competitive, with some links to smallholder producers south of the VCF and limited links to those north of the VCF. Farmers north of the VCF face high barriers to participation in the high-value beef export value chain, including high transaction costs related to quarantine and vaccination of cattle, as well as high transportation and logistics costs that further limit the extent of their market participation.

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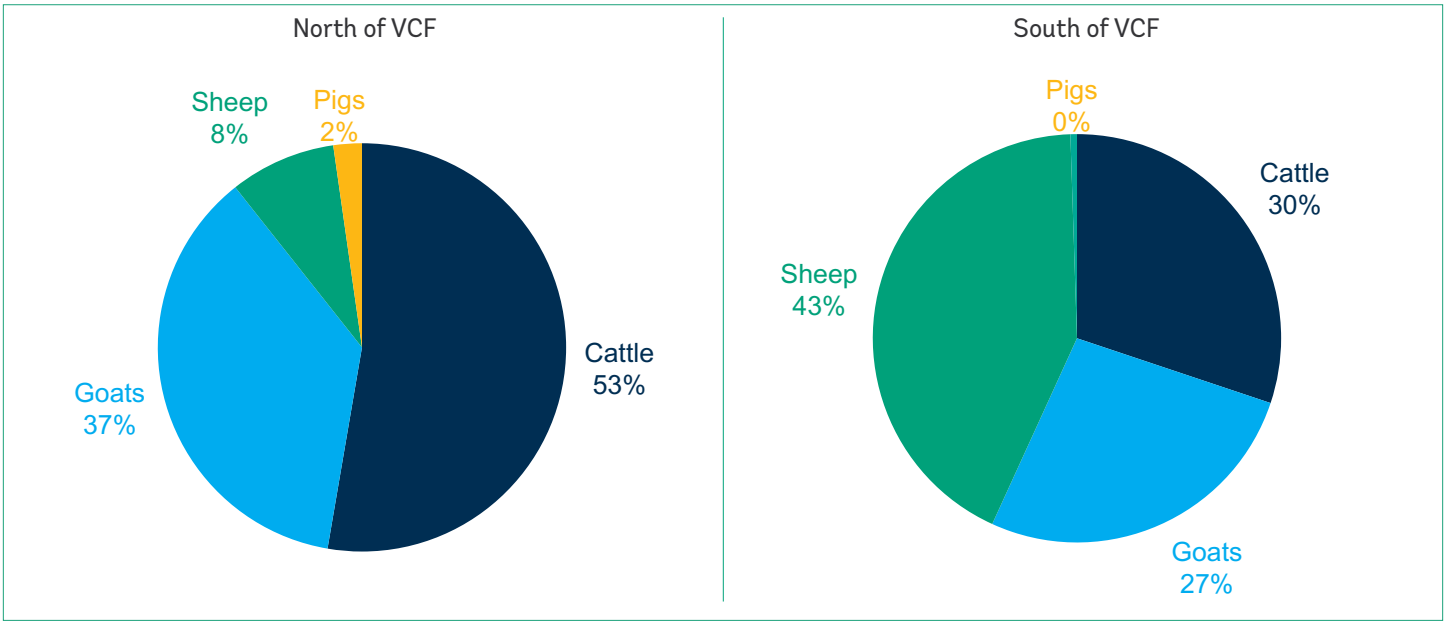
Figure 1: Livestock Distribution North and South of the VCF



Source: World Bank analysis based on data from MAWLR and the agricultural statistics bulletin.

The total livestock production value has been on an upward trend over the last 20 years, but notable drops occurred in 2012, 2014, and 2016 corresponding to water scarcity and drier years. The number of large stock marketed has fluctuated over the years, while the number of small stock has been declining since 2003 (figure 2). There is evidence of marginal downward pressure on domestic livestock prices during times of drought and a slight upward pressure on livestock prices in periods immediately after droughts. It is important to note that these figures are mostly from the commercial sector, as communal farmers have limited access to the market. Roughly 55 percent of Namibian smallholder livestock farmers are north of the VCF. These farmers experience a range of barriers to participation in the export beef value chain, including high transactions costs and fees for animal quarantine and vaccination and high transport and logistics costs. On the other hand, the area south of the VCF is free of foot-and-mouth disease and export oriented. The zone is home to 4,000 commercial farmers, who manage 52 percent of the national herd, and 65,000 communal farmers, who manage just 8 percent of the national herd.

2. The area south of the VCF is free of foot-and-mouth disease.

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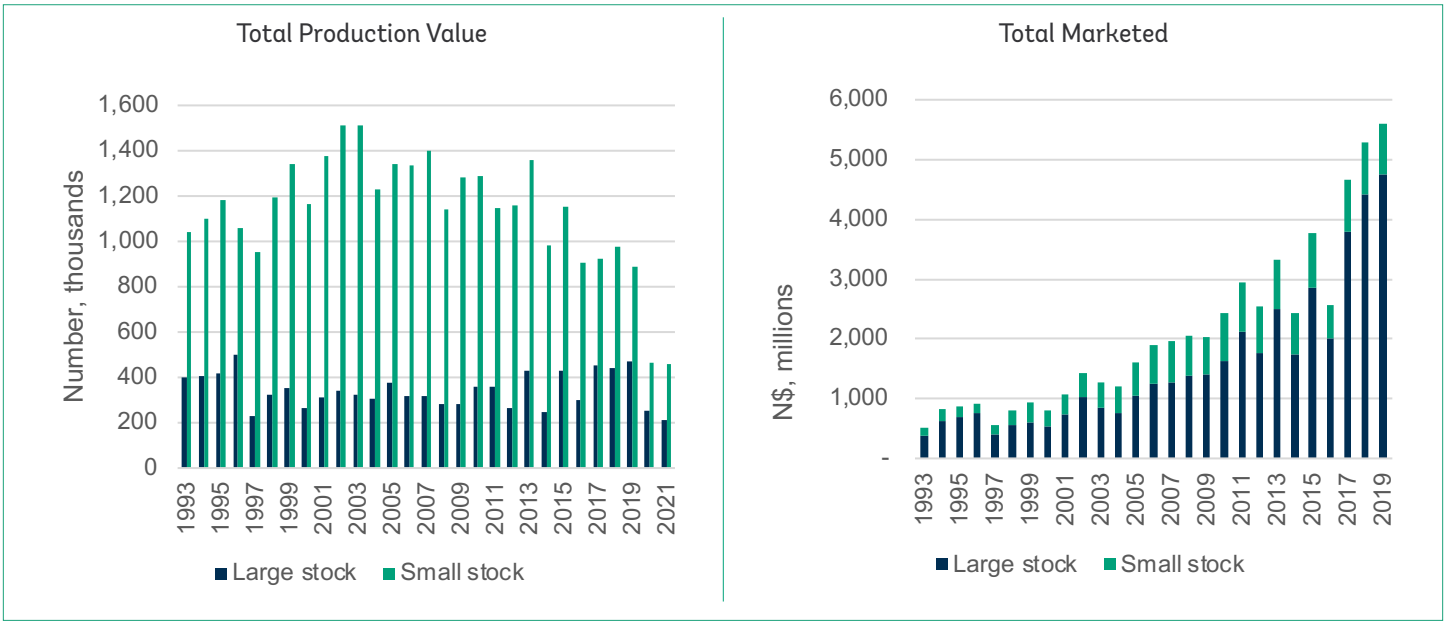
Figure 2: Total Livestock Production Value and Number Marketed



Source: World Bank analysis based on data from MAWLR and the agricultural statistics bulletin.

Financial Sector

Namibia has a well-developed financial system. In the post-independence years, the financial system has undergone structural changes, leading to an upgrade of legal and regulatory frameworks. The Banking Institutions Act of 1998 provided the legal framework for banking operations, with the BoN as the supervisory authority. In 2001, NAMFISA was established to regulate and supervise nonbank financial institutions. However, the two development finance institutions—the DBN and AgriBank, the state-owned agriculture bank, both of which do not take deposits—are not regulated by either regulator.

The banking sector is sound and profitable but faces short- to medium-term risks arising out of the pandemic and recent monetary tightening. The banking sector in Namibia had assets equivalent to 81 percent of GDP in 2021. It comprised eight banks and a branch of a foreign banking institution. Tightening monetary policy conditions globally coupled with back-to-back sovereign credit rating downgrades have increased the cost of credit. Since 2020, both Fitch and Moody's have downgraded Namibia. These factors likely contributed to the decline in Namibia's domestic credit to the private sector, from 71 percent of GDP in 2019 to 69.4 percent in 2021. Nonetheless, this is significantly higher than the average for Sub-Saharan Africa (36.9 percent). Nonperforming loans (NPLs) in the banking sector, which had been increasing since 2016, hit an all-time high of 6.4 percent in 2021 but have since fallen to 5.6 percent in 2022. Nonetheless, short- to medium-term risks remain significant as banks could face an increase in NPLs due to the rise in household and corporate defaults due to overall monetary policy tightening and increase of interest rates in 2022. Also, due to delays in recognition of asset quality deterioration, data on banks' NPLs, profitability and capital ratios may not fully reflect the impact of the COVID-19 crisis.

In contrast to most countries, the nonbank financial institution sector in Namibia is much larger than the banking sector. Its size was about 201 percent of GDP in 2021. Retirement funds, with assets of about 116 percent of GDP, constituted the largest subsector. Insurance industry

assets composed 40 percent of GDP, and collective investment schemes were 34.2 percent of GDP. The insurance industry included 14 insurance companies and one reinsurance company.

Financial inclusion in Namibia has also expanded significantly since 2014, although there seems to have been some slippage due to COVID-19. The 2021 Findex survey finds that 71 percent of adults have an account with a financial institution or a mobile money service, a significant growth over 59 percent in 2014 but a reduction from 81 percent of adults in 2017. Individuals who reported having an account at a financial institution increased from 58 percent in 2014 to 77 percent in 2017 but decreased to 65 percent in 2021. Individuals making or receiving digital payments increased from 45 percent in 2014 to 71 percent in 2017 but declined to 66 percent in 2021.

Notwithstanding the relatively developed state of Namibia's financial sector, access to finance remains a key binding constraint for smallholder farmers. Although Namibia's financial system is relatively well developed, smallholder farmers have limited or no access to credit, limiting their ability to provide the needed inputs and services and to invest in needed infrastructure. The challenges of access to finance by smallholder farmers stem from both supply-side and demand-side issues. On the demand side, lack of collateral (due to the historic legacy of exclusion and the lack of land titling on communal land), low productivity, and frequent climatic shocks are key factors. On the supply side, factors include the highly concentrated nature of the Namibian commercial banking sector and limited outreach by the publicly owned AgriBank among communal farmers.

In 2021, N$5.8 billion in commercial bank loans went to the agriculture and fisheries sector, amounting to 5.5 percent of the commercial loan portfolio (Bank of Namibia 2021). Most of this credit was estimated to go to the large commercial agriculture sector and agribusinesses. AgriBank, the public sector lender, provides a smaller volume of financing to the sector; as of March 2021, the bank's portfolio amounted to N$2.9 billion. AgriBank also finances primarily the commercial agriculture sector and provides only a limited amount of financing to small-scale farmers and rural agribusinesses under its no-collateral lending scheme (AFDB 2022). Further, AgriBank's financial performance remains concerning; NPLs form nearly a quarter of its portfolio.

Disaster Risk Finance: Introduction and Namibia Context

DRF involves prearranging financial resources to ensure predictable and timely access to funding for disaster response and early recovery. DRF aims to improve the effectiveness of, and reduce the cost of, disaster response by planning ahead where funds come from and how they will be implemented. This financial protection helps affected governments, businesses, farmers, households, and the poor and most vulnerable to 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 agreed-upon objectives, decision processes, and implementation modalities and by promoting greater discipline, transparency, and predictability in post-disaster spending.

DRF contributes to sustainable and resilient development. It is a critical component of a comprehensive approach to disaster risk management that complements risk reduction, preparedness, and recovery measures. Risk finance instruments can contribute to risk reduction and preparedness—for example, by pricing risk and establishing clear rules of responsibility for managing risk and for bearing the costs for post-disaster response. Similarly, by reducing damage and the subsequent recovery cost, risk-management measures reduce disaster-related contingent liabilities (figure 3).

Figure 3: DRF Is a Core Part of Disaster Risk Management

Source: World Bank (2012).

Across Sub-Saharan African countries, there is an increasing appreciation of the role of DRF in fostering resilient development and the role of the government in providing and enabling financial protection for strategic assets and populations. Consequently, since 2021 to date, a record number of more than 10 countries are developing national DRF strategies. (See figure 4.) Meanwhile, Kenya is now evaluating the performance of its strategy and preparing for a second phase. Malawi is expected to undertake a medium-term review of its strategy imminently, while Mozambique is in the early implementation phase of its strategy (Government of Malawi 2020; Republic of Mozambique 2022).

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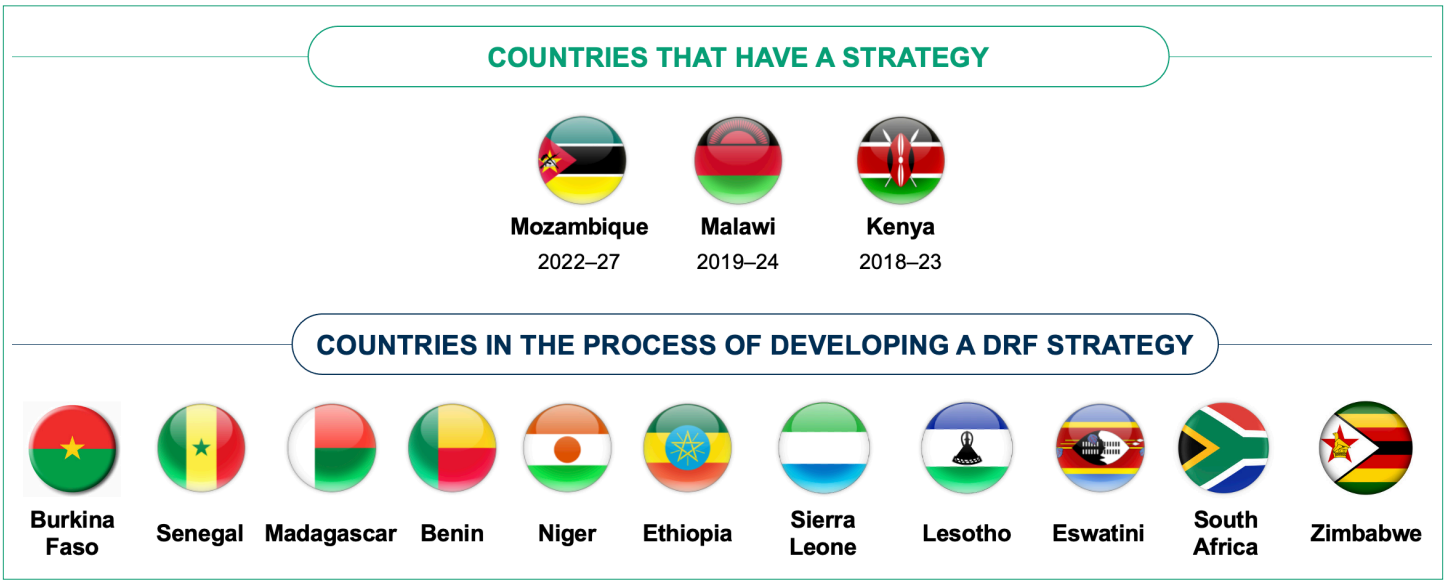
Figure 4: Countries in Sub-Saharan Africa That Have a DRF Strategy or Are Preparing One



Source: Authors.

The core principles of DRF 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 that DRF strategies meet policy objectives. Figure 5 summarizes the four core principles. The application of these principles may differ from one country to another as well as by sector. Within the agriculture sector, timing needs, disbursement mechanisms, and risk-layering approaches may further differ, depending on strategic priorities for protection. Financial protection of food security and livelihoods may require less but more rapid funds, while the protection of agriculture assets may require more but less rapid funds. Effective DRF is underpinned by data and analytics to assess probable impacts, prioritize planning, and trigger early action. Innovation in digital technology and big data, such as Earth Observation, is enabling more robust and timely analytics to inform investment decisions and financial products.

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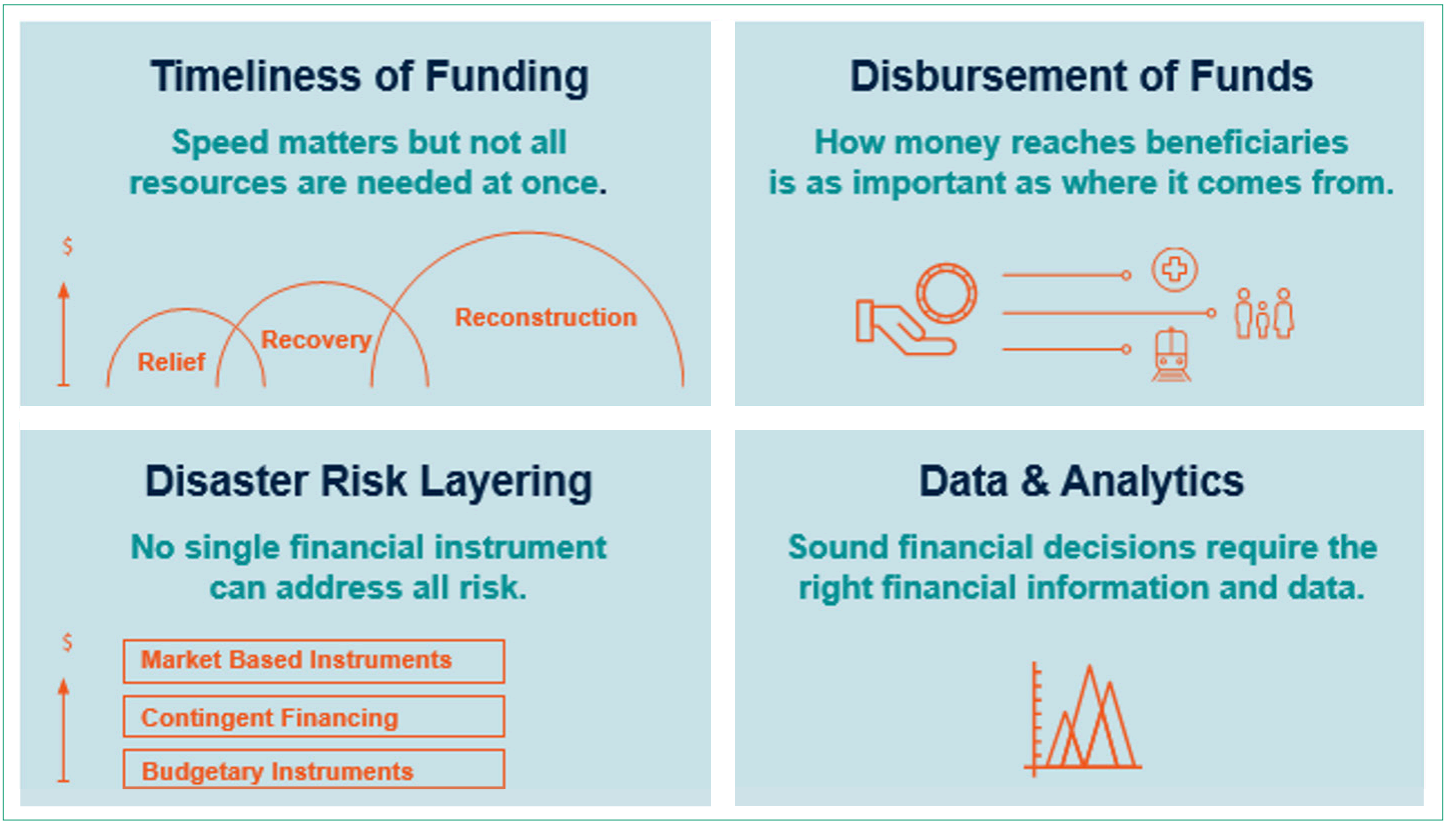
Figure 5: Four Core Principles of DRF



Source: World Bank Group (2019).

To plan effectively, it is important to consider the speed and volume of funds required and ensure that funds are available quickly when—and only when—they are required. Governments require access to immediate liquidity for emergency response and the maintenance of essential services until additional funds become available. While less money is required for the relief phase, timeliness is more critical and may require trade-offs in cost and reliability. For example, parametric-based solutions enable speed and cost less, but funds may not completely reflect the losses (basis risk). Meanwhile, concessionary loans may be reliable but take time to arrange. Ensuring the rapid mobilization of funds has been shown to reduce humanitarian costs and save money. A cost-benefit analysis of DRF 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 the cost of restocking a core herd of sheep was three times higher than the cost of keeping the core herd alive, and 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 Vargas Hill 2013).

For financial preparedness to improve development outcomes, it is as important to consider how money reaches beneficiaries as where it comes from. Governments require dedicated mechanisms and expertise to allocate, disburse, and monitor funds for response and recovery effectively. Strong collaboration between the ministry of finance and the public entity tasked with spending post-disaster funds—such as disaster agencies and ministries of agriculture—is crucial. In addition, the disbursement system must balance the fast disbursement desired by policy makers with the transparency and accountability required by the public and donors.

International experience has shown that combining different instruments to protect against events of different frequency and severity is the most cost-efficient way to mobilize prearranged finance, as no single financial instrument can address all risk. This approach, known as risk layering, ensures that cheaper sources of money are used first and that the most expensive instruments are used for extreme events. For example, (parametric) insurance is usually not cost-effective against recurrent low-cost events. A risk-layering strategy also matches the sources of risk and the needs of the beneficiaries to the characteristics of the different instruments in terms of funding amount, frequency of payment, speed, reliability, and cost of capital.

Namibia's Disaster Risk Vulnerability and Impact of Climate Change

Namibia is one of the driest countries in Sub-Saharan Africa and is highly vulnerable to external shocks. Namibia is particularly susceptible to frequent spells of drought and floods because of the variability in the weather patterns. Low to very low mean annual rainfall, high variability in rainfall, and very high evaporation rates combine to limit water supplies severely. Between 2011 and 2019, the country experienced several episodes of droughts and floods with devastating effects on agriculture and infrastructure. In 2011, Namibia was hit by the worst floods in the country's history; over 500,000 people were affected, and infrastructure and residential houses were destroyed. In 2013, a devastating drought hit the country, leading to crop failure and poor livestock conditions. As a result, over 300,000 people were considered food insecure and had to receive emergency food assistance from the government. In 2019, another severe drought hit the country, killing about 60,000 livestock and causing about two-thirds of crops to fail. Droughts have become more successive and are increasing in severity; 2019 was recorded as the driest in 90 years. National states of disaster were declared in six of the last 20 years.[3]

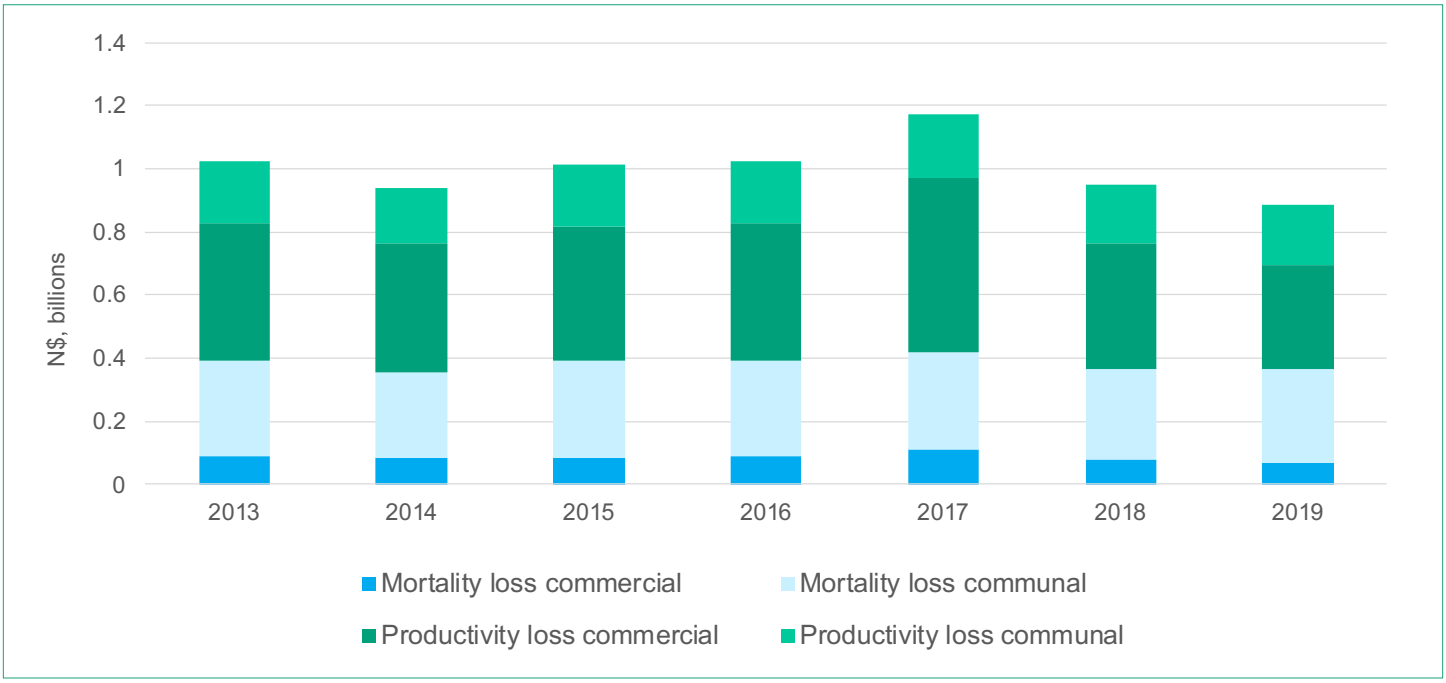
The portion of the population and GDP affected by disasters has increased significantly over the last two decades and is projected to increase further due to climate change. Since 1990, Namibia has experienced at least 12 years in which half of the country received below-average rainfall, resulting in meteorological droughts. Based on probabilistic risk assessments, 31 percent of the total population and about 33 percent of GDP, or US$3.6 billion, on average is affected by drought per year, and both are estimated to increase significantly in the future. Flood is very localized, affecting on average about 15,000 people every year, or 0.6 percent of the total population (UNISDR 2018). Further, the increase in losses due to climate change is expected to be larger at lower return periods, which suggests that a combination of risk-financing instruments balancing retention and transfer would be more sustainable.

Drought is a major threat to Namibia's livestock sector. On average, the sustainable stocking rate throughout Namibia has halved over the last 100 years, and livestock farmers have a degraded resource base, which is no longer resilient to severe droughts, as experienced in the last decade. Approximately 60 million ha is available for grazing, but most of the land is severely degraded; nearly 40 million ha is covered with thickened bush that reduces the amount of forage available for livestock production (World Bank and IFC 2022).

Frequent periods of droughts have caused significant losses to the livestock sector. Prolonged drought between 2012 and 2019 caused losses of between N$2 billion and N$3.6 billion to the commercial livestock sector and between N$3.4 billion and N$4.8 billion for communal livestock farmers (figure 6). While commercial farmers incur higher productivity-related costs, communal farmers face higher mortality-related losses. This is driven by several factors. Firstly, communal farmers have a lower level of productivity to begin with. Secondly, communal farmers in the north, who hold the bulk of the national herd, have limited access to the market. GRN's livestock marketing incentive, which is provided after declaration of disaster and only upon proof of sale, is ineffective at incentivizing effective livestock herd management to limit mortality loss due to drought. Communal farmers account for an increasingly larger proportion of the total livestock in Namibia, accounting for 79 percent of total cattle in 2019, up from 69 percent in 2010. Overall, the total stock has been declining due to drought-induced mortality since 2016. Droughts have a modest impact on crop production, compared to the livestock sector.

3. In 1992–93, 1995–96, 2012–13, 2013–14, 2015–16, and 2018–19, based on the Disaster Risk Management Act (2012).

Figure 6: Historic Livestock Losses Due to Drought



Source: Authors, based on data from MAWLR.
Note: This analysis includes losses due to livestock mortality and productivity losses (hike in fodder price coupled with a drop in market price due to distress selling).

Rural communities, the northern region, and the poor throughout Namibia are the most vulnerable to the negative impacts of climate change. About 43 percent of the population lives in poverty, and rural areas (59.3 percent) are poorer than urban areas (25.3 percent). Notably, current and future drought risk is concentrated in the northern and central belt. Overall, the northern region has the highest level of poverty, specifically Kavango West (79.6 percent), Kavango East (70.0 percent), and Kunene (64.1 percent). This is because adaptive capacities among these vulnerable groups are very low. This vulnerability is exacerbated by existing marginal or lacking delivery of adequate services to remote areas, as such endeavors are generally considered prohibitively expensive. In addition, the dualism of the agriculture sector, with its marked differences in access to credit, markets, and inputs, accentuates the socioeconomic vulnerabilities of rural population in Namibia.

Namibia ranks among the highest in the world in terms of disaster mortality, relative to population size (Kapuka and Hlansy 2020). These results stem from a combination of high vulnerability and low capacity to cope. Most of the population is reliant on rain-fed agriculture and natural resources. Agriculture is the sector most vulnerable to climate change, followed by water, tourism, and health. Recent droughts have had a significant impact on poverty, with the income loss up to 28 percent in some affected areas (World Bank, forthcoming). Consequently, poor subsistence farmers face drought-induced food insecurity. The resulting malnutrition is worsened by water scarcity induced disease outbreaks, such as cholera and hepatitis E. (Sanitation levels are 65 percent in urban and 25 percent in rural areas.) The poor continue to be trapped in a cycle of poverty, which worsens with each drought. Namibia is ranked as a medium-risk country by the Notre Dame–Global Adaptation Initiative Country Index, which summarizes a country's vulnerability to climate change in combination with its readiness to improve resilience.[4]

Institutional Framework for Disaster Risk Management in Namibia

Institutional capacity for disaster risk management and financing is limited. Disaster risk management is handled by the Directorate for Disaster Risk Management under OPM;

4. Countries are ranked from 1 (lowest risk) to 182 (highest risk). Namibia ranks 107, with high vulnerability (121 of 128) and medium readiness (109 of 192).

climate risk management is handled by the National Climate Change Committee under the Ministry of Environment; and drought risk management is handled under MAWLR. These institutions are guided by different policy frameworks with different reporting structures. In addition, the existing legislation does not make clear provisions for linking crucial technical institutions (for example, the Meteorological Service or Hydrology Services) to the Directorate for Disaster Risk Management. The Meteorological Service further lacks regional presence, specialists, and equipment. Hydrology Services has limited infrastructure and equipment, limited human and financial resources, and weak collaboration with other institutions on early warning.

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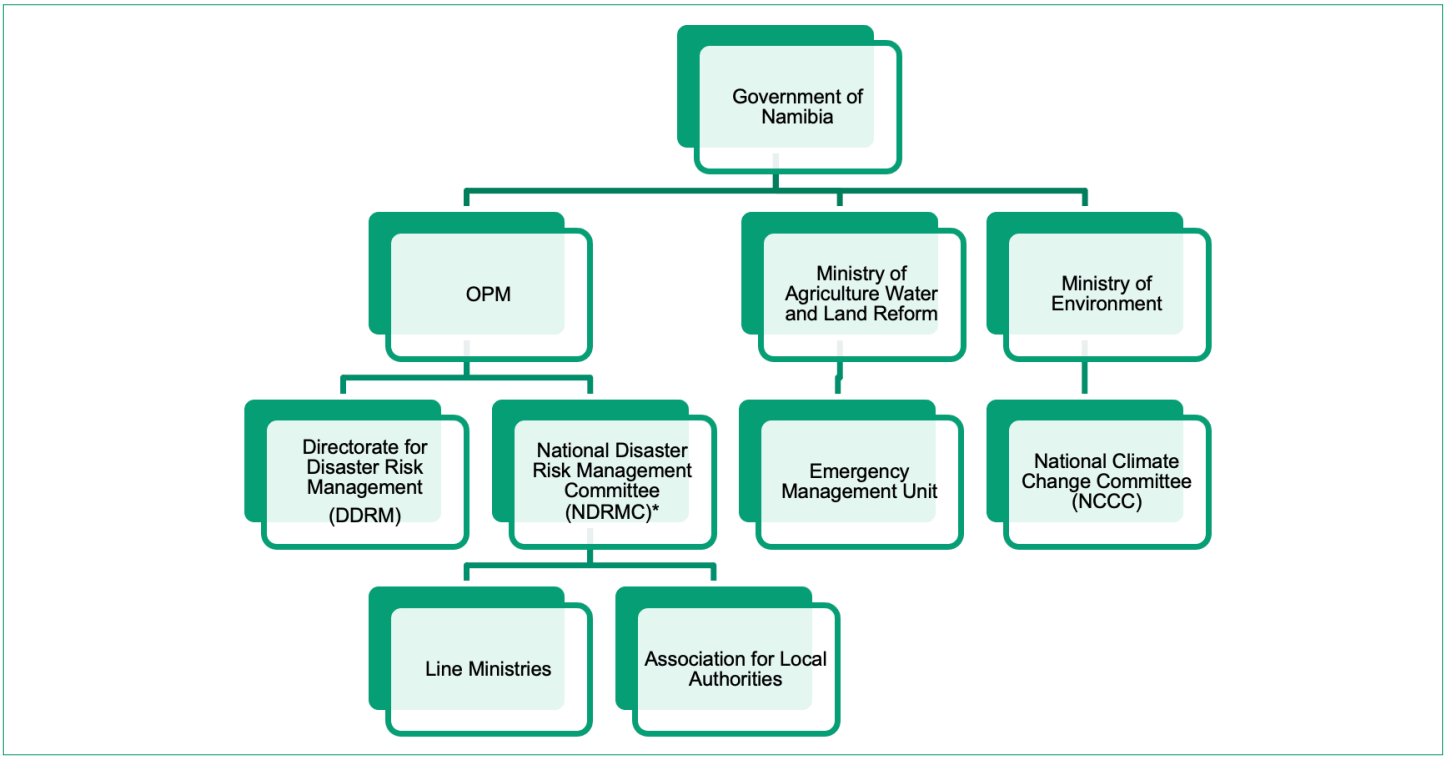
Figure 7: Institutional Framework for Disaster Risk Management



Source: Authors, based on interviews with GRN officials.

The National Emergency Management Committee, which is chaired by the secretary to the cabinet and includes representation from 20 line ministries and several nongovernmental organizations, is a national policy-making and coordinating body. It is supported by the Emergency Management Unit in OPM, which acts as its secretariat, and the Namibia Early Warning and Food Information System, which provides information on the status of food production and stocks in the country. The Namibia Early Warning and Food Information System is also responsible for gathering, analyzing, and reporting on drought-related matters. At the regional, constituency, and village levels, responsibility for drought emergency management currently resides with Regional Emergency Management Units, Constituency Emergency Management Units, and Village Emergency Management Units. In addition, the National Food Security and Nutrition Council, supported by the Food Security and Nutrition Technical Committee and Secretariat, as well as other national coordinating structures, such as the National Land-Use and Environment Board, are responsible for coordinating functions related to drought-recovery programs and long-term drought mitigation.

Status of Disaster Risk Financing Instruments in Namibia

The current approach to DRF relies on risk retention without use of risk-transfer instruments.[5] Figure 8 presents existing and proposed risk-financing instruments in a risk-layered framework for Namibia. GRN's current approach offers low financial protection and results in a critical funding gap for moderate to severe shocks. Further, major constraints in operational capacity result in costly delays. It may take longer than two months for beneficiaries of the livestock marketing and fodders incentive programs to receive reimbursement. The claim-settlement process from the National Disaster Fund is manual, paper based, and cumbersome. The emergency management units in MAWLR and OPM are severely capacity constrained. There is no leverage effect, and the budget is left exposed, which may compromise development plans across multiple sectors. A notable development is the emergence of the use of parametric solutions to fund humanitarian response, through the Red Cross Society's forecast-based financing programs for drought and flood.

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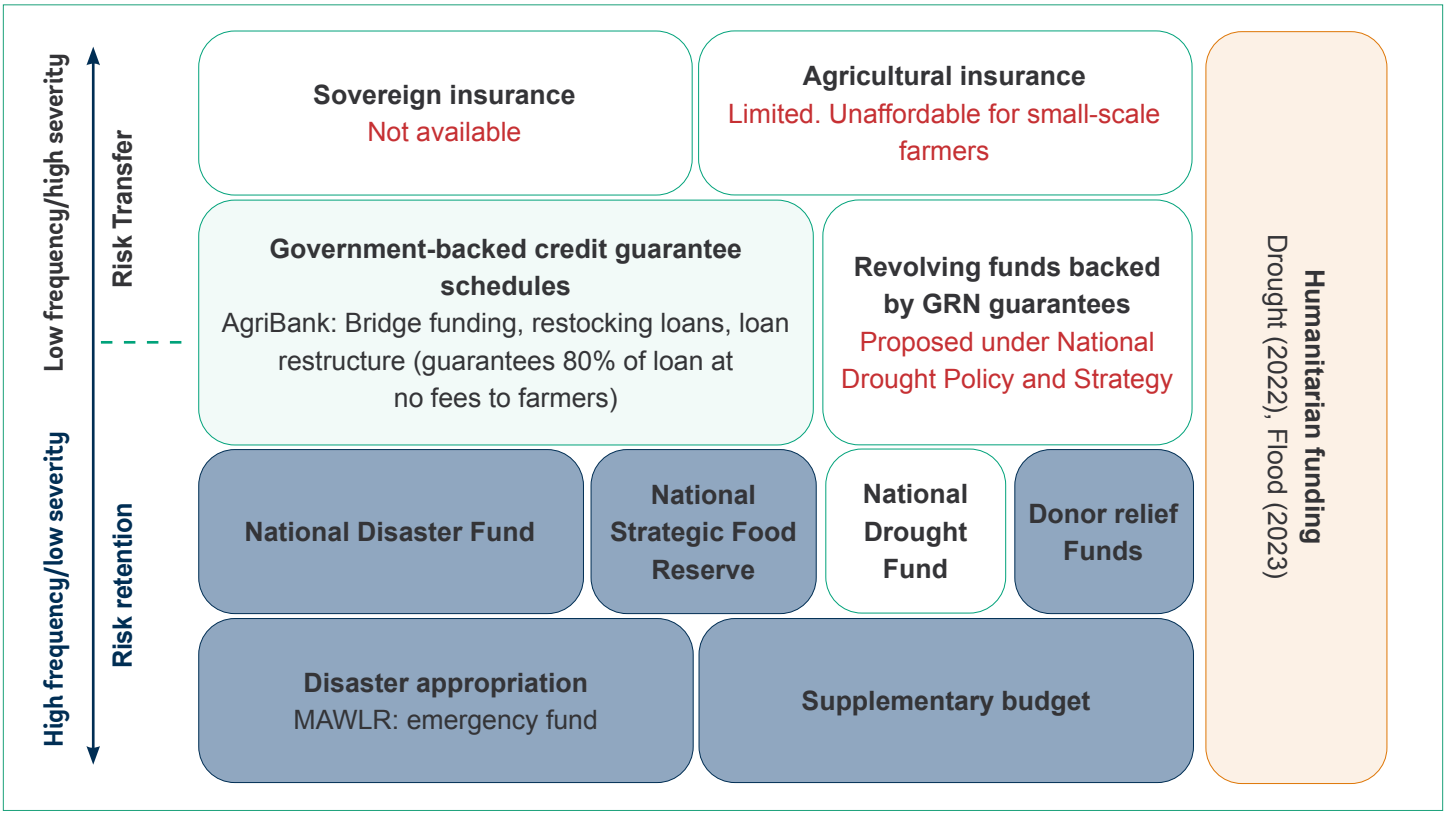
Figure 8: Existing and Proposed DRF Mechanisms for Agriculture



Source: Authors, based on interviews with GRN officials.
Note: Boxes highlighted in blue indicate instruments that GRN currently has in place and is using, while white boxes indicate instruments that are not yet in place or used by GRN. The National Drought Fund is proposed under the pending National Drought Policy and Strategy. The box highlighted in yellow indicates that this instrument is in place but under review.

GRN's use of multiple uncoordinated risk-retention instruments creates inefficiencies, which further limit the scale of support to farmers. The National Disaster Fund is the main instrument used for financial protection of farmers, while the food reserve is used to protect food-insecure households. Donor-relief funds provided by institutions affiliated to MAWLR are used periodically, particularly for severe drought years. Key instruments include the following:

- ***The National Disaster Fund*** was established by the Disaster Risk Management Act (2012) for the development and promotion of disaster risk management. It is managed

5. Annex B summarizes laws, policies, and strategies relevant to Namibia's approach to disaster risk management.

by the Directorate for Disaster Risk Management under OPM. It is financed from the national budget and donor partners. Funds may accrue and may be invested. If funds are insufficient to meet disaster-related costs, an advance may be made from the national budget (N$134 million in 2021–22). The broad scope of the fund, which includes research, capacity building, and training on disaster risk management, as well as capital expenditures such as the acquisition of land and construction of buildings, compromises its efficiency as a DRF instrument.

- ***A National Drought Fund*** is proposed in the pending National Drought Policy and Strategy to meet obligations with respect to food security, agriculture, and water-supply services in disaster drought years. The objective is to avoid the disruptive effects of emergency budget reallocation and to speed up mobilization of funds. It is proposed that the drought fund will be managed by MAWLR and financed by the national budget, a percentage of agriculture industry levies (collected by the NAB and Meat Board of Namibia), direct contributions from farmers in normal rainfall years, and international donor contributions. The fund would be legislated for, a permanent institution, and managed by an independent board. Funds would be invested until such time as they were required. The fund is expected to be about N$100–200 million and would operate in parallel to the existing National Disaster Fund under OPM.

- ***The National Strategic Food Reserve*** is used for the provision of food relief to disaster-affected communities. It is funded through the national budget, and procurement is done through the Agro-Marketing and Technology Agency (AMTA). The reserve currently has a total storage capacity of 21,900 metric tons, which is insufficient to meet national food-security needs for six months. In addition, the reserve has faced funding constraints. During the 2020–21 fiscal year, funds available procured grain equivalent to 20 percent of the reserve's storage capacity. There is a need to increase the storage capacity to 67,000 metric tons to meet national food-security needs for six months.

- ***Donor reserve funds*** are mainly affiliated to MAWLR and include the NAB (N$14,000 in 2019) and Meat Board, which contributed a total of N$20,000 in 2019 and N$730,000 in 2020.

- ***Disaster appropriations*** have been used to provide emergency funds to MAWLR from the national budget. About N$580,000 was provided during the 2019–20 fiscal year, and a further N$988,000 and N$2.5 million have been budgeted for the 2021–22 and 2022–23 fiscal years, respectively.

Overall, GRN's risk-financing instruments are limited in terms of coverage and operate in a fragmented way, which increases operational costs. In addition, the funds are fully reliant on the national budget and donor contributions for replenishment. The proposed National Drought Fund will increase fragmentation as well as operational costs and will require up-front investment in risk finance expertise. GRN could improve the efficacy of its existing risk-financing mechanisms by consolidating or integrating the multiple funds.

GRN funds disaster response predominantly through the National Disaster Risk Management Fund followed by the contingency reserve. Figure 9 shows that funding from the contingency reserve has been substantial in the last five years, ranging between 30 percent and 87 percent of the contingency reserve. This creates significant potential budgetary strain if other contingencies materialize within the same year. Despite the rising incidence of disaster events and the prolonged drought between 2012 and 2019, humanitarian funding has been low. Excluding the 2019–20 fiscal year, when GRN received N$115 million, on average GRN received humanitarian support of N$1.4 million per year between 2013 and 2021, equivalent to 1 percent of the contingency reserve and covering less than 2 percent of total losses. The amount of funds allocated to the Disaster Risk Management Fund and the contingency reserve fluctuates widely and is not risk based. The budgeting process could be strengthened by incorporating a climate risk assessment for key sectors, such as agriculture. Funding for disaster relief and support has declined over the last five years to less than N$200 million from an annual average of over N$300 million between 2013 and 2017.

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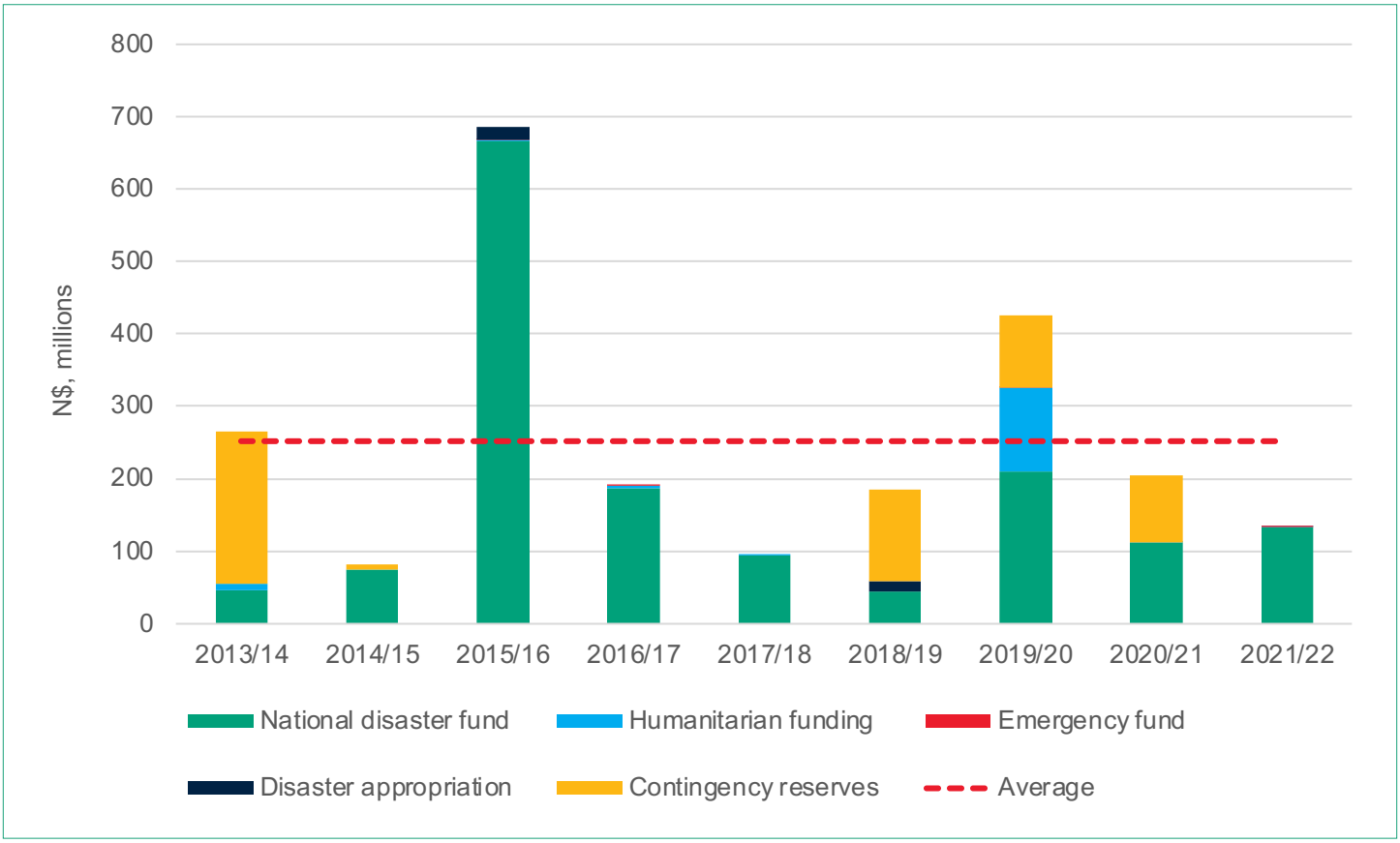
Figure 9: Total Funding and Sources for Disaster Response Programs



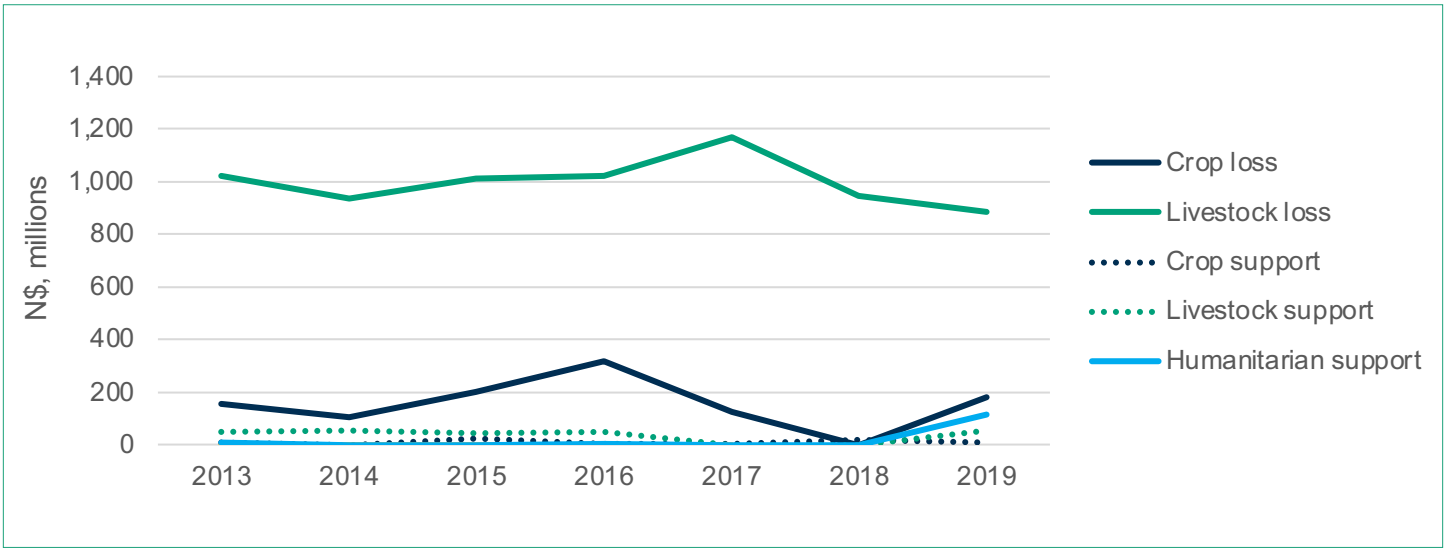
Source: Authors, based on data from MoF.
Note: The National Disaster Fund is under OPM. The Emergency Fund is an emergency account under MAWLR. The disaster appropriation refers to budgetary allocation for the purchase of grain for the National Strategic Grain Reserve.

Financial Protection for Agriculture in Namibia

The agriculture sector faces a significant financial protection gap, estimated at about 95 percent, due to the absence of a comprehensive financial protection program.

As figure 10 shows, between 2013 and 2019, GRN's drought-relief and recovery programs are estimated to have covered only 5 percent of total losses in the crop and livestock sectors. Given the impact of climate change and limited alternative coping mechanisms, there is a compelling need to develop robust financial protection mechanisms for both commercial and communal farmers.

Figure 10: Estimated Loss Due to Drought versus GRN and Humanitarian Disaster Support



Source: Authors, based on data from MoF and OPM.

Multiple drought-relief programs under OPM and MAWLR exacerbate the fragmentation and poor targeting of the national social-protection system.[6] Multiple ministries deliver services through multiple programs to the same households. Drought-relief programs include food transfers to households whose livelihoods are affected by drought; financial and production support to crop and livestock farmers; and water-supply programs (for human consumption and access to new grazing areas). Livestock programs include (a) fodder and salt subsidies; (b) a marketing incentive scheme that pays farmers an incentive for every livestock unit that they sell, up to certain limits (this is meant to encourage farmers to reduce the number of livestock on the range); (c) support for transporting cattle and leasing emergency grazing; and (d) subsidized loans for drought recovery. Crop programs for subsistence and commercial farmers include (a) drought-recovery inputs and a services voucher scheme (this includes the provision of seed and fertilizer as well as pest-control services); (b) crop-damage subsidies; and (c) subsidized loans or deferring loan repayments for drought recovery.

Overall, drought-relief and social-protection programs seem to be poorly targeted, particularly for less widespread events. Nearly 70 percent of those who received drought-relief assistance following the 2015–16 drought were not in areas hit by the drought, which suggests substantial leakage. In contrast, 93.3 percent of those who received drought relief were in the areas hit by the 2018–19 drought, which was more widespread (World Bank, forthcoming).

GRN's drought support is dominated by food support. As figure 11 shows, over the past nine years, on average, food support accounted for 49 percent, livestock support 21 percent, and crop support 6 percent. Marketing incentives form the bulk of livestock support, which presupposes access to market and limits communal farmers' access to protection. Although out-of-hand transaction mechanisms have been put in place to address this challenge, northern communal livestock farmers remain disadvantaged. The government could consider digitizing payments as part of the national DRF strategy, to reduce cost of response and deepen financial inclusion, which has been shown to strengthen financial resilience among poor households (Moore et al. 2019).

6. Social protection consists of cash transfers, food support, in-kind assistance, social care services, and community-based development programs for marginalized groups.

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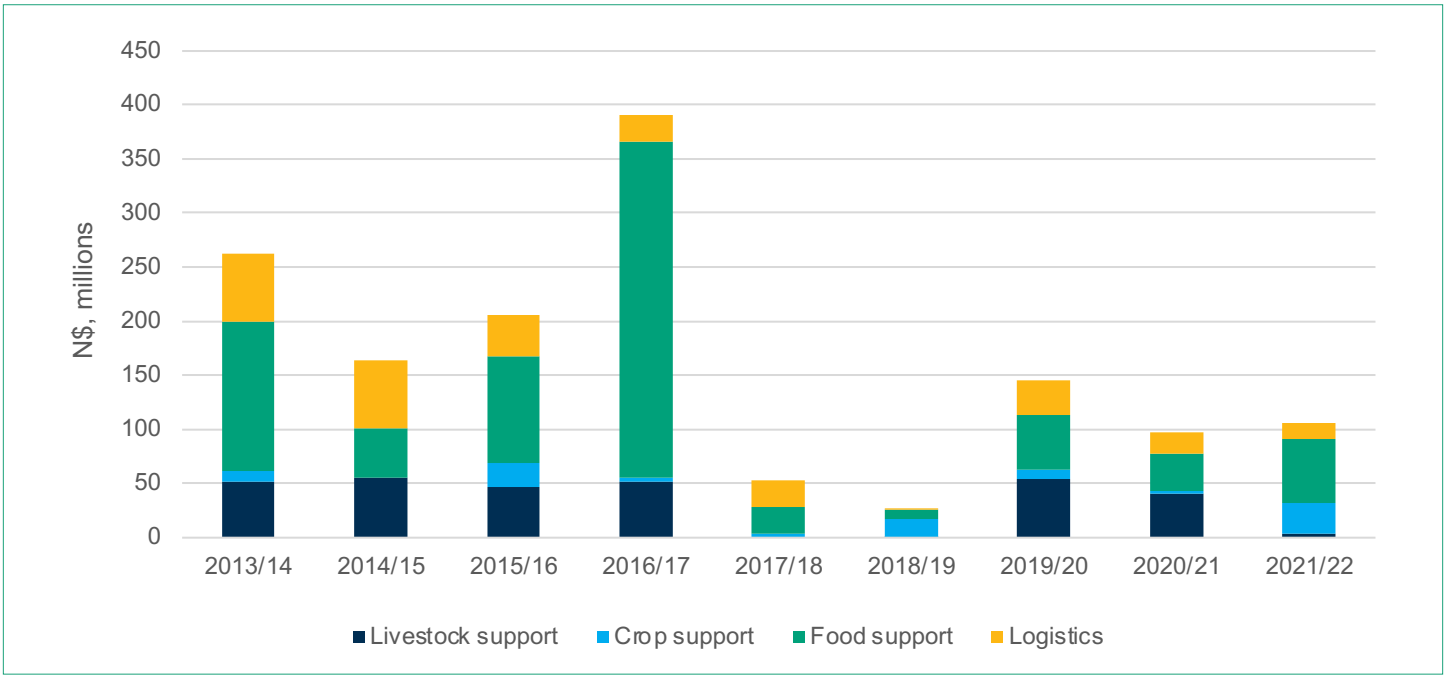
Figure 11: Total Expenditure in Response to Disasters



Source: Authors, based on data from MoF and OPM.

Risk layering can also be applied at the household level to strengthen household resilience. International experience and emerging research on the role of financial services in enhancing the climate resilience of households show that households require a range of services both before a shock and after a shock (box 1). To ensure effective use of risk-layered financial services, it is essential to tailor products to the specific needs of the farmers to be targeted by a program. Farmers can be segmented based on their existing vulnerabilities and levels of financial literacy or capability. (See figure 12.)

BOX 1: BUILDING RESILIENCE THROUGH FINANCIAL INCLUSION

Low-income households are particularly vulnerable to shocks but the least prepared to cope with and recover from the impact of shocks. The effects of climate change exacerbate vulnerability. Financial inclusion can enable households to manage risk before a shock and to recover after a shock occurs. This builds resilience—the ability to mitigate, cope with, and recover from shocks and stresses without compromising future welfare. Evidence suggests well-designed financial products and services can play a role in increasing low-income families' resilience by helping them to be prepared for risk, reduce risk, increase investment in the face of risk, and respond when a shock occurs.

Before a Shock			After a Shock
Risk preparedness	**Risk reduction**	**Investment in the face of risk**	**Responding to shocks**
Liquid accounts, savings groups, and behavioral nudges may enable households to build precautionary savings to smooth consumption after a shock.	Lower barriers to credit and goal-based savings may encourage adoption of risk-mitigating technology and reduce exposure to shocks.	Insurance can lead to more productive investments.	Digitization can lower costs of informal risk sharing and social protection to help households affordably access funds when shocks occur.

Source: Moore et al. (2019).

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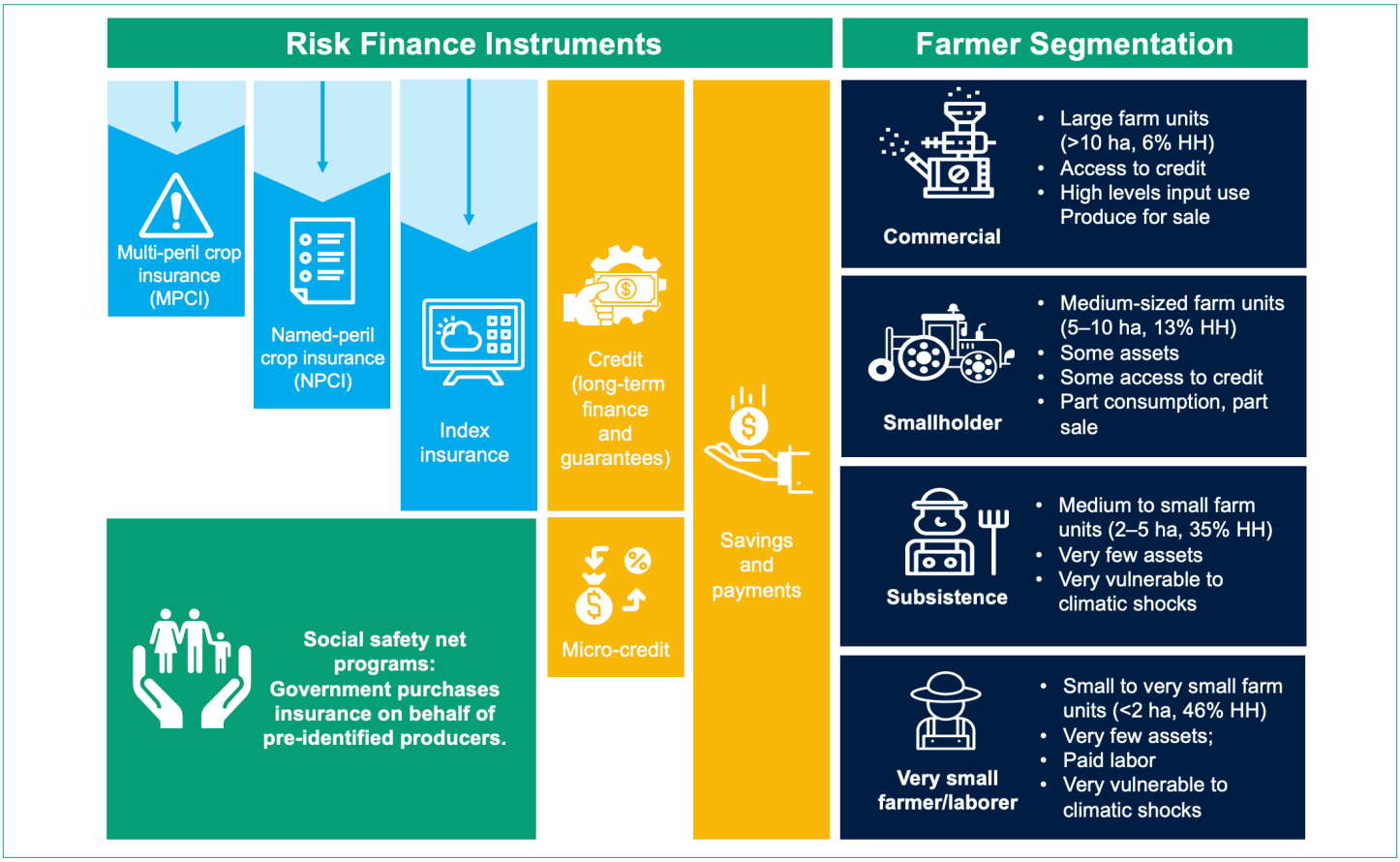
Figure 12: Risk Layering at the Household Level for Communal Farmers in Namibia



Source: Authors, using data from the NSA (2019).

The increasing use of formal financial institutions by Namibian farmers suggests that a key requirement to expand access to financial services by farmers is increasingly being met. As shown by figure 13, which is based on World Bank's Findex data, between 2014 and 2021, the percentage of individuals who reported receiving payments for the sale of an agricultural commodity (a good proxy for farmers linked to the market) into an account at a financial institution jumped by 42 percentage points (from a low 12 percent to 54 percent). When those who received payments to a mobile money account are included, this increase jumps to 49 percentage points (from 13 percent to 62 percent). The share of agriculture payment recipients who only used cash dropped by 48 percentage points, from 71 percent to 23 percent.[7]

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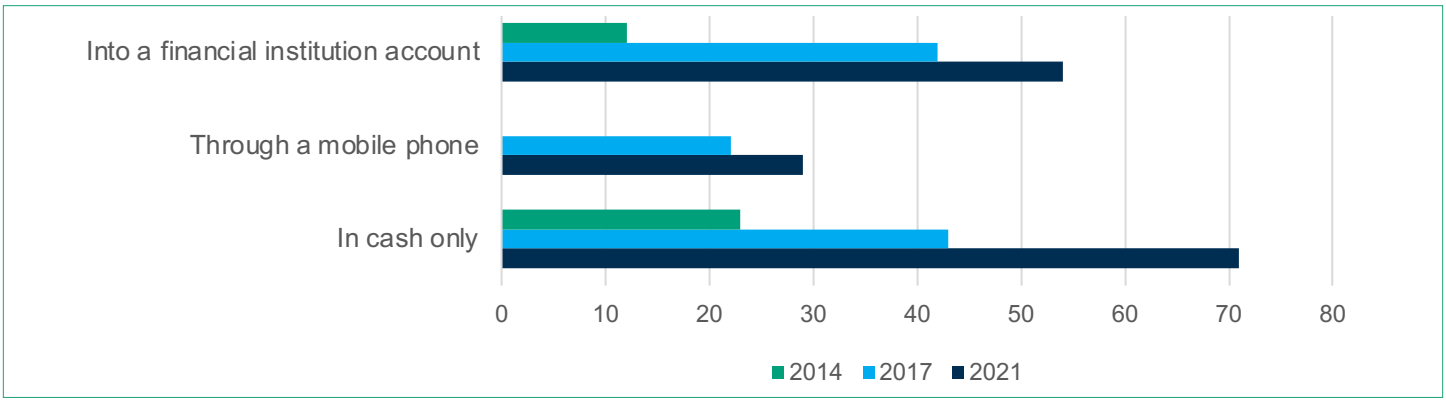
Figure 13: Financial Inclusion of Farmers



Source: Findex.

7. Findex defines agricultural payment recipients as "respondents who report personally receiving payments from any source for the sale of agricultural products, crops, produce, or livestock in the past year." This is a good proxy for full-time and part-time farmers, who have at least some linkages to the market.

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Agriculture Insurance for Smallholders in Namibia

Agriculture insurance is an important tool for transferring risks out of farming communities. Agriculture is exposed to a large number of risks, and this makes farming incomes significantly uncertain. Thanks to their experience in dealing with adverse conditions, farm households and rural communities have developed various strategies for managing risks. However, traditional risk-management arrangements lead to a suboptimal allocation of resources and frequently fail to provide adequate protection in severely adverse circumstances (Hazell, Pomareda, and Valdes 1986). If appropriately structured and implemented, insurance can represent a useful tool for transferring risk outside of the farming communities, helping to stabilize agricultural incomes and to incentivize farmers to use resources more efficiently.

Features of Agricultural Insurance Products

A first way to classify agricultural insurance products is to distinguish between indemnity-based and index-based products. Indemnity insurance policies are contracts in which compensation is based on measured loss or damage, while index insurance contracts pay out with reference to an indirect indicator intended to be a "proxy" for loss or damage (CABFIN 2017).

The index approach has many advantages in smallholder agriculture, where operating indemnity products is very challenging, but it also has some relevant drawbacks. The main shortcoming in index insurance is basis risk, which can be defined as the mismatch between the loss experienced by the farmer and the payout triggered by the insurance policy.[8] Assessing the likelihood of basis risk events and defining how the consequences of such events will be handled are key prerequisites for determining whether a proposed index insurance product should be implemented.

8. See box 2 for a more detailed discussion on basis risk in index insurance.

The following are the main typologies of indemnity-based crop insurance products:

- Named-peril crop insurance (NPCI), which can be either "single peril" (for example, hail) or "combined perils" (for example, hail + frost + wind), in which payments are issued on the basis of a percentage of assessed damage
- Multiple-peril crop insurance (MPCI), in which payments are established on the basis of loss of yield generated by a comprehensive set of perils (some exclusions may apply)
- Revenue insurance, in which the yield-loss component of an MPCI cover is complemented by a price coverage element[9]

On the side of index products for crops, there are two main categories:

- Weather index insurance (WII): Contracts that, for a specified area, provide the same payouts to all farmers according to the value of an index based on a weather variable (for example, rainfall, temperature, wind speed, and so forth)
- Area yield index insurance (AYII): Contracts that, for a specified unit area of insurance (UAI), provide the same payouts to all farmers against an estimated reference average yield (the "yield index") of the area

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Table 3: Comparative Analysis of Multiple-Peril Crop Insurance, Area Yield Index Insurance, and Weather Index Insurance

		What Is It?	Transaction Costs	Moral Hazard and Adverse Selection	Basis Risk	Claim Settlement Time
Multi-peril crop insurance	Individual farm	• A traditional indemnity insurance product against all perils • Payouts are determined through a farm-level loss assessment process	High	High	Low	Medium
Area-yield index insurance	Multiple farms in an area	• Based on average losses at the regional level, rather than farm level • Often based on crop-cutting experiments	Medium	Low	Medium	Medium
Weather index insurance	Multiple farms in an area	• Based on weather parameters (such as rainfall, temperature, or soil moisture) correlated with farm-level yields or revenue outcomes	Low	Low	High	Low

Source: World Bank Group (2015).

9. Strictly speaking, revenue insurance products should be considered hybrid indemnity-index products since the price component of the coverage is usually based on aprice index, such as found in a commodity market.

Insurance products for livestock as well can be classified as indemnity based and index based. The following are the more traditional indemnity products for livestock (CABFIN 2017):

- Standard accident and mortality insurance, which typically insures individual animals against accidental death or injury requiring slaughter due to various named perils, such as fire, lightning, aircraft and explosion, smoke, flood and windstorm, subsidence and landslide, and so forth. Standard mortality covers generally exclude risks such as diseases (especially epidemic diseases), theft, and other difficult-to-monitor risks.
- All-risk mortality insurance, which is a type of coverage available only in advanced agricultural production contexts, extends the standard accident and mortality insurance to include named diseases and, in certain cases, epizootic or Class A diseases (for example, foot-and-mouth disease), theft and straying, veterinary expenses, third-party liability, and other special types of risk.
- Business-interruption policies for catastrophic (epizootic) diseases, which are covers designed to indemnify both loss of animals following the outbreak of a catastrophic epidemic disease and the reduction or loss of income arising out of a ban on the sale of animals or animal products (meat, milk, eggs, and so on) for up to 12 months after the event.
- Livestock production can be also covered by other special types of indemnity insurance covers, such as transit insurance, exhibition insurance, loss-of-use insurance, carcass removal and destruction, and the like.

Index insurance principles are also used to develop covers for livestock. However, the most common approaches for livestock index products target pasture availability, rather than direct damage to the animals.[10] Indices to proxy pasture growth can be developed on the basis of weather data or on estimated biomass levels.[11]

BOX 2: BASIS RISK IN INDEX INSURANCE

Basis risk is a key constraint for index insurance, and it can give rise to underpayments or overpayments, compared to the intended payment. In its widest sense, basis risk is the difference between the loss experienced by the farmer and the payout triggered. However, identifying the **differences between losses and payouts received** by the farmers can be complex. Such differences depend on the index insurance methodology on which the coverage is based. For example, a weather index insurance contract is not structured to cover pest and disease losses. Therefore, losses generated by such perils should not be compensated by a weather index insurance contract, and, accordingly, lack of payouts following a pest or disease attack should not be considered basis risk events.

A key dimension of index insurance is the distinction between average losses experienced in the coverage area as a whole **(covariate risk)** and losses experienced by individual farmers **(idiosyncratic risk)**. Causes of basis risk could be related to the distance from the point of measurement of the indexed variable and the geography or size of the unit area of insurance **(spatial-basis risk)**, or to the timing of the start of crop season, which may differ from the measurements established in the index insurance contract **(temporal-basis risk)**. If parameters such as triggers and exits are incorrectly calibrated, or the relationship between the index measurement and the crop yield is not clear, basis risk may be attributed to product design **(product-basis risk)**.

Source: IFAD (2017), modified.

10. An interesting index insurance experience for livestock has been developed in Mongolia, where payouts were triggered by a "mortality index." See DeAngelis (2013).
11. For more details on livestock index insurance, see, for example, World Bank Group (2015).

Lastly, agricultural insurance, particularly in its index-based version, can be implemented at different application levels, generally identified as "micro," "meso," and "macro," depending on the nature of the policyholder.

- At the **micro level**, the policyholders (the insurer's customers) are farmers, households, or small-business owners who purchase insurance to protect themselves from potential losses caused by adverse weather events. Micro-level policies can also be distributed to farmers by organizations such as financial service providers, farmers associations, input suppliers, processors, or nongovernmental organizations. In addition to having wider outreach to the target group than most insurers, these intermediaries also have vested social or commercial interests in protecting themselves and their smallholder clients against weather risk. For example, insuring farmers can help financial service providers, input suppliers, and other intermediaries manage their risk of default by farmers. This in turn can help unlock development opportunities for poor smallholders, such as access to credit or higher-quality inputs.
- At the **meso level**, the "aggregators" mentioned above can act as the policyholder. At this level, insurance can be structured through a policy issued to the organization, but with payout rules that could either directly or indirectly benefit farmers—for example, to alleviate mass loan defaults in a microfinance institution.
- At the **macro level**, insurance can also be sold to aid governments and relief agencies in development and disaster management.

As for any other insurance product, a key element for the design and implementation of agricultural insurance is data. Data availability is indeed critical and influences the selection of the products that can be adopted. For example, AYII requires the availability of appropriate time series of regional yield data and the possibility of implementing appropriate data-collection procedures—usually based on in-field crop cuttings—while weather index insurance requires time series of weather data of suitable quality and, when based on ground measurements, a network of weather stations located in the appropriate sites.

Index insurance can also be designed on the basis of data collected through remote sensing devices, and this is being used more and more in agricultural insurance programs. Remote sensing data can be collected through satellites, aircrafts, and drones and can be used to develop pure weather index products (such as, for example, rainfall index products based on precipitation levels estimated through satellites) or to develop products that measure variables that are directly related to the growing conditions of the crop (hence resembling more closely an area-yield index). The most common remote sensing approaches adopted in index insurance for agriculture include rainfall estimates, vegetation indices (NDVI, fAPAR, LAI, fCover, and so forth), evapotranspiration estimates (actual and relative evapotranspiration), soil moisture, and estimation of cultivated area and productivity based on synthetic-aperture radar (SAR) data. Each approach will differ by the type of variable that can be described, the spatial and time resolution, and the amount of historic data available.

Remote sensing applications to agricultural insurance are relatively new, and the industry is still on the learning curve. Their potential for addressing some of the key problems in the implementation of crop and livestock insurance is very strong, particularly in reference to the chronic lack of yield and weather data and the challenges of ground-based monitoring of remote areas. However, the ability to capture variation in productivity to an acceptable degree needs to be tested in every specific implementation case.

Public and Private Approaches to Developing Agricultural Insurance Markets

Given the distinctive features of agricultural production activities, developing agricultural insurance markets presents numerous challenges. In the first place, not all insurability conditions hold in agriculture,[12] and there are well-documented obstacles that hinder the development of agricultural insurance markets (Skees and Hartell 2006). Agricultural risks are generally "correlated"; therefore, the

12. Insurability conditions, as presented by Skees and Hartell (2006), quoting Rejda (2001), are the following: (a) determinable and measurable loss, (b) accidental and unintentional loss, (c) calculable expected frequency and magnitude of loss, (d) potential insureds can be accurately classified into roughly homogeneous pools, and (e) large number of independent exposure units.

diversification effect that insurers count upon does not hold. Then there are asymmetries in information (that is, the different parties of the contract have different level of information about the object of the coverage) that lead to "adverse selection" and "moral hazard" effects. There are also structural features of agricultural production that generate high transaction costs for underwriting, monitoring, and loss-adjustment activities. All these elements have traditionally generated a market failure in agricultural insurance, and viable markets for this class of products hardly develop unless there are specific conditions or dedicated support is provided.

Experience shows that agricultural insurance models based on public-private partnerships (PPPs) contribute to a more effective and efficient intervention. Different operational models have been tested in various countries, and after decades of tests and experiences at the international level, both the "entirely public" and the "entirely private" approaches to implementing agricultural insurance (figure 14) have shown their limitations. The set of possible arrangements for agricultural insurance PPPs is broad, and there is no predefined approach to be prescribed; each country should identify the solution that best suits its specific needs. Also, effective agricultural insurance typically requires the involvement of several stakeholders, including local insurers, reinsurers, distributors, farmers organizations, and government departments/agencies. The distributors could include commercial and other banks (agricultural, rural, and cooperative), microfinance institutions, and agribusiness companies, including input suppliers. Government departments and agencies that could have a role include the insurance regulator, ministry of finance, ministry of agriculture, planning ministries, the meteorological service, and other research and specialist institutes.

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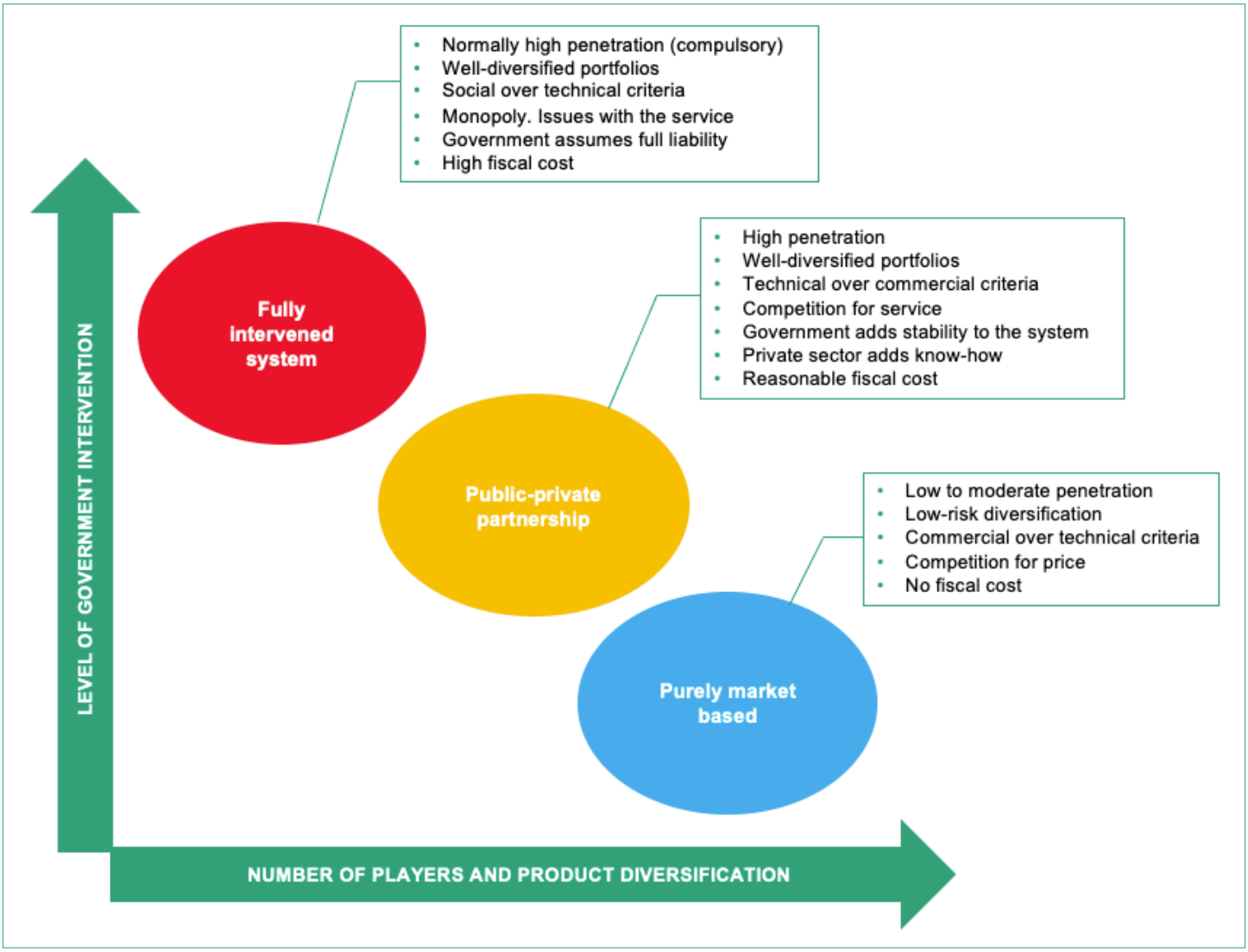
Figure 14: Roles of Public and Private Sectors in Different Types of Agricultural Insurance Programs



Source: Iturrioz (2010).

Agricultural insurance programs can be structured around different types of organizational frameworks. A completely private structure can be suitable for countries that have very specific structural and risk profiles or for programs that target mainly localized and independent perils (for example, hail or fire). Figure 15 illustrates a case in which the structure of the program is entirely managed by the private sector and there is no involvement of public institutions, except for regulatory purposes. In this type of structure, farmers may be provided with insurance policies by different types of agents (direct sales agents, brokers, input suppliers, banks) that offer products on behalf of insurance companies that have acquired protection from reinsurers.

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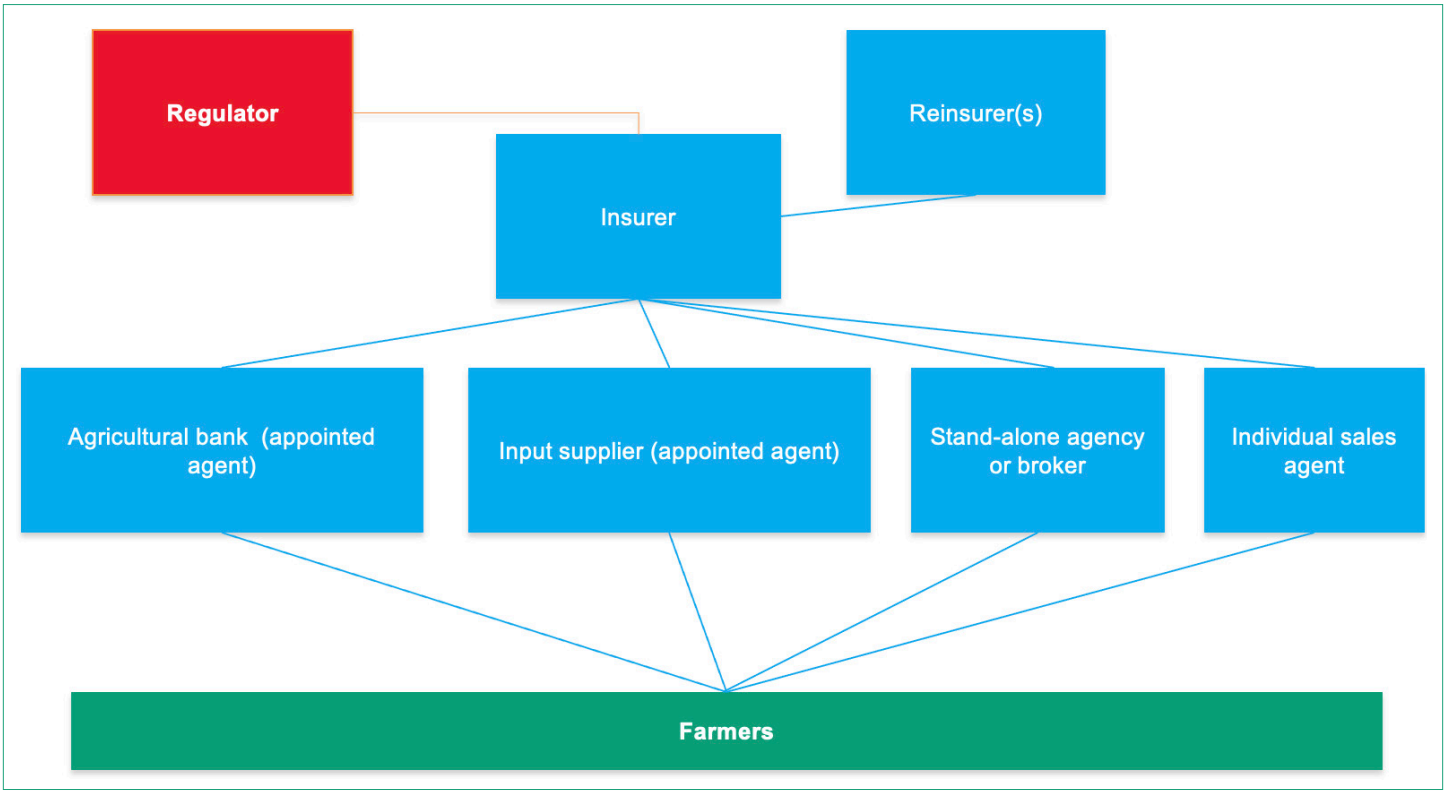
Figure 15: Private Market Structure for Agricultural Insurance with No Public Support



Source: CABFIN (2017).

In a PPP approach, the public sector can take a lead in different areas. These include a very light engagement, in which the government provides some technical support, from a simple aggregation of staff of selected ministries up to the development of a governmental agency for agricultural risk management. Government participation in an agricultural insurance PPP can be further enhanced by taking an active role in financing reinsurance, as happens in various countries (Mexico, Morocco, Spain, the United States, and so on).[13] Figure 16 presents a hypothetical structure in which the public sector is heavily involved in various roles—from providing financial support and public reinsurance (ministry of finance) to planning, collecting, and disseminating data; providing education and training (ministry of agriculture); developing dedicated legal frameworks and regulations (regulator); and providing special assistance in case of disaster events (disaster authority)—all feeding into a dedicated "Agricultural Risk Management Agency" that coordinates the entire system.

13. See Mahul and Stutley (2010) for a detailed analysis of public support to reinsurance of agricultural risk management schemes.

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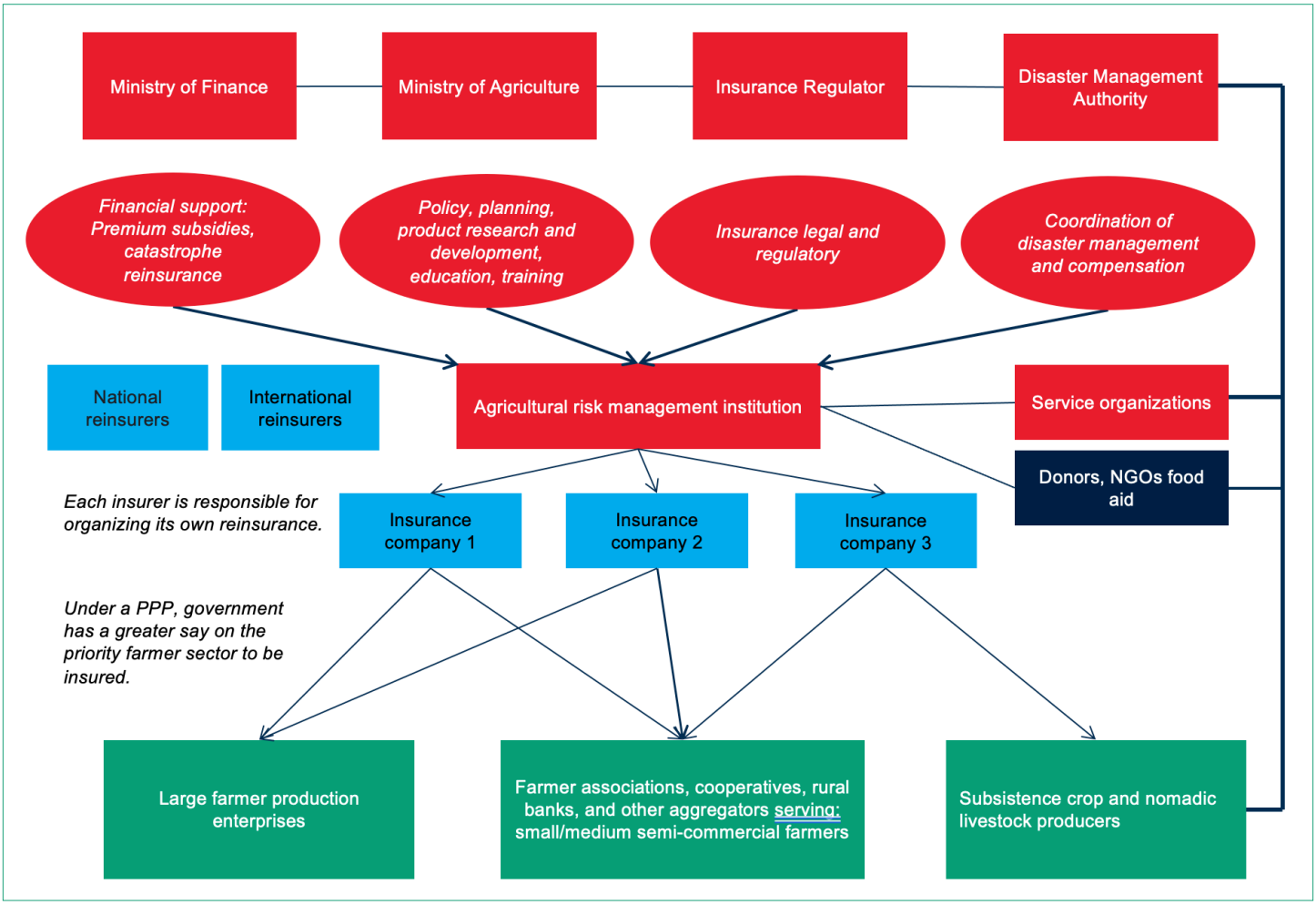
Figure 16: PPP Organizational Structure for Agricultural Insurance



Source: CABFIN (2017), modified.

The insurance industry can also interact with the government and farming communities in different ways. Insurance companies can work independently but can also develop different types of integrated structures that go from a simple market association to a co-insurance pool, and up to a single national insurance entity. Co-insurance pools are arrangements in which several insurance companies work together to issue insurance policies for specific products. A group of insurers decide that an insurance policy for a new or difficult class of insurance can be issued as a joint ("co-insurance") policy, where each insurance company is named as carrying a certain share of the overall risk. The pool can appoint a lead insurer to be responsible for taking underwriting decisions. Key examples include Spain and Turkey, where insurers have formed not only a pool but also a specialist managing agency (Agroseguro for Spain and Tarsim for Turkey) that is responsible for policy issuance and claims management. "Specialist agricultural insurance companies" are entities established to have responsibility for all business related to agriculture in a specific country. Many specialist agricultural insurance companies exist internationally. Examples are the Compagnie Nationale d'Assurance Agricole du Sénégal in Senegal and the agricultural insurance company formed in each province of Canada. These companies may be state owned or formed with joint state and private sector shareholding.

Public financial support is a critical element for a successful implementation of agricultural insurance. Public financial support to agricultural insurance is usually composed of funds for premium cofinancing and of resources allocated to the improvement of the enabling environment for insurance. Box 3 provides examples of public financial support for agricultural insurance, and box 4 presents the Government of Kenya's wide-ranging support for developing the agricultural insurance market in the country.

BOX 3: INTERNATIONAL EXAMPLES OF PUBLIC FINANCIAL SUPPORT FOR AGRICULTURAL INSURANCE

- Provision of **agricultural insurance premium subsidies:** In high- and middle-income countries, some level of premium subsidy is the most popular form of financial support, especially in support of multiple-peril crop insurance—for example, in Brazil, Canada, China, India, Japan, Mexico, Portugal, South Korea, Spain, Turkey, and the United States—although it is notably absent in some countries, including Australia, New Zealand, and South Africa. Due to budget constraints, premium subsidies are less common in low-income countries, but they are important in countries that have developed structured agricultural insurance programs, such as Kenya, Morocco, the Philippines, and Senegal.
- **Reinsurance support**: Government supplies reinsurance support in Canada, South Korea, and the United States and provides favored access to state reinsurance funds or companies in Brazil, Mexico, and Spain.
- **Administrative and operational expenses support**: This form of government financial support is provided in India, the Philippines, South Korea, and the United States.
- Governments may also provide **subsidized access to other government departments**, such as meteorological departments, statistics, training, and education, as well as enabling legislation.
- Promotion of **agricultural insurance pools** and supporting agencies or **technical support units**: for example, in China, Malawi, Mongolia, Spain, Thailand, and Turkey.

In addition, public funding can also support the development of insurance products, the collection of yield data, the strengthening of infrastructure, cover operating costs of dedicated institutions, and consumer education for farmers.

Source: Mahul and Stutley (2010), modified and updated.

BOX 4: THE KENYAN PPP EXPERIENCE IN DEVELOPING AN AGRICULTURAL INSURANCE PROGRAM

Starting in 2014, the Government of Kenya, with the support of the World Bank, has actively supported the development of crop and livestock insurance for smallholder farmers under a PPP between the government and private sector insurance companies. The government tenders the business, and prequalified insurance companies compete for the business either singly or as part of an insurance consortium (pool of co-insurers). Government support has been mainly in the form of premium subsidies on the crop and livestock insurance programs, but also through insurance literacy campaigns, implemented by the Insurance Regulatory Authority, and through assistance to strengthening agricultural insurance data and statistics.

Kenya Crop Area Yield Index Insurance Program

The State Department of Agriculture of the Ministry of Agriculture, Livestock, and Fisheries (SDA-MALF) has worked closely with the private sector insurers to develop an AYII program that was rolled out in 2016–17. The AYII program is underwritten by a pool of co-insurers led by APA Insurance. The Government of Kenya provides support to the program in the form of 50 percent premium subsidies, while SDA-MALF has assisted the private insurers to define the unit areas of insurance; to collect historic crop production and yield data to construct the area yield indices; through insurance awareness creation for county governments and farmers; and in the conduct of end-of-season crop-cutting experiments. The AYII program is closely linked to the government's e-fertilizer program and has been bundled with seasonal loans, most notably through the One Acre Fund. To date, well over half a million smallholder farmers in Kenya have been supported and benefitted by the AYII program.

Kenya Livestock Insurance Program

With the support of the World Bank, the Government of Kenya launched the Kenya Livestock Insurance Program (KLIP) in the 2015–16 short-rains season. The program is implemented by the State Department of Livestock of the Ministry of Agriculture, Livestock, and Fisheries. This insurance program is based on a satellite pasture drought index insurance cover using a vegetation or forage availability index (NDVI). Under KLIP, the government purchases an annual drought insurance cover from private insurance companies on behalf of vulnerable pastoralists. The government fully funds (subsidizes) the annual premiums for nearly 20,000 vulnerable pastoral households located in eight northern drought-prone counties of Kenya. Even though the livestock insurance is purchased by the government, insurance companies pay claims directly to the beneficiaries in the event of a payout triggered by drought. Payouts are made into beneficiaries' bank accounts or their mobile money accounts. The cost of the annual premium subsidies for the Government of Kenya is about US$2.1 million. Such volume of premiums from the government-supported initiative makes the agriculture insurance market attractive and may encourage private sector insurers to invest and further develop the market in the future. Between 2017 and 2020, northern Kenya experienced drought conditions caused by the El Niño/La Niña Southern Oscillation that triggered KLIP payouts of approximately US$7.5 million, benefiting more than 28,000 pastoralists and their family members.

Source: Authors.

Like other population groups, farmers are generally unfamiliar with insurance principles and modalities and, therefore, may not be able to assess rationally the opportunities offered by insurance. In addition, smallholders tend to follow traditional risk-management strategies, which may provide acceptable protection for the more frequent low- to medium-impact events and may lead the farmers to consider insurance as an unnecessary cost. Smallholder farmers also need to make income allocation choices for their limited resources and may frequently lack the cash to purchase insurance. Lastly, in case of major shocks, farmers may also expect to receive government relief, and this further reduces motivation to purchase insurance. All of this typically leads to most farmers not being willing to buy agriculture insurance, particularly if it is retailed as a stand-alone product.

Most of the schemes that have reached a high penetration have conditional requirements that bundle insurance with other support programs or services that farmers need. Nearly universal agricultural insurance coverage has been achieved in Greece because the purchase of agricultural insurance is required to be eligible for support provided to farmers by the Common Agricultural Policy of the European Union. In the **United States and Spain**, farmers that do not enroll in the agricultural insurance schemes are not eligible for disaster relief support. In **India**, the massive scale of around 50 million farmers insured under the Pradhan Mantri Fasal Bima Yojana scheme (IBEF 2023) is driven by the mandatory requirement to purchase insurance when applying for input credit from public sector banks. In **Kenya** (box 4), the increase in agricultural insurance take-up from practically nil to over 750,000 policies sold per year is due to a combination of premium support (50 percent cofinancing) and the role of "aggregators," such as One Acre Fund, Apollo Agriculture, and Kenya Seed Company, which request farmers to purchase insurance with the provision of inputs or input loans (Biese, McCord, and Gopalakrishna 2021).[15] Lastly, in **Zambia**, agriculture insurance scaled exponentially when it was bundled with a public scheme to provide subsidized agriculture inputs, increasing from less than 20,000 policies to over 900,000 policies in one year (World Bank 2019).[16]

The Agricultural Insurance Market in Namibia

In Namibia, access to agriculture insurance is currently limited. Insurance is available only to commercial farmers and mainly for liability covers and for protecting assets (buildings, vehicles, and so forth). Supply of covers for crops and livestock-production risks is very limited. The main players in the market for agricultural insurance are Santam, Hollard, Corporate Guarantee (through alternative risk-transfer arrangements), Old Mutual, Western National, and MMI.

Interest in agricultural risk management is growing, and a range of insurance and non-insurance risk-transfer options have been tested recently or are being considered. These options cover micro-, meso-, and macro-level interventions and include both indemnity and index approaches. The micro-level interventions being considered include multiperil mortality risks for livestock (so far limited to commercial farmers only); an index cover based on rainfall measured by weather stations for drought and flood risks for livestock (NASRIA); a revolving fund financed by farmers and linked to input provision for drought risk (NAB); and a vegetation index–based drought cover for livestock (Hollard). A meso-level drought index cover (based on rainfall measured at meteorological stations) for lead firms in select crop supply chains has been tested recently in the Kavango East and West Zambesi region (above the VCF). Lastly, macro-level drought covers based on a soil moisture index and on vegetation or adequacy-of-water requirement indices are being proposed, respectively, by the Namibia National Reinsurance Corporation (NamibRe) and the African Risk Capacity (ARC).

NamibRe, the state-owned national reinsurer, is developing a sovereign risk-transfer product. The product aims to allocate part of the liability to which GRN is exposed in case of major drought events to the reinsurance market (NamibRe 2022). The policy would be based on a high-resolution soil moisture index, and the government would pay a premium to obtain such a cover. Part of the risk originating from the transaction will be retroceded to the international reinsurance market and would be locally intermediated by NASRIA.

14. The translation of *Pradhan Mantri Fasal Bima Yojana* is "Prime Minister's Crop Insurance Scheme."
15. It is interesting to note that 90 percent of premium volume is generated through the "bundling" approach, while direct retail supported by the government with education, awareness and enrollment campaigns generates only the remaining 10 percent (Biese, McCord, and Gopalakrishna 2021).
16. A relevant example of lack of scale-up is the case of Ghana, where, despite remarkable preparation and implementation work supported by the German development agency, the lack of premium support and of a conditional requirement led insurance take-up to lag at low levels (Ankrah et al. 2021).

Index insurance for agriculture is currently not regulated in Namibia. To allow index-based insurance products to be offered in the market, NAMFISA may be able to use the regulatory sandbox approach currently under consultation. Also, since there is no disaggregated reporting requirement for agriculture insurance, specific data for this class of insurance products is currently not available from NAMFISA.

Market Segmentation and Peril Identification

GRN's primary interest in agriculture insurance in Namibia is to protect "communal" smallholder farmers. As mentioned in chapter 1, a clear distinction is made in Namibia between communal and commercial farmers, with the former referring to farmers who farm in communal land and the latter referring to those who farm in titled land. And, according to NAB, a further distinction is made between "communal subsistence farmers," with farm sizes up to 5 ha, and "communal smallholder farmers," with farm sizes above 5 ha.

To identify the right set of farmers to be targeted by an agricultural insurance program, the segmentation between smallholders and subsistence farmers should be verified. It is generally agreed that agricultural insurance programs should target smallholder farmers, while subsistence farmers should be protected using other DRF mechanisms—such as the National Disaster Fund in Namibia—or other macro-level insurance programs. Agricultural insurance programs are usually not an appropriate solution for subsistence farmers due to these farmers not being linked to the markets and thereby having limited capacity to contribute to insurance premiums. In the Namibian context, the key question is whether all farmers that operate farms below 5 ha are actually "subsistence farmers," or whether it would be more appropriate to classify as subsistence farmers those that operate smaller farms (for example, less than 2 ha, according to the NSA classification in table 2).

Based on the perils discussed in chapter 2, support for the development of insurance covers needs to focus on drought risk exposure for grazing cover for livestock, and pearl millet and maize cultivation. Husbandry of large and small animals is a fundamental component of the livelihood of the communal farming environment; hence, it should be one of the targets of the envisaged risk-transfer activity.[17] Crop cultivation is equally important, as it provides local communities with staple food inputs. The main crop-production activities among communal farmers are mahangu (pearl millet), maize, and sorghum.[18] Pearl millet covers nearly 80 percent of the grains area, while maize (15 percent) and sorghum (8 percent) share the rest. (Wheat is cultivated on only 1 percent of the total cereal area.) Hence, pearl millet and maize could be the main targets of an insurance program that intends to service the majority of the crop-farming population.

In the Namibian communal farming context, crops and livestock farming are carried out in the same productive environment and largely by the same households. According to the last census, 62 percent of households are engaged in both crop and livestock activities.[19] This is different from other countries in Africa, where crop and livestock activities targeted by insurance programs are carried out in separate environments by different parts of the population (for example, farmers versus pastoralists in East Africa). This is a relevant dimension to consider while designing products for communal smallholders in Namibia.

Selecting Appropriate Agriculture Insurance Products

International experience indicates that indemnity-based insurance is not well suited to the risk-transfer needs of smallholder farmers; hence, the most feasible options for them are index-based insurance products. Indemnity insurance requires pre-inspections, collection of individual production history records, and in-field assessment of losses and is also significantly exposed to moral hazard and adverse

17. According to the Namibia National Farmers Union: "In Namibia livestock makes a major, although largely underestimated, contribution to rural development. They produce food, enhance crop production and provide additional economic goods and services as well as cash income. The inclusion of livestock diversifies and increases total farm production and income, provides year-round employment and disperses risk. Sales of livestock products provide funds for purchasing crop inputs and for financing farm investments. Livestock often form the major capital reserve of farming households and, in general, enhance the economic viability and sustainability of a farming system. Despite communal areas constituting about 41 percent of the total land mass, being home to two-thirds of the country's population and supporting over 81 percent of the national herd, livestock production in the communal areas is still extensive and characterised by low productivity and communal livestock farmers especially in the NCA are still marginalised" (NNFU 2022).
18. Data from correspondence with MAWLR.
19. Table 3.1 in Namibia Census of Agriculture 2013/2014: Communal Sector Revised Report. June 2019.

selection. All these elements make indemnity products more challenging to operate in a smallholder farming context. Therefore, insurance products based on an index approach are more likely to be feasible and scalable. Further, index insurance products that use data collected via remote sensing can remove the constraints generated by the lack of adequate coverage of the territory by ground-level weather stations.

For livestock, vegetation indices or soil moisture or evapotranspiration index–based products that use remote sensing data seem most feasible. These products can focus on the amounts of pasture available for animal grazing or on the level of water available for pasture growth. Both approaches have their strengths and weaknesses, and the merits of vegetation indices, such as NDVI, and other indices such as soil moisture and evapotranspiration need to be assessed in the operational context of Namibia and the most promising one adopted. (See annex C for details on these indices.)

For crops, in the short term, soil moisture or evapotranspiration index–based products seem most feasible. The key risk for crop production in Namibia is drought, and soil moisture indices are specifically developed to monitor the water content of the soil, which is directly correlated with the level of water available for crop production. Evapotranspiration indices include an estimation of potential water demand by the crops and are also used to monitor drought.

While remote sensing–based index insurance products are likely to be more feasible to implement in the short run, the feasibility of AYII for crops should also be tested in the medium term. AYII typically provides a comprehensive coverage for crops, including a wider set of production risks. However, AYII requires more complex yield-estimation support activities, which are currently not in existence in Namibia.[20] Such data-collection activities would need to be established specifically by the public service or by dedicated private service providers. Therefore, an implementation of AYII in the short term may not be feasible.

20. Personal communication from MAWLR.

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Table 4: Features of Insurance Products Proposed for Smallholder Farmers

	Soil Moisture or Vegetation Index Micro-Level Index Coverage for Communal Smallholder Livestock Farmers	Soil Moisture or Evapotranspiration Micro-Level Index Coverage for Communal Smallholder Crop Farmers	Area-Yield Micro-Level Index Coverage for Communal Smallholder Crop Farmers
Target segment	Communal smallholder livestock farmers (not including subsistence farmers) mainly located above the VCF (red line)	Communal smallholder crop farmers (not including subsistence farmers); potentially also for commercial farmers without premium support	Communal smallholder crop farmers (not including subsistence farmers); potentially also for commercial farmers without premium support
Application level	Micro-level coverage (the policyholders are the farmers)	Micro-level coverage (the policyholders are the farmers)	Micro-level coverage (the policyholders are the farmers)
Risk covered	Drought	Drought	All risks affecting the average yield of the area
Insurance approach	Index-based, remote sensing soil moisture or vegetation index	Index-based, remote sensing soil moisture or evapotranspiration index	Index-based; yield assessed on area basis through sample crop cuts
Responsible agents	Private insurance companies, Ministry of Finance (financing), potential intermediaries/distribution channels	Private insurance companies, Ministry of Finance (financing), potential intermediaries/distribution channels	Private insurance companies, Ministry of Finance (financing), Ministry of Agriculture (or external service provider) for yield assessment, potential intermediaries/distribution channels
Risk financing	Potential partial premium subsidy up to a number of livestock heads to be determined	Potential partial premium subsidy up to 10 ha	Potential partial premium subsidy up to 10 ha
Pros/ advantages	• Tested and effective index insurance approach • Compared to applications in other countries, potentially easier in Namibia, given the prevalence non-pastoralist livestock husbandry"	Effective index insurance approach for transferring drought risk; recently growing, thanks to technological innovation that has significantly improved resolution of data	Comprehensive coverage including a wide set of production risks
Cons/ challenges	As per any index insurance product, potential occurrence of basis-risk events to be minimized through accurate contract design and definition of insured areas	• As per any index insurance product, potential occurrence of basis-risk events to be minimized through accurate contract design and definition of insured areas • Appropriate mainly for drought risk "	Given the need to estimate average yields per area units, operationally more laborious than a simple weather index

Source: Authors.

Implementing a National Agricultural Insurance Program

Support for the development of agriculture insurance is best delivered within the framework of a comprehensive national agricultural insurance program (NAIP). As discussed previously, several countries that support agriculture insurance for their farming communities have taken this approach. Adopting a NAIP approach can be particularly useful in integrating public and private sector efforts. To be effective, a NAIP would need to do the following: (a) reach a significant proportion of farmers prioritized by GRN; (b) provide comprehensive and integrated coverage in synergy with existing DRF programs; (c) target specific farmer segments; (d) potentially include interventions at different levels (that is, farmer level, aggregator level, and sovereign level); and (e) help strengthening infrastructure and data collection and management.

An effective public-private institutional structure is critical for a successful NAIP. Figure 17 illustrates a potential program structure that GRN could consider implementing.

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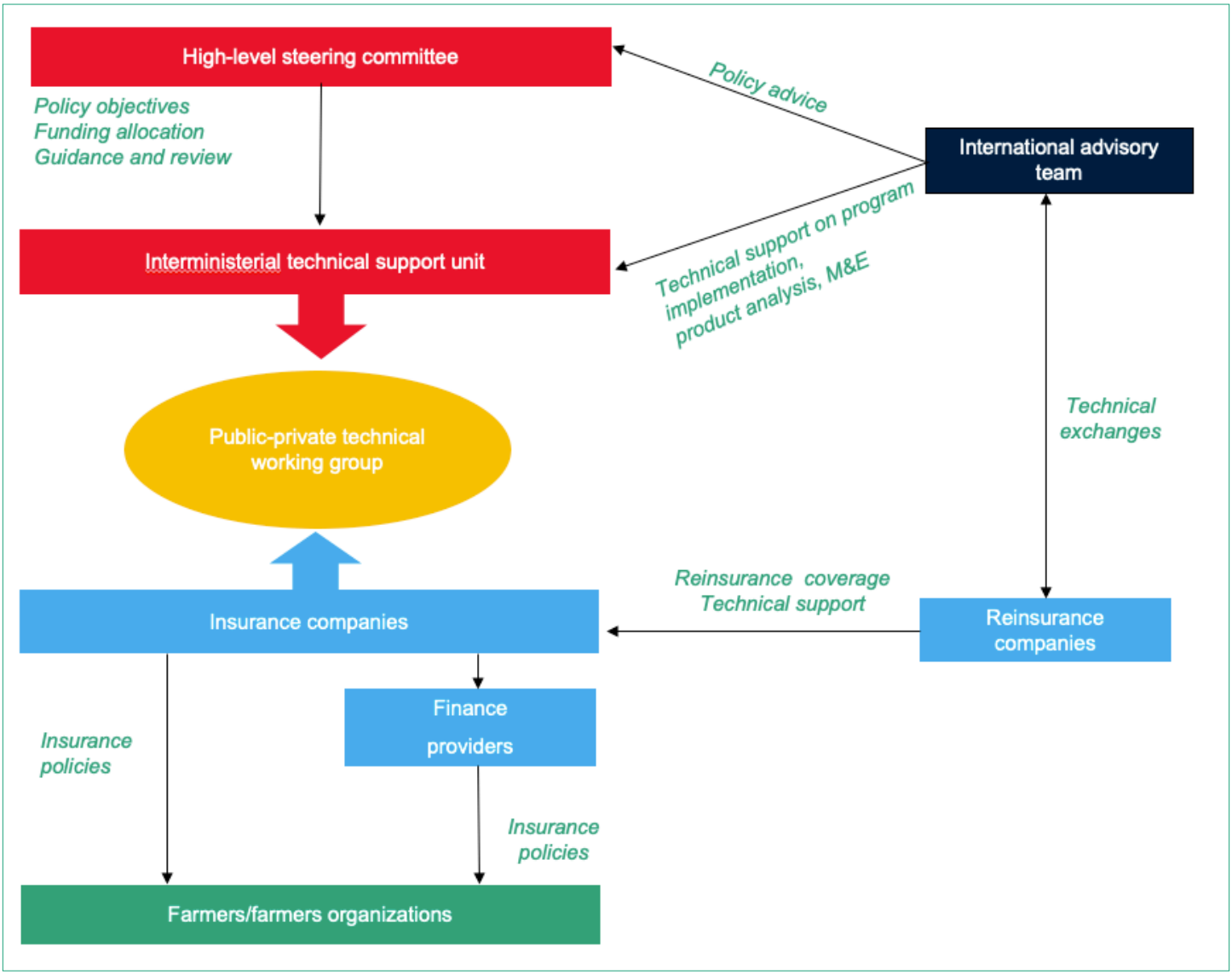
Figure 17: Potential Initial Institutional Structure for a NAIP in Namibia



Source: Authors.
Note: The graphical representation of a potential institutional framework for a NAIP in Namibia shows two different insurance-retailing models: (a) insurance directly retailed to farmers, and (b) insurance bundled with agricultural credit or production inputs and retailed through financial service providers or input suppliers.

On the public sector side, the NAIP should include both a high-level steering committee and an interministerial technical support unit. The high-level steering committee should include key government policy makers and identify the policy objectives, define the amount of resources to be allocated to the program, and provide general guidance on policy-level issues. The interministerial technical support unit should focus on implementing the orientations of the steering committee, oversee the operational activities of the program, and interact with the private sector components of the program.

Key private sector participants in a NAIP are the insurance and reinsurance companies. The insurance companies should interact primarily with the interministerial technical support unit, in order to receive guidance on program features and implementation procedures, and they would in turn provide feedback on the operational requirements of the program. Such interaction could take place in a public-private technical working group. Reinsurance companies would provide reinsurance capacity and, potentially, also technical support for product design and implementation. The insurance industry may or may not decide to work in a specific market aggregation form. An international advisory team could be also set up to provide policy advice and technical support to the public and private sector participants. Such a team could potentially be supported by multilateral and/or bilateral development agencies and comprise experts in agricultural risk management and finance.

Strengthening the quality of agriculture and farmer data is critical for the success of a NAIP. High-quality data is the backbone of any agriculture insurance program, and GRN and the private sector would need to collaborate to maximize data-collection outcomes. The availability of high-quality agricultural and farmer data is critical for insurers to be able (i) to measure losses, (ii) to design reliable products, (iii) to transfer risks to reinsurance markets, and (iv) to deliver payouts. In addition, data is needed for continual monitoring and assessment of the products.

A NAIP would also enable GRN to provide effective and efficient multiyear public funding necessary to finance various components of a NAIP. The largest component of such support is likely to be premium cofinancing. Given the significant levels of drought risk in Namibia, it is expected that premium rates for agricultural insurance policies will be high. Therefore, premium cofinancing would be key in making insurance more affordable for farmers. As is the case in most countries that operate public agricultural insurance programs, supporting the cost of insurance would have a relevant impact on the uptake of the covers. This would probably be a necessary condition, although it may not be a sufficient one. Public funding will also need to be allocated to support product development, yield-data collection, strengthening of infrastructure, and covering the operating costs of dedicated institutions and costs of farmers' awareness raising and education.

Lastly, a robust monitoring and evaluation (M&E) system is a key requirement to track the performance and implementation progress of a NAIP. The implementation of a robust M&E system allows assessment of the program's inputs and outputs, timeliness, effectiveness, and impact; it also facilitates information sharing, decision-making, and periodic reviews to address any new challenges and emerging issues. Specific areas that M&E needs to focus on are product performance (with particular attention to basis risk in index insurance programs), service quality, product satisfaction, and economic impact (in particular, measuring whether the program enables participating farmers to maintain their consumption levels following major events, and whether farmers are able to get back into production rapidly). A robust M&E system can also help stakeholders to identify and mitigate proactively key risks that can be faced by even a well-designed, adequately funded, and effectively implemented NAIP.

Providing Fiscal Support for a NAIP

A costing exercise was carried out to estimate the potential cost of a NAIP for Namibia during the start-up and scale-up phases. Initial costs for developing a NAIP would target expenses for (a) institutional building, (b) product research and development, and (c) product testing and piloting (including a small premium cofinancing component). Table 5 presents these cost estimates and assumptions.

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Table 5: Initial Costs for Product Development and Pilot Testing of Agricultural Index Insurance Policies

	Estimated Costs (Million US$)
Start-up and operational costs for interim unit for coordinating product development and pilot testing	0.1
Development of selected insurance products	0.2
Identification of pilot areas and data collection	0.1
Implementation of pilot tests: 2023-24 and 2024-25 crop seasons (tests on 3-5% of target area, including premium support)	0.6
Initial budget allocation for product development and pilot testing (total)	1.0

Source: Authors.

A costing exercise was also undertaken for the scale-up phase, under various scenarios. The scenario testing used the following parameters: (i) the subsidy levels, (ii) the farmer segments to be targeted, (iii) the potential take-up progression, (iv) the potential premium rates, and (v) the values to be insured. The farmer segment scenarios include households that farm more than 5 ha of land, a maximum of 31,673 households being targeted, and households that farm above 2 ha of land, an estimated 95,477 households being targeted. The exercise assumes 50 percent subsidy levels up to first 10 ha and a 10 percent uptake growth per year. The premium rates range from 5 percent to 15 percent for crops and from 4 percent to 10 percent for livestock, and insured value assumed is N$3000 per hectare. Annex D provides details on the parameters and scenarios considered for estimating the costs for GRN during the scale-up phase.

Source: Authors

The costing exercise produces a wide range of potential fiscal costs for GRN. Table 6 presents the overall costs per year for NAIP for the two target farmer group segments, including both livestock and crop insurance, and under low, medium, and high premium rate scenarios. The results indicate that at full rollout, depending on the farmer group segment targeted and premium-rates charged by the market, costs for GRN could range from US$1 million to US$4.5 million per year.

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Table 6: Summary of Fiscal Costs per Year for NAIP

		Premium Rate Scenarios		
		Low	Medium	High
		(Million US$)		
Total costs per year (targeting households that farm more than 5 ha)	**At program inception**	0.4	0.4	0.5
	At full program rollout	1.0	1.8	2.5
Total costs per year (targeting households that farm more than 2 ha)	**At program inception**	0.4	0.6	0.8
	At full program rollout	1.7	3.1	4.5

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Recommendations and Next Steps

This chapter summarizes the main recommendations of the diagnostic. The first two recommendations relate to strengthening Namibia's overall DRF approach, and the following four recommendations relate to supporting the development of agriculture index insurance. The chapter concludes with a set of sequenced next steps for GRN's consideration.

Develop and Adopt a Risk-Layered Approach to Disaster Risk Financing

An in-depth review of existing risk finance instruments and operational procedures is critical to develop a cost-effective risk-layered financing approach. An in-depth review of risk finance instruments will give the MoF a complete picture of the various risk-financing instruments currently being implemented by the government, help identify areas of redundancy, and enable review of the scope of the multiple contingency funds to ensure that they are appropriate and focused on the key policy priorities of GRN. Based on this review, actions can be taken to harmonize, streamline, and strengthen the risk financing instruments and claims settlement operational procedures with the objective of enhancing their efficacy in providing financial support to vulnerable households. GRN could consider building surge capacity within OPM and MAWLR, as well as the feasibility of scaling up cash support using mobile money to reduce high logistics expenditures.

Conducting a robust fiscal gap analysis can help the MoF in estimating the financing gap GRN is exposed to in relation to the financing of disaster response. Under such an analysis, historic disaster losses are collated and a statistical distribution is fitted to the historic relief costs. A Monte Carlo simulation is performed using the statistical distribution to produce an

indicative distribution of future relief costs. The distribution of future relief costs can then be compared against the existing risk financing that GRN has available to finance response, to understand the fiscal gap for minor, medium, and severe disaster events.[21]

A national DRF policy can help GRN provide policy coherence for its various DRF programs, including the NAIP. A national DRF policy can set out GRN's strategic priorities for financing disaster response. The MoF is ideally placed to lead the development of this policy. Developing a DRF policy can help strengthen the efficiency and efficacy of public expenditure. A comprehensive strategy would help avoid fragmentation and ensure the different mechanisms complement each other and support other relevant policy priorities. The policy would highlight the segments of society whose support the government would prioritize in the event of future shocks; the current (and potentially new) financing instruments upon which it intends to draw to support these households; and the delivery mechanisms through which it intends to disburse funds. Moving forward, the policy would support the MoF in prioritizing the allocation of funds to specific assets or populations based on its policy priorities. Figure 18 presents a risk-layering approach that incorporates the agriculture insurance program recommended for Namibia.

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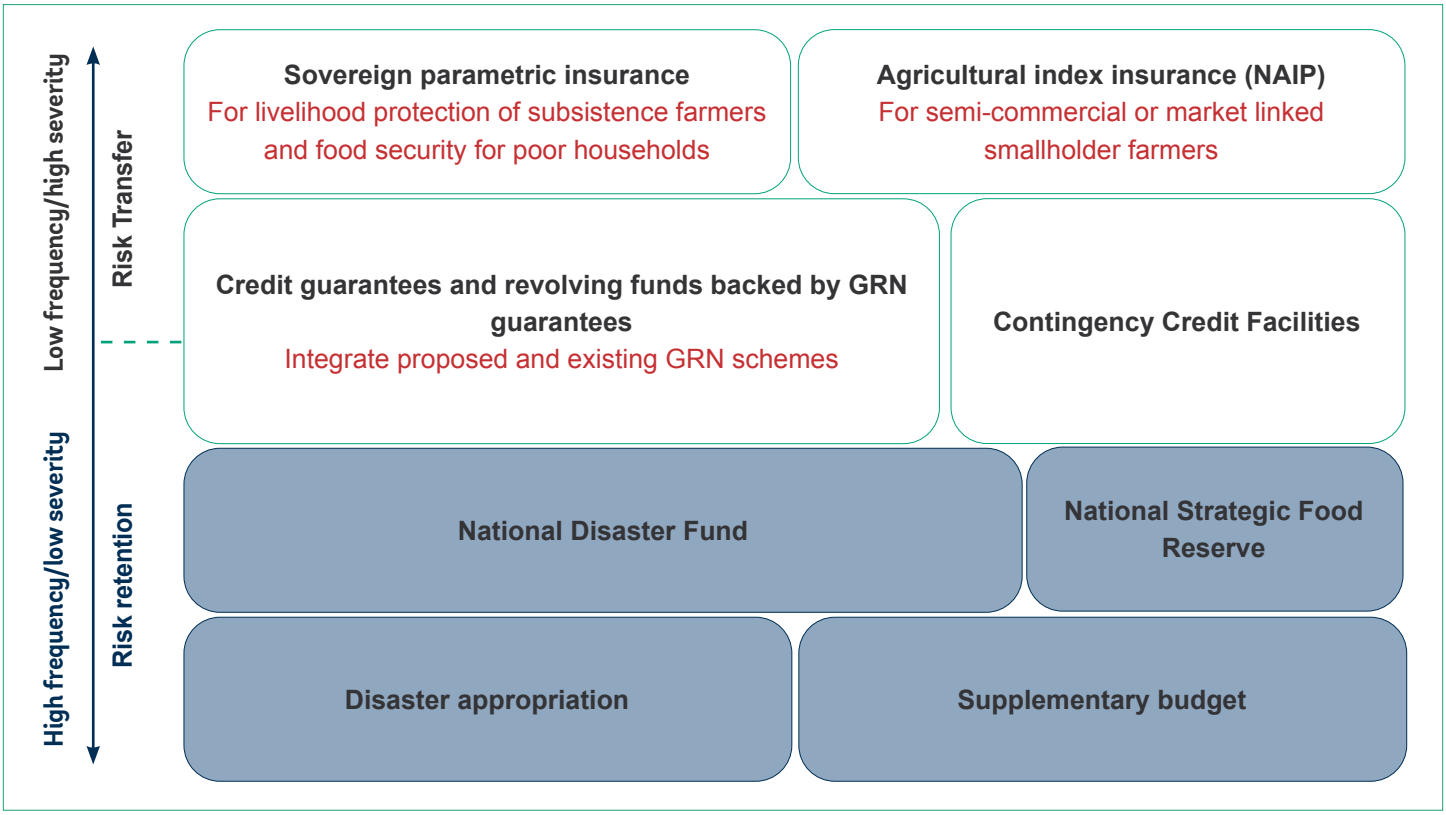
Figure 18: Risk-Layering Approach with Recommended NAIP



Source: Authors.
Note: Boxes highlighted in blue indicate instruments that GRN currently has in place and is using, while the white boxes indicate instruments that are not yet in place or used by GRN.

21. An example of a fiscal gap analysis, performed in South Africa, can be found at World Bank (2022).

Support the Expansion of Access to Financial Services for Smallholder Farmers

Increasing access to a broad range of financial services for smallholders is critical for several reasons. As discussed in chapter 2, access to a broad range of financial services is critical to help households optimally manage the risks they can retain. Further, as discussed in chapter 3, the value proposition for agriculture insurance is significantly increased when bundled with access to credit. Unfortunately, as discussed in chapter 1, access to credit for Namibian farmers, particularly communal farmers, remains extremely limited. Increasing access will require addressing the demand- and supply-side constraints. On the demand side, a key constraint that would need to be addressed is increasing the productivity of communal smallholder farmers and expanding the number of farmers who have access to formal markets. This is particularly relevant for the 55 percent of Namibian smallholder livestock farmers who are north of the VCF, but it is also relevant for the rest of smallholder farmers south of the VCF. On the supply side, there is a need to improve commercial bank and Agribank's offerings to the communal smallholder sector and expand financial service providers serving the sector beyond the banking sector.

GRN should consider developing an action plan to support expansion of access to finance for smallholder farmers. The action plan can build on the recommendations made by the 2021 Country Private Sector Diagnostic (IFC 2022) to improve access to finance for smallholder farmers, which included establishing a window for agribusiness under the credit guarantee scheme managed by DBN, strengthening availability of reliable data on smallholder farmers, and supporting the entry of fintech/agtech players to provide new financial products. The action plan could also benefit from a dedicated agriculture finance diagnostic. World Bank has undertaken such diagnostics in several countries in Africa, including Rwanda, South Africa, and Zambia.

Use Differentiated Approaches to Protect Smallholders and Subsistence Farmers

Agricultural index insurance programs should focus on smallholder farmers who are linked to the market. The size of this group that can be feasibly reached would depend on available or potential channels for distributing the products developed. Such channels typically include agriculture finance providers and agriculture input dealers. The number of farmers that a program can reach would also depend on the farmer group segments targeted. The scenario analysis undertaken by the diagnostic presents two scenarios based purely on available data on distribution of households farming on communal lands, ranging from under 32,000 (households farming over 5 ha) to over 95,000 (households farming over 2 ha). Further, at least in the initial phase, the livestock farmers that can be reached are likely to be those that are south of the VCF.

Subsistence farmers should be protected using other DRF mechanisms—such as the National Disaster Fund—and potential macro-level insurance programs. Based on international good practice, farm-level agricultural insurance programs are usually not an appropriate solution for subsistence farmers.[22] Micro-level insurance may not be a cost-optimal or viable option for subsistence farmers due to farmers not being linked to the markets and limited capacity to contribute to insurance premiums. This is compounded by insurers' lack of efficient distribution channels to reach subsistence farmers, which results in a high cost of distribution per policy. The National Disaster Fund, the primary instrument currently being used to support subsistence farmers, could be strengthened by introducing a risk-based assessment in the annual budgeting process and obtaining macro-level insurance or catastrophe protection, to increase the level of protection offered to individual farmers and ensure sustainability of the fund. Such an arrangement would complement the proposed NAIP for smallholder farmers. Further, the payouts from a macro-level insurance program could be integrated in the disaster relief activities of the government and distributed to the beneficiaries through already existing channels.

22. See, for example, World Bank (2011), 56.

Support Development of Index Insurance Products for Livestock and Crops

Based on the analysis presented in chapter 3, index insurance products are recommended for Namibia to cover both livestock and crop-production risks. The testing of index insurance products based on remote sensing data is recommended for livestock and crops, and for crops the recommendation is also to test a product based on area yield (AYII). Based on hectarage of crop-production data, it is recommended that pearl millet and maize be the initial target crops. The features of the index products recommended are summarized in more detail in table 4 in chapter 3.

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Figure 19: Agricultural Insurance Products Recommended for Smallholder Farmers and Potential Macro Cover for Subsistence Farmers

	Livestock	Crop	
Subsistence farmers	Macro-level soil moisture index: NamibRe (Government safety net)		
Smallholder farmers	**(Government safety net)**	**Micro-level soil moisture/ evapotranspiration (Commercial Insurers)**	**Micro-level area-yield (Commercial Insurers)**

Short-term Medium-term

Source: Authors.

Establish a National Agricultural Insurance Program as a PPP

As discussed in chapter 3, support for the development of agriculture insurance is best delivered within the framework of a comprehensive NAIP. Adopting a NAIP approach can be particularly useful in integrating public and private sector efforts, and this can be done effectively through a public-private institutional structure.

The NAIP should have a well-designed communication strategy that clearly communicates not only the advantages of index insurance but also its risks, particularly basis risk. As illustrated in box 2 in chapter 3, the main shortcoming of index insurance is basis risk, which is the difference between the losses experienced by the farmer and the payouts triggered by the policy. Basis risk can be minimized through appropriate product design and the development of a solid database for agricultural production data, but it cannot be eliminated. The NAIP's communication

strategy and materials should clearly communicate this risk together with the advantages this approach presents. Pilot testing can greatly contribute to the assessment of the quality of the products and could be implemented in the areas in which the quality of data is the highest.

Lastly, a robust M&E framework is necessary to track the performance and implementation progress of the NAIP and help mitigate key risks. The implementation of a robust M&E system allows for the assessment of the program's inputs and outputs, timeliness, effectiveness, and impact; it also facilitates information sharing, decision-making, and periodic reviews to address any new challenges and emerging issues. Equally important, it allows for the mitigation of key risks that a NAIP would face. Table 7 lists some of the key risks that the program can be exposed to and the potential measures that can be adopted to mitigate such risks.

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Table 7: Potential Risks and Mitigation Measures for the Development of a Successful NAIP

Risks	Mitigation Measures
Lack of participation by the insurance industry	• Develop a dedicated institutional structure in which the public and private sectors can interact and the requirements and concerns of the private sector can be addressed • Provide fiscal support to agricultural insurance to make the business proposition more sustainable • Establish accurate agricultural regulation to generate a clear and incentivizing operational environment
Lack of take-up from farmers	• Identify the appropriate farmer segment to be targeted • Link insurance with a conditional requirement or value proposition • Reduce the cost of the covers for farmers through dedicated fiscal support (mainly premium cofinancing)
Poor performance of the insurance products	• Carry out appropriate design of the products (particularly for index insurance) • Carefully consider triggers and exits of insurance products, in particular in regard to the understanding of farmers of the coverage provided • Set up a structured and well-planned testing activity for new products, and test different potential approaches comparatively • Carefully monitor and evaluate the results of the testing activity • Strengthen data collection
Issues in long-term sustainability of the program	• Set up a dedicated and effective institutional framework to manage the program • Establish high-level effective public governance of the agricultural insurance program • Carefully assess fiscal cost requirements to support the program and make long-term commitments

Provide Adequate Fiscal Support to the NAIP

As discussed in chapter 3, public funding would be needed for both the start-up phase and the scaling-up phase. In the start-up phase, public funding will be needed to support product development, improve yield-data collection, strengthen infrastructure and cover the operating costs of dedicated institutions and costs of farmers' awareness raising and education. In the scaling-up phase, the largest component of support needed is likely to be for premium cofinancing. Given the significant levels of drought risk in Namibia, it is expected that premium rates for agricultural insurance policies will be high. Therefore, premium cofinancing would be key in making insurance more affordable for farmers. As

is the case in most countries that operate public agricultural insurance programs, supporting the cost of insurance would have a relevant impact on the uptake of the covers. This would probably be a necessary condition, although it may not be a sufficient one.

The costs for GRN for the start-up phase are estimated at approximately US$1 million, while the costs for the scaling-up phase would depend on several factors. As discussed in chapter 3, initial start-up costs for developing a NAIP would target expenses for (a) institutional building, (b) product research and development, and (c) product testing and piloting (including a premium cofinancing component for three years). The costs for the scaling-up phase would depend on several factors, including (i) the subsidy levels, (ii) the farmer segments to be targeted, (iii) the potential take-up progression, (iv) the potential premium rates, and (v) the values to be insured. The scenario analysis undertaken shows that the cost for GRN could range from US$1 million to US$4.5 million per year at full rollout. The US$1 million per year cost relates to the program covering only communal smallholders with over 5 ha (approximately 31,000) and low premium rates, and the US$4.5 million per year cost relates to the program covering communal smallholders with over 2 ha (approximately 95,000) and high premium rates. Both scenarios assume that 80 percent of the grazing and cropped area of these farmers would be covered at full rollout.

Next Steps

The following steps are suggested as a sequenced approach to operationalize the recommendations for DRF and agriculture insurance made in this report:

Disaster Risk Finance

1. **Establish a technical working group (TWG) and an action plan to develop a risk-layered DRF strategy.** Such a multisector working group would be led by the MoF and consist of all relevant ministries and agencies, including academia, civil society, and development partners, as well as humanitarian partners such as the Red Cross, which is piloting Forecast-based Financing for droughts and floods. This would ensure wide stakeholder buy-in and strengthen coordination.

2. **Conduct a review of available risk instruments and their operational procedures and cost drivers.** This review could consider the cost-to-benefit ratio of in-kind support versus the high cost of logistics and building surge capacity within OPM and MAWLR, as well as the feasibility of scaling up cash support using mobile money to reduce high logistics expenditures. The review could be led by the Directorate of Economic Policy Advisory Services (EPAS) of the MoF, working very closely with OPM and MAWLR.

3. **Conduct a fiscal gap analysis to determine the financing needs, the current financing gap, and potential instruments and mechanisms to address this gap.** Subject to this analysis, GRN may consider options to strengthen the existing instruments, such as the National Disaster Fund, and adopt additional instruments, such as a risk transfer solution or sovereign parametric insurance, to sustainably increase protection to subsistence farmers who may not be a viable customer segment for micro-level insurance under the proposed NAIP. This analysis could be conducted under the guidance of the TWG and informed by the funding gap analysis methodology in the guidance note on conducting a disaster risk finance diagnostic (Benson, Mahul, and Alton 2017).

4. **Establish a TWG to develop an agriculture finance action plan.** Similar to the TWGs established for agriculture insurance and recommended for DRF, this TWG should also be a multisector group that could be led by the MoF or BoN and include both agriculture sector entities (MAWLR, NAB, Namibia Meat Board, and AMTA) and financial sector entities (BoN, NAMFISA, commercial banks, AgriBank, and DBN). The TWG can be informed by the key available analytical and policy reports, such as the Country Private Sector Diagnostic, and new ones, such as an agriculture finance diagnostic.

Agriculture Insurance

1. **The NAMFISA-led TWG engages with the insurance industry to plan for the development of the agricultural insurance market (immediate to short term).** The discussion should focus on reviewing the set of targeted stakeholders, the productive activities to be covered, and the types of products to be developed. A critical activity would be to **engage with insurance companies** to assess their interest in developing the agricultural insurance market and whether the interested insurers intend to consider potential forms of collaborations and synergies (for example, co-insurance agreements) within the framework of a national program. In addition, the public and private stakeholders should **carefully discuss and identify potential entry points/conditional requirements** that can allow insurance to scale up among the targeted segments of the population.

2. **Secure funds for the start-up phase of the program (short term).** Initial costs for developing a NAIP would be relatively contained and would target expenses for (a) institutional building, (b) product research and development, and (c) product testing and piloting (including a small premium cofinancing component). For the following phases of program development, budget allocations would need to cover more substantial amounts for (i) farmers' enrollment and registration, (ii) insurance awareness and education costs, (iii) premium cofinancing, and (iv) strengthening of yield-data collection.

3. **Set up the components of the NAIP institutional framework (short to medium term).** The key components of the agricultural insurance program would be (i) the steering committee, which would provide high-level policy decisions and oversight; (ii) the interministerial technical support unit, which would be responsible for implementing the orientations of the steering committee, for overseeing the operational activities of the program; and (iii) the public-private technical working group, in which the exchange of information and the negotiations between the public and private components of the scheme would take place.

4. **Establish regulations for index insurance and for potential aggregations of insurance companies (for example, co-insurance agreements) (short to medium term).** The use of index-based insurance products for agriculture in the Namibian market is currently not regulated, and the adoption of a regulatory sandbox approach or of specific regulation would be required. Similarly, should the insurance market plan to develop commercial aggregations to supply agricultural insurance, specific regulation may need to be developed.

5. **Define the process for developing the selected index insurance products, and support the product development activity (short to medium term).** The index insurance products suggested in this report are currently unavailable in the Namibian market, and dedicated research and development activities would be required. The steering committee and the technical support unit, in concert with the interested insurance companies, should identify the modalities for developing the technical solutions identified. In particular, it should be agreed whether the development work should be promoted and coordinated by the public-private technical working group, or if it should be carried out individually by each of the interested insurance companies or by a potential aggregation of insurance companies.

6. **Plan to test products and roll them out (short to medium term).** In parallel with the development of the selected insurance products, a plan should be devised for testing the products and for rolling them out.

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Annex A: Organizations Met by the Mission

Ministries	
1.	Office of the Prime Minister (OPM)
2.	Ministry of Finance (MoF)
3.	Ministry of Agriculture, Water, and Land Reform (MAWLR)
Agencies	
4.	Namibia Financial Institutions Supervisory Authority (NAMFISA)
5.	Agro-Marketing and Technology Agency (AMTA)
6.	Namibia Agronomic Board (NAB)
7.	University of Namibia (UNAM), Faculty of Agriculture
8.	Namibia Meteorological Service
9.	National Climate Change Commission
10.	Environmental Investment Fund of Namibia (EIF)
11.	Red Cross Namibia
Farmers Organizations	
12.	Namibia Agricultural Union (for commercial farmers)
13.	Namibia National Farmers Union (for communal farmers)
Insurers and Reinsurers	
14.	Namibia Special Risks Insurance Association (NASRIA)
15.	Hollard Namibia and Hollard Mozambique
16.	Santam
17.	MMI
18.	Old Mutual
19.	Corporate Guarantee
20.	Namibia National Reinsurance Corporation (NamibRe)
Banks	
21.	AgriBank
22.	Development Bank of Namibia (DBN)

Annex B: Disaster Risk Management Policy Framework

Policy/Strategy	Status and Alignment with the Proposed NAIP Embedded within a Comprehensive DRF Strategy
Disaster Risk Management Act 10 of 2012	• Enacted and in force. • Provides for the National Disaster Fund as a key instrument for financial protection against low to moderate losses. This is critical for a sustainable macro-level drought insurance solution and could complement a micro-level index agricultural insurance scheme. • Makes provision for line ministries to make budgetary allocations for disaster risk management at the national and subnational levels. However, this is not being implemented.
Namibia National Drought Policy and Strategy of 1997	• Drafted in 1996 but not adopted. • Currently under review for adoption in 2023. • Calls for an efficient, equitable, and sustainable approach to drought management and financing of drought response. In line with Namibia's National Agricultural Policy.
National Resilience Building Strategy and Action Plan (2022–30)[23]	• Aims to institute integrated and systematic planning for risk management and to build resilience to future risks across sectors between 2022 and 2030. • Aligned to the Sendai Framework for Disaster Risk Reduction (2015–30), which complements financial protection. • Identifies limited government funding for disaster response and management and the unpredictability of humanitarian funding as impediments to building resilience. The strategy proposes a Resilience Building Fund, in addition to a range of other resource-mobilization methods, such as catastrophe insurance and a contingency fund. The proposed national DRF strategy seeks to address this by establishing a cost-optimal risk-layering approach that links prearranged funds to disbursement mechanisms. • Recognizes the private sector and PPPs as critical to sustainable development. The proposed program is based on a PPP.
Namibia's Vision 2030; 5th National Development Plan (2017/18–2021/22); Harambee Prosperity Plan (2021–25); Regional Planning and Development Policy of 1997	• Focused on inclusive socioeconomic development. The proposed program covers all segments of smallholder farmers and aims to foster digital financial inclusion. • Aims to mainstream climate resilience into national development planning.

23. Resilience refers to capacity of individuals, households, communities, and the nation to anticipate and prepare for, withstand, respond to, and recover from shocks and stresses.

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Annex C: Indices Based on Data Collected via Remote Sensing

Vegetation Indices[24]

Time series of optical satellite data from sensors such as SPOT-VGT, Proba-V, NOAA/METOP-AVHRR, and MODIS have been used for many years to monitor and map vegetation anomalies over large areas and to assess major damage caused by extreme climatic conditions. Thanks to the frequent availability of these images, they are used for monitoring crop growth and development. One drawback is their rather coarse spatial resolution; pixel sizes vary between 250 m and 1 km, although, increasingly, high-resolution images (10–20 m) are becoming available. Crop monitoring with optical satellite images can be hampered by persistent cloud cover, but special techniques, such as profile smoothing or data fusion, may offer a solution to this problem.

The best-known vegetation index is the Normalized Difference Vegetation Index (NDVI). It is a simple product based on the combination of the measured reflectances in the red and near-infrared parts of the spectrum. NDVI is a good indicator of the amount and the condition of the vegetation. More advanced indicators include the fraction of Absorbed Photosynthetically Active Radiation (fAPAR) and the Leaf Area Index (LAI). Compared with NDVI, these model-based, biophysical variables often show a better correlation with crop yield and primary production.

Insurance programs based on vegetation indices, mainly NDVI, are implemented on a sizable scale in Canada, Ethiopia, India, Kenya, Spain, and the United States. In most cases, these are grassland or livestock products insuring against drought. As NDVI is a good indicator of vegetation vigor (or health) and yield, it is suitable for index-based insurance to provide cover against drought or other perils that are affecting crop yield (for example, those pests or diseases that have a visible impact on the plants' health condition). The relationship between NDVI and crop yields, however, is highly variable, depending on crops and regions. It also assumes that sufficiently long time series of accurate and preferably fine-scale yield data are available for calibration, which, in practice, may be problematic, especially in developing countries.

Evapotranspiration Estimates[25]

Evapotranspiration (ET) is the sum of evaporation and plant transpiration from Earth's land and ocean surfaces to the atmosphere. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and water bodies. Actual ET (ETa) is a function of the water demand by the crop (potential ET or ET0) and the water reserves in the soil. ETa can be derived from satellite observations using two different approaches. The most common approach is to use land surface energy balance models. Input to these models consists of visible, near-infrared, and thermal infrared observations from satellite sensors such as Meteosat or MODIS, whether or not complemented with weather station data. The second approach relies on the ability of satellite-based vegetation indices to trace the crop growth and estimate the basal crop coefficient (Kcb)—that is, a crop-specific conversion factor needed to adjust potential ET (estimated from weather station data) to the crop-specific ETa. Relative

24. IFAD 2017
25. IFAD 2017

evapotranspiration (ETr) is derived by dividing ETa by ET0. ETr provides an indication of plant water availability in the root zone and can be considered a measure of actual plant water use.

ET is a key variable that plays a strategic role in water-resource management, agriculture, ecology, and climate change. ET is a good indicator for agricultural drought. The Food and Agriculture Organization addressed the relationship between crop yield and water use in the late 1970s, proposing a simple equation by which relative yield reduction is related to the corresponding relative reduction in ET (Steduto et al. 2012). ET products are usually made available on an 8- to 10-day basis. The spatial resolution varies from roughly 1 km to 3 km. Depending on the satellite observations used, the time series can go back up to 35 years. Figure C.1 shows relative evapotranspiration anomalies in 2019, a drought year, and 2021, a normal year.

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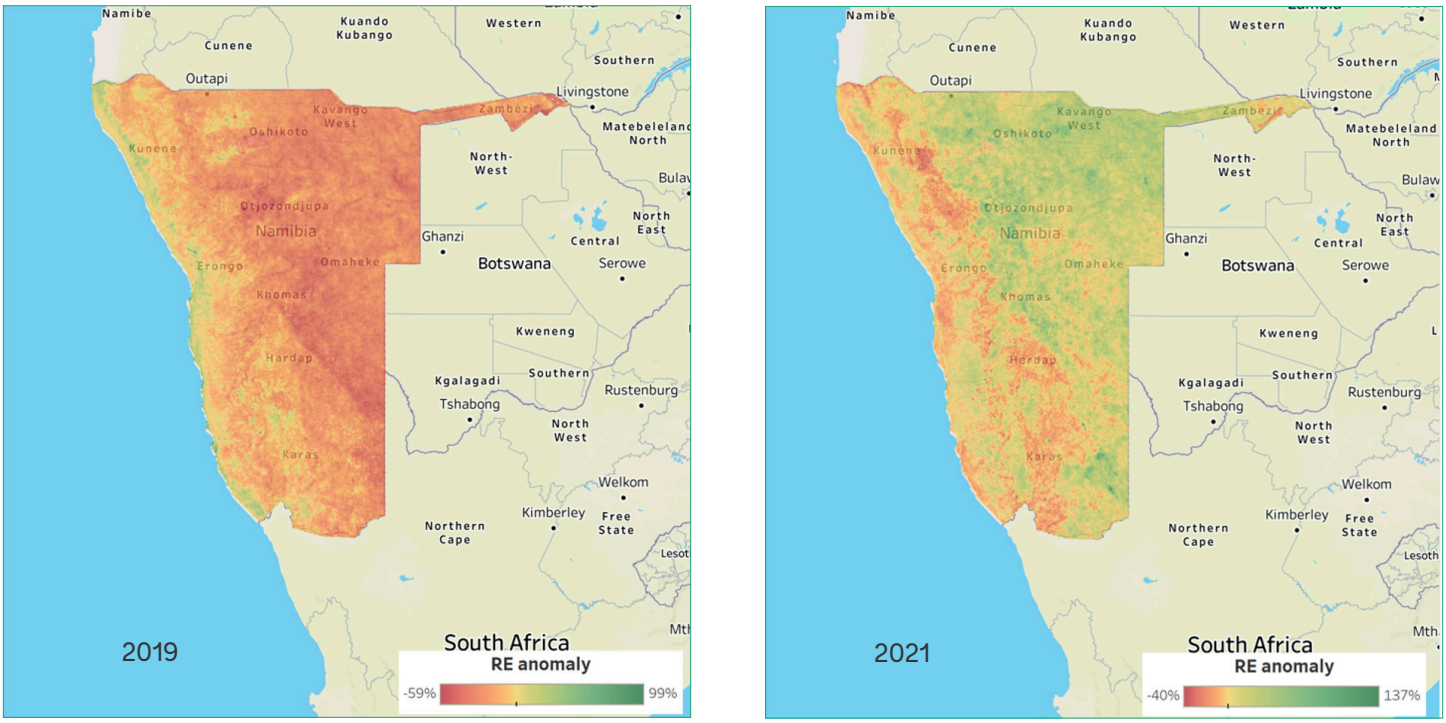
Figure C.1: Relative Evapotranspiration Anomalies in Namibia in 2019 and 2021



Source: Developed by eLEAF for this report.

Soil Moisture Indices

In the context of drought risk monitoring, soil moisture closes a critical gap between rainfall deficit and the response of the land surface (for example, vegetation health). Particularly, the water available to the root zone of crops is a critical indicator for agricultural production. Currently, there are various satellite sensors with different technologies. Most of them rely on microwave remote sensing, either via radar (active sensors sending down microwave beams and recording the backscatter) or radiometers (passive sensors analyzing the electromagnetic radiation from Earth's surface). There are surface and root-zone soil moisture datasets, single- and multi-sensor products, near real-time products, and long archives dating from 1978 to the present (with relatively large gaps until 1992).

Even the combination of soil moisture from a sensor with a high spatial resolution and another sensor with a high temporal resolution is possible. Long time series are a big advantage for drought risk assessment, because they allow the calculation of robust anomalies. In combination with machine learning, soil moisture can be used to predict near-future vegetation health. However, several limitations, such as the performance of soil moisture retrieval over sandy soils or dense vegetation, require expert knowledge.

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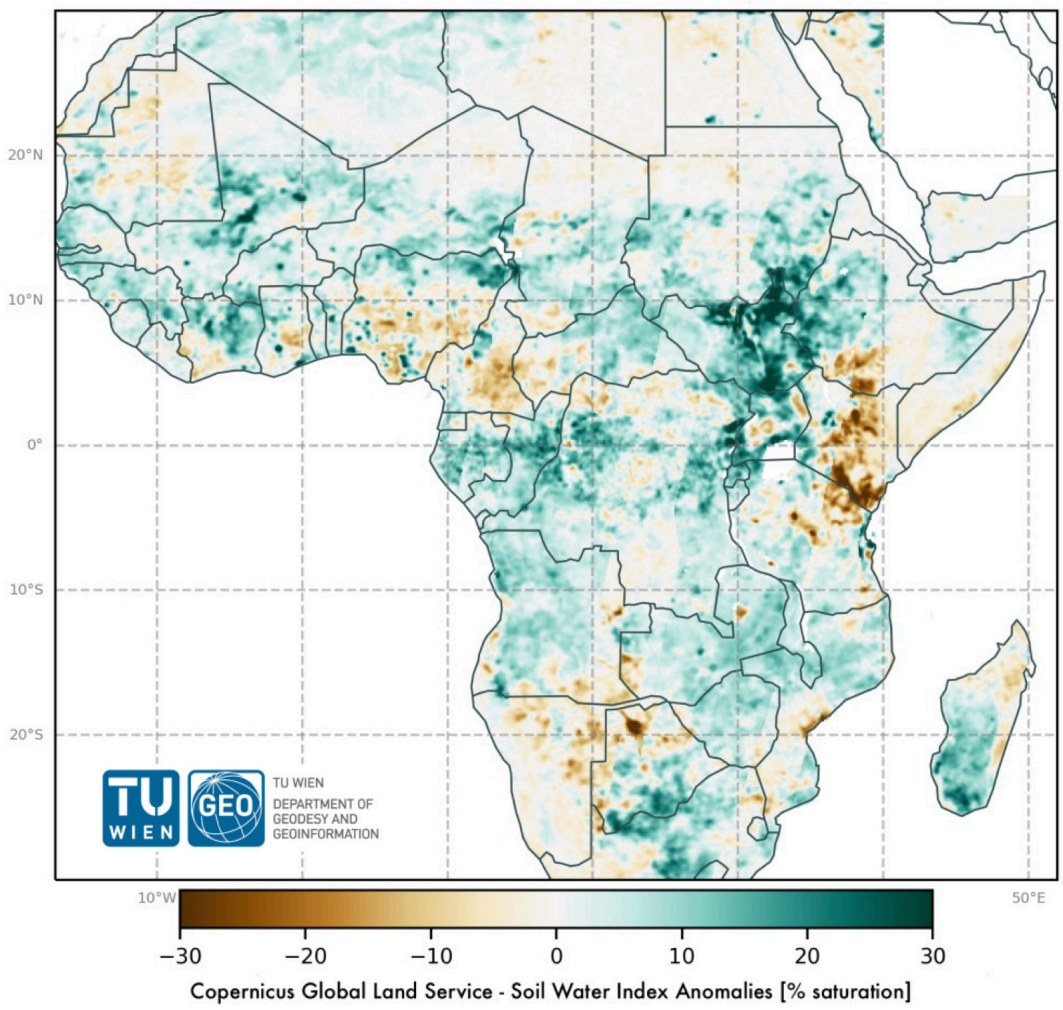
Figure C.2: Soil Moisture Anomalies in Africa in January 2023



Source: Department of Geodesy and Geoinformation, Technical University of Vienna

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Annex D: Parameters for Scenario Testing

Subsidy Levels

To estimate the fiscal costs of a NAIP for Namibian smallholders, it was assumed that GRN will incentivize the policies with a 50 percent subsidy level. The 50 percent premium subsidy level is applied frequently since it reduces the cost of expensive insurance covers while still leaving farmers with the responsibility of paying for a significant amount of the cost of the coverage. Where governments have opted to select insurance as a key agricultural policy intervention and to pursue full coverage of the farming population, subsidy levels are actually higher, reaching up to 80–90 percent of the premium cost (for example, India, Morocco, and the United States).

Insurance premium cofinancing that may be provided by GRN could be granted for up to the first 10 ha of any farm (that is, only the first 10 ha of each farm would be eligible for premium cofinancing). Such capping is recommended to make public support more targeted and efficient. That said, such a measure may lead to strategic behavior of farmers to segment their farms in 10 ha units in order to receive more support. The potential effectiveness of the capping measure and the impact of the potential strategic behavior need to be assessed by the Namibian policy makers, who, based on the knowledge of the local context, will be able to foresee the merits of such a measure.

Additional public costs for product development, yield-data collection, strengthening of infrastructure, and covering the operating costs of dedicated institutions and the costs of farmers' awareness raising and education are projected according to support levels estimated for other countries. For the case of **crops**, the amount is projected to be relatively stable over time, since some costs will be increasing in parallel with the expansion of the scheme (that is, yield estimation), while other costs will tend to decline (for example, infrastructure, awareness raising, and so forth). For **livestock**, the amounts are lower than for crops and are actually decreasing, since the yield-data collection carried out for crop covers will not be required. Some of the public support costs may indeed be common to both the crop and the livestock schemes, and more accurate estimations will need to be developed if GRN decides to progress toward the implementation of the program.

Target Farmer Segment and Size of Areas to Be Insured

The targeted farmer segments of the program could be the "communal smallholder farmers" who manage farms between 5 and 10 ha or between 2 and 10 ha. Accordingly, the identification of the aggregate hectarage that could be targeted by the insurance program has been carried out based on table 2, which presents the land use area and number of households by size of holding reported in the 2014 National Census for Communal farmers (NSA 2019). The data presented groups according to different land sizes, with the segmentation also including brackets between 2 and 5 ha, between 5 and 10 ha, and above 10 ha, which are in line with the conditions listed above. Accordingly, the area that could be targeted for crop insurance is estimated at 159,752 ha, and the area that could be targeted for livestock insurance is estimated at 85,552 ha.

The costing projections for livestock insurance were carried out based on the area of grazing land and not on the number of livestock heads. This is because (a) a segmentation of livestock numbers per household is unavailable, nor it is known how many heads per households would characterize subsistence and smallholder farmers; and (b) as opposed to the cases of other African livestock insurance programs, in Namibia, livestock husbandry is not based mainly on pastoralism. Therefore, the land that a household uses for livestock grazing can be considered proportional to the livelihood extracted from livestock production.

Insurance Take-Up

The potential progressive increase in take-up of agricultural insurance policies depends on many different conditions. The increase rate will depend mainly on the type of "entry point/conditional requirement" for farmers targeted in the program, if any. Progression of penetration of insurance can go from 1 percent to 95 percent in one season if there is a stringent mandatory condition (for example, Zambia, India, and so forth), or it can stay low, only a few percentage points, even in the presence of an appropriate institutional framework but with no clear value proposition for the farmers (for example, Ghana).

Given that GRN is motivated to promote agricultural insurance as an effective policy tool, the increase rate for purchasing insurance is set at 10 percent per year. However, the assumption that 10 percent of the eligible hectares will be insured in the first year of implementation may be considered optimistic, and it could be revised to lower levels (for example, to 5 percent in the first years of the piloting stage). In the same line, a 10 percent rate of expansion per year could be considered low if appropriate entry points for agricultural insurance are identified, and it could be revised upward. Currently, the assumptions on the rate of penetration are generic and are not based on specific policy orientations. Prior to implementation, scenarios will have to be updated to situations that better reflect the potential developments according to actual policy guidelines and also depending on the potential entry points identified.

Premium Rates

For the purposes of this analysis, the premium rates are based on the cost of agricultural insurance products in contexts similar to Namibia. No detailed yield or mortality databases were accessible for the current analysis. Therefore, it was not possible to provide estimates of the expected loss costs for the insurance products discussed or account for the potential variability of insurance rates according to different areas, production activities, and varying coverage levels. Hence, potential insurance premium levels to be considered for estimating the aggregate cost of the program were based on knowledge of costs in situations that resemble the operational environment of Namibia. Scenarios for a range of "low," "medium," and "high" rates were used. For crops, these were 5, 10, and 15 percent, respectively, and for livestock, these were 4, 7, and 10 percent, respectively. Premium rates for livestock are lower, since livestock are more resilient than crops with respect to drought, which is the main peril to be covered.

Values Insured

A key parameter to be identified for the definition of the costing projections is the value insured per hectare. Given the significant predominance of pearl millet in communal smallholder farming, the average value insured per hectare has been set at N$3,000, which is roughly the current price of the average yield of pearl millet per hectare (0.6 tons).[26] It is worth noting that 0.6 tons per hectare is an extremely low average productivity level, and that protection granted by the insurance cover on the basis of such a productivity reference may be quite low. Lacking specific information, the same reference insurance value has also been used for the areas used for livestock grazing.[27]

26. In many cases, the approach to determine a reference value to be insured is to consider production costs per hectare. The value could therefore be adjusted based on the actual production costs or by estimating them at 70 percent or 80 percent of production revenues.
27. This is also a parameter for which further information would be useful.


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