Climate and Disaster Risk Financing in Zambia

A Protection Gap Analysis

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G:ENESIS
25 YEARS OF UNLOCKING VALUE

Contents

Figures, boxes and tables

Figures

Boxes

Tables

Acronyms

AAL	Average annual losses
ADRiFi	Africa Disaster Risk Financing Programme of the African Development Bank
AGRICA	Climate risk Analyses for Adaptation Planning in Sub-Saharan Africa
ARC	African Risk Capacity
ARDIS	African and Asian Resilience in Disaster Insurance Scheme
CC	Climate Change
CDRFI	Climate and Disaster Risk Finance and Insurance
CRA	Climate Risk Analyses
DMMU	Disaster Management and Mitigation Unit
DRF	Disaster Risk Financing
DRR	Disaster Risk Reduction
FISP	Farmer Input Support Programme
FRA	Food Reserve Authority
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GRZ	Government of the Republic of Zambia
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
MOA	Ministry of Agriculture
MoFNP	Ministry of Finance and National Planning
MPI	Multidimensional Poverty Index
NDRT Fund	National Disaster Relief Trust Fund
NGO	Non-Governmental Organization
OCC	The Official Creditor Committee
PIK	Potsdam Institute for Climate Impact Research
RF	Risk Financing
SSA	Sub-Saharan Africa
UN	United Nations
UNDRR	UN Office for Disaster Risk Reduction
WB	World Bank
WFP	UN World Food Programme
ZK	Zambian Kwacha

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1 Background of the Project and Introduction

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) contracted Genesis Analytics to supplement the Climate Risk Analysis (CRA) in Zambia – implemented by the Potsdam Institute for Climate Impact Research (PIK) and GIZ as part of the "Climate Risk Analyses for Adaptation Planning in Sub-Saharan Africa (AGRICA)" project – with a risk financing component. The risk financing component serves as a concept for bringing resilience goals closer to implementation by 1) analysing financing options for identified adaptation measures and 2) paving the way to better manage residual risk through pre-arranged finance instruments.

This report relates to the second action area: it provides a quantification of the 'protection gap' in Zambia (focusing on the agriculture sector) as an analytical input to inform a future Climate and Disaster Risk Finance and Insurance (CDRFI) strategy. The protection gap refers to the difference between the expected financial impacts associated with disasters and the extent to which there are pre-arranged finance mechanisms in place that are available to provide finance in the event of a disaster. Understanding the size and characteristics of the protection gap is a critical component in the development of a CDRFI strategy: any strategy should focus on addressing the drivers of the gap identified and responding to where the gaps are greatest.

This work contributes to the objectives of the "Global Shield against Climate Risks". The Global Shield is an initiative for pre-arranged financial support designed to be quickly deployed in times of climate disasters launched by the Vulnerable 20 Group (V20) of Finance Ministers and the Group of Seven (G7) at COP27 to close the financial protection gap and strengthen resilience of vulnerable countries and people.

The remainder of this report is structured as follows:

- Section 2 provides details about the risk context in Zambia, including the results of a recent probabilistic analysis of risk.
- Section 3 discusses how risk financing instruments can be used to respond to the risks that the country faces and how different instruments are more or less appropriate for risks with different characteristics. It also outlines how this report defines the term 'protection gap'.
- Section 4 looks at the different pre-arranged financing options that Zambia can already access and estimates what these imply for the protection gap in Zambia.
- Section 5 discusses how the outputs of this analysis can inform the development of Zambia's future CDRFI strategy.

2 Risk Context in Zambia

2.1 Overall Risk Profile

Zambia is amongst the countries most vulnerable and least adapted to climate risk, scoring 138 out of 181 countries on the ND-GAIN Vulnerability Index in 2020.[1] Its vulnerability has been attributed to its large dependency on natural resources and the limited climate change (CC) adaptive capacity in the agricultural sector. Historically, Zambia has had a tropical climate with a single rainy season between November to April in most parts of the country.

Zambia is highly vulnerable to a range of disasters. In the past 30 years, floods and droughts cost Zambia more than US$ 13.8 billion in disaster losses, equivalent to a loss of 0.4% in annual economic growth.[2] From 2012-2019, Zambia had moderate or severe drought in every year except 2014.[3] The frequency of droughts has increased over the past 30 years. These disasters have both a devastating short run impact on those people who experience them and constrain the long-term growth and development opportunities of the country.

These disasters are expected to worsen significantly because of climate change. Climate change will affect both temperatures and precipitations, with important differences depending on the future path of global emissions (**Box 1**). [4]

Box 1. Summary of temperature and precipitation factors affecting climate change

Under a global low emission scenario (SSP1-RCP2.6), Zambia's mean annual temperature stabilises at around 2°C increase in the late 21st century, compared to pre-industrial levels. However, under a high emission scenario (SSP3-RCP 7.0) temperatures in Zambia continually increase throughout the 21st century, passing the 2°C threshold by 2050 and increasing by more than 4°C by 2080. In this scenario, *the number of very hot days is projected to increase in all parts of the country,* with an expectation that the country's average number of extreme hot days will increase by 88 days by the 2080s.

These effects will be particularly pronounced in the southern part of the country which could see around 140 more hot days each year. Given that some of these regions already experience up to 70 hot days per year under the current climate, this implies that most of the year will be very hot.

Precipitation trends are more uncertain. Under a low-emissions scenario, the most northern parts are projected to experience a slight increase in annual precipitation of up to ca. 6% by 2080 while the southern and central parts of the country, which are already drought prone, show a decrease in precipitation of around 12% (10%) by 2050 (2080). However, under the high emission scenario, most of the country shows a drying trend throughout the 21st century and an increase in extreme drought is predicted all over the country.

There is expected to be a tripling of 'extremely dry months',[5] with the strongest increase in central Zambia under SSP3-RCP7.0.

Source: Authors based on referenced sources

1 The index summarises a country's vulnerability to climate change and other challenges in combination with its readiness to improve resilience. Zambia has a high vulnerability and low readiness score.

2 Zambia national drought plan (2018). Republic of Zambia

3 World Bank (2021). The role of strategic grain reserves in enhancing food security in Zambia and Zimbabwe

4 Potsdam Institute for Climate Impact Research (2023). AGRICA Zambia Climate Risk Analysis

5 Potsdam Institute for Climate Impact Research (2023). AGRICA Zambia Climate Risk Analysis: The Standardised Precipitation Index (SPI) is a relative measure of accumulated dry conditions. Extremely dry months are defined by an occurrence of approximately once every 3 to 4 years.

The impact of this current and future risk profile is reflected in recent probabilistic risk analysis by UNDRR.[6] A probabilistic risk analysis examines the relationship between disaster severity and the frequency of occurrence: it allows users to understand how the impacts of a disaster (measured in terms of, for example, people affected, or damage caused) change depending on the probability of an event of differing severity happening. For example, it might identify that events that happen on average once every two years (sometimes referred to as events that have a 1 in 2 year return period or a 50% annual exceedance probability) typically cause US$ 1 million damage and would be expected to affect 2,000 people but that rarer, more severe events that would only be expected to happen once every 100 years (i.e. they have a 1 in 100 year return period, or a 1% probability of happening in any one year) might be expected to cause US$ 50 million of damage and would be expected to affect 50,000 people. Understanding this relationship makes it possible to have a quantitative understanding of how much impact might be caused on average every year, as well as how severe the impacts may be in the extreme cases. **Probabilistic risk analysis is typically conducted using catastrophe models that combine information on exposure** (who or what might be affected), **hazards** (the probability and severity of different events) **and a module that considers the consequences of the interaction of hazard and exposure.**[7]

The key results from this UNDRR analysis are:

- **Droughts** – the average number of people directly affected by drought each year is currently around 3.26 million people, almost 19% of the country's 2019 population. Under the combined effect of both climate change and socio-economic change, this could increase to 6.93 million by the second half of the century, although this would represent a slightly smaller proportion of the total country population in 2050 (17.9%).[8] This is associated with direct economic losses of US$ 75 million (0.35% of 2015 GDP as reported in the study), which could rise to US$ 250 million in the decades beyond 2050 (0.11% of expected 2050 GDP as reported in the study). These are losses associated with agricultural production (see below) and hydroelectric power production. The report does not provide an assessment of how the economy-wide average annual loss might be distributed between high frequency/less severe and less frequent/more severe events, although this is analysed on a sectoral basis, as discussed below.
- **Floods** – on average, 19,600 people are currently affected by floods each year, amounting to 0.11% of the 2019 population. Considering the combined impact of future climate change and socio-economic trends, this could increase to around 66,000 people by the second half of the century (0.17% of the 2050 population). This is associated with an average annual loss of US$ 25 million (0.12% of 2015 GDP) which could increase to US$ 31 million (0.01% of expected 2050 GDP). Both now and in the future, losses are expected to be heavily concentrated in the housing and service sectors. Average annual losses are very heavily dominated by high frequency events – for example, under current climate conditions, losses associated with a 1 in 5-year return period event are around US$ 50 million while a 1 in 150-year event is only estimated to cause US$ 60 million of damage.

The analysis shows that while both hazards have the potential to cause significant damage and human suffering, droughts are expected to affect more people and cause greater economic losses, and that these effects could become particularly pronounced with future climate change.

2.2 Deep Dive into Agriculture

As the AGRICA project has a focus on risks associated with the agricultural sector, **a deep dive into the risk profile, pre-arranged finance landscape and protection gap in the agriculture sector is additionally included in this report.**

2.2.1 Drought

Unsurprisingly, drought is particularly important in the agriculture sector. Average annual direct agricultural losses associated with drought conditions are currently US$ 29 million (39% of total losses modelled) but could rise to US$ 180 million (72% of total losses) in future. These are the losses associated with crops only.[9]

The probabilistic analysis shows that these losses are driven by events which happen relatively frequently. Stylistically, the average annual losses associated with disaster events can be driven each by infrequent events that cause large amounts of damage or by more frequent events that cause relatively less damage. In the case of drought in Zambia, most of the losses are associated with regular events. For example, a 1 in 20-year event (an event for which there is a 5% probability that it will happen in any one year – annual probability) is associated with losses of around US$ 150 million, while for a 1 in 100-year event (annual probability of 1%) these losses increase, but only to US$ 350 million.[10]

Livestock is also highly vulnerable to drought conditions. Around 4 million units of livestock are currently affected by drought each year. This could rise to 5.7 million per year by the second half of the century.[11]

Agricultural losses are concentrated in regions where poverty is particularly high. Figures 1 and 2 show the correlation between each region in Zambia's multidimensional poverty index (MPI)

6 UNDRR, CIMA Research Foundation (2019). Disaster Risk Profile: Zambia – 2019

7 In a standard probabilistic modelling exercise looking at building damage, this interaction would be assessed through a vulnerability module which would analyse how much damage might results to buildings (exposures) affected by different events (hazards).

8 The emissions scenario used in this analysis of future climate impacts is RCP 8.5 which has higher atmospheric concentrations of GHGs than RCP 7.0 used in the AGRICA analysis. This will typically result in more extreme climate impacts. There is an ongoing debate in the climate change literature regarding the appropriateness of using RCP 8.5 in studying climate change impacts. See, for example, Carbon Brief (2019). Explainer: the high emissions 'RCP 8.5' global warming scenario. Available at: https://www.carbonbrief.org/explainer-the-high-emissions-rcp8-5-global-warming-scenario/

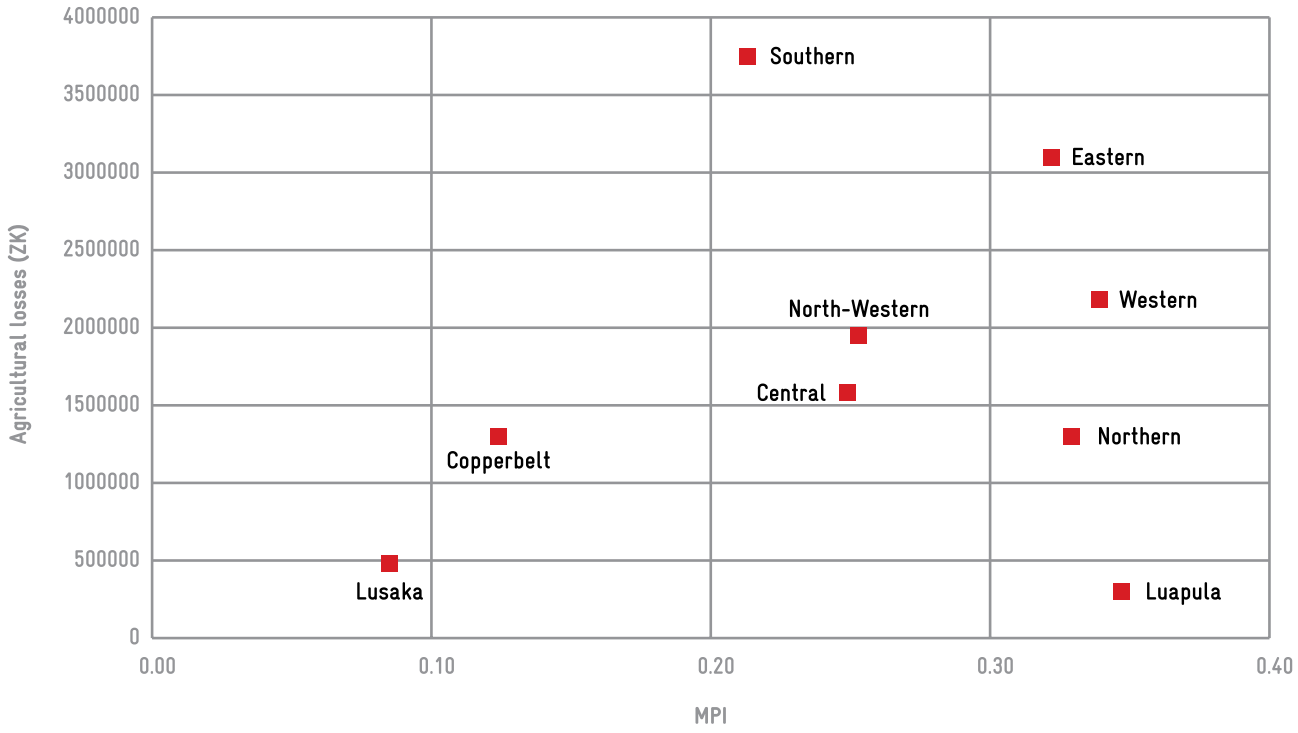
9 UNDRR, CIMA Research Foundation (2019) Disaster Risk Profile: Zambia – 2019

10 Ibid

11 Ibid

score and, respectively, agriculture losses and livestock losses as estimated in the UNDRR study. Figures 3 and 4 show the same data but considering losses per person. Figures 1 and 3 show that average annual agricultural losses and average annual losses per person are most substantial in those regions which have a high MPI score, especially the Eastern and Western area on an absolute loss basis, while the North-Western region also experiences high per person losses. Lusaka has the lowest MPI of all regions and the lowest agricultural losses and agricultural losses per person. By contrast, there is no pronounced relationship between MPI scores and livestock losses although it is apparent that the Southern region has both a relatively high MPI score and is most likely to experience livestock losses (both on an absolute basis and when measured in terms of losses per person).

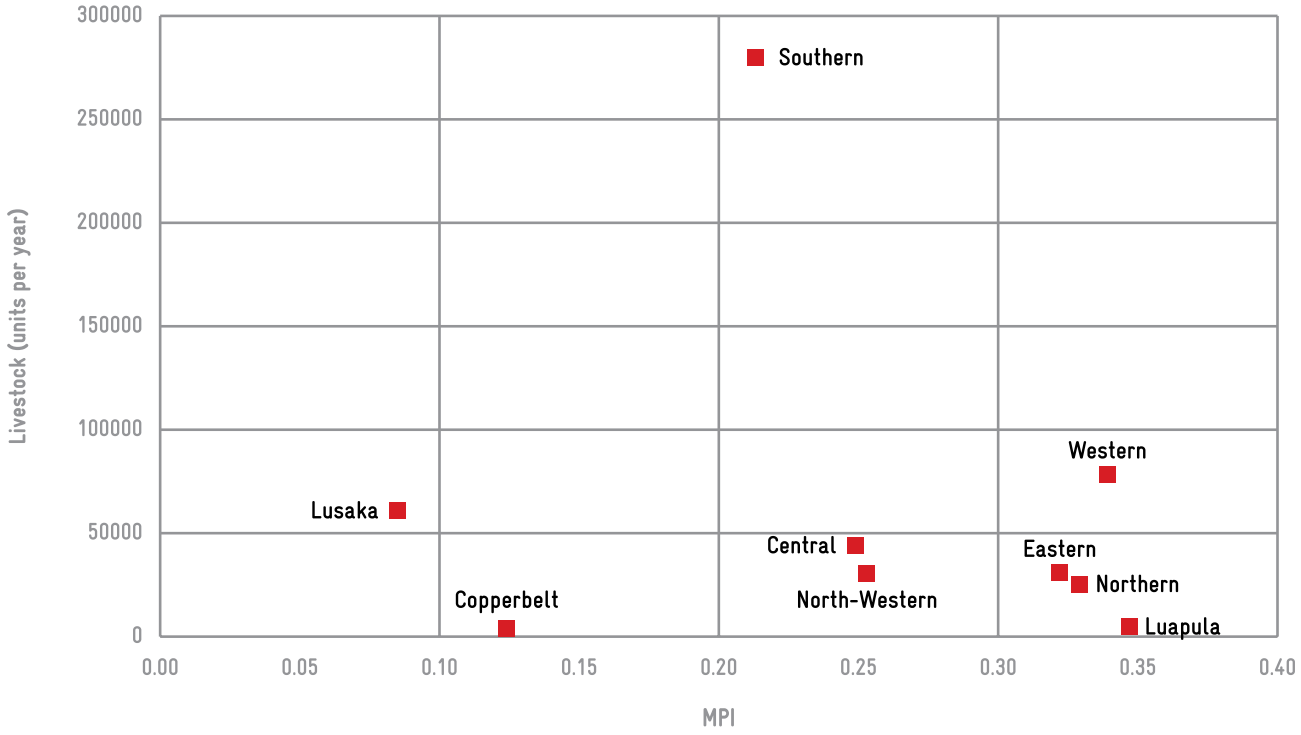
Figure 1. Scatter graph of average annual agricultural losses (ZK) 1979-2018 against MPI for Zambian regions



Source: Authors based on UNDRR, CIMA Foundation (2019) and MPI data

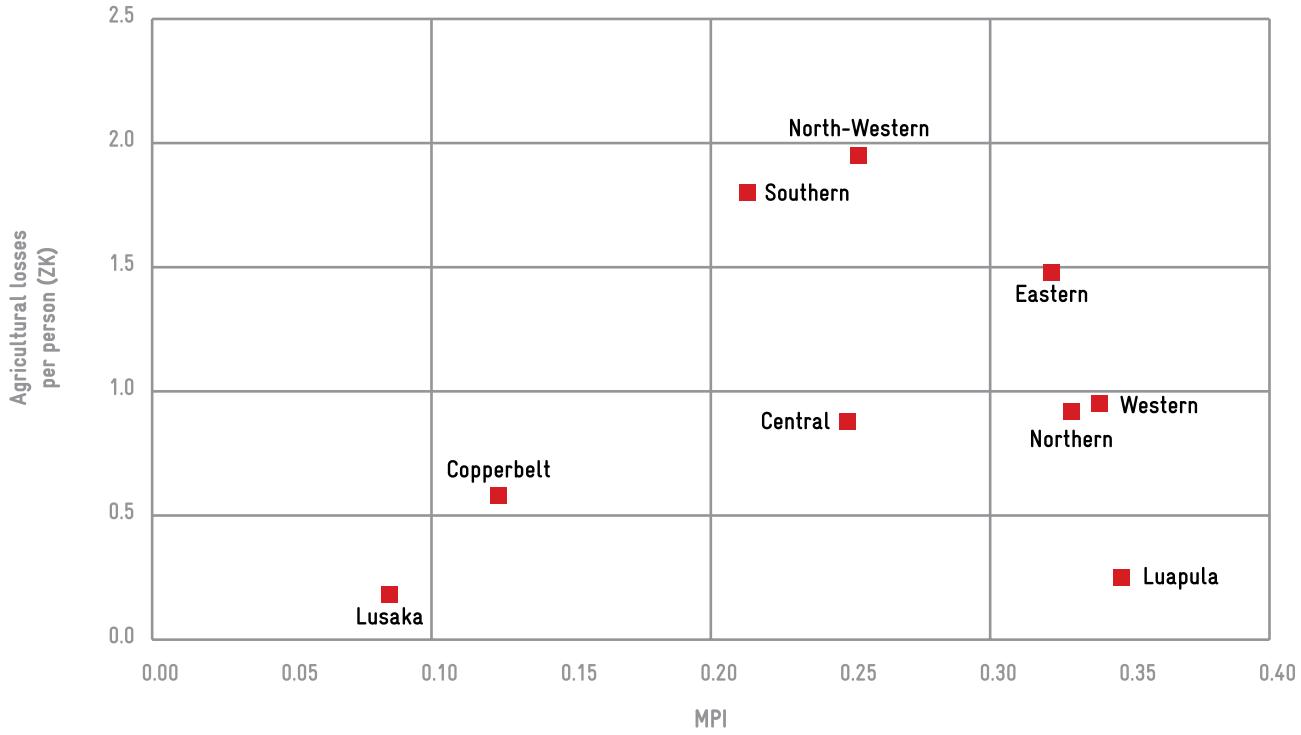
Note: The average exchange rate in 2018 was 10.47 Kwacha: 1 USD, implying average annual losses of between $28,000 (Luapula) to $357,000 (Southern)

Figure 2. Scatter graph of average annual livestock losses (units) 1979–2018 against MPI for Zambian regions



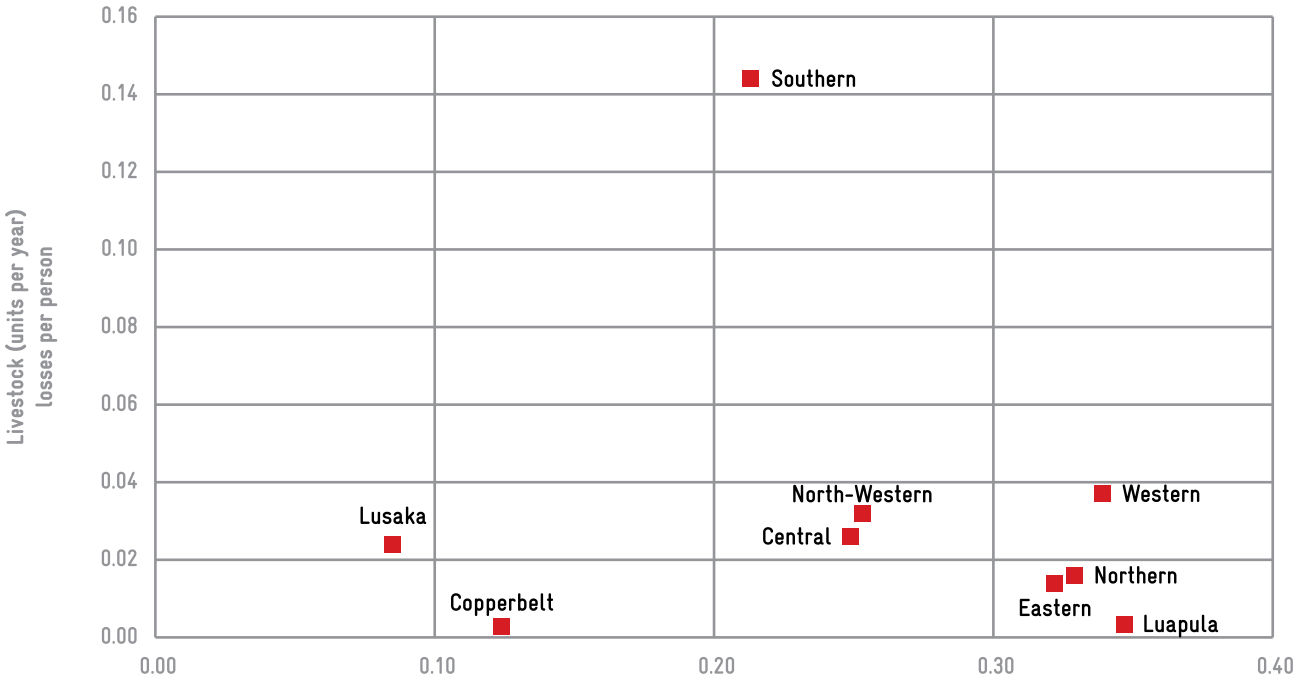
Source: Authors based on UNDRR, CIMA Foundation (2019) and MPI data

Figure 3. Scatter graph average annual agricultural losses (ZK) per person 1979–2018 against MPI for Zambian regions



Source: Authors based on UNDRR, CIMA Foundation (2019) and MPI data

Figure 4. Scatter graph of average annual livestock losses (units) per person 1979-2018 against MPI for Zambian regions



Source: Authors based on UNDRR, CIMA Foundation (2019) and MPI data

These estimates of economic losses do not consider the costs of responding to drought events. Instead, they focus explicitly on the loss in the value of crops and the number of livestock that could be affected by droughts. However, in response to these challenges, costs will need to be incurred – by the government and/or other response agencies – to meet the needs of those who experience these conditions. While a full probabilistic analysis of these costs has not been possible, analysis using Africa Risk View suggests that the actual average annual response cost associated with droughts has been around US$ 16 million over the period 2001/02 to 2022/23.[12] A regional breakdown of response costs is not easily available.

There is evidence that adaptation actions can help reduce losses (which would also reduce response costs) but, especially as climate change impacts intensify, they will be unable to eliminate them. The same UNDRR analysis also considers how losses might change with the introduction of drought tolerant varieties of maize and sweet potato. For maize, it also considers the introduction of a short-cycle variety to avoid planting too early in the season. The results suggest that these adaptation measures could substantially reduce losses associated with maize under current climate conditions and would reduce sweet potato losses by about two thirds.[13] However, under future climate conditions, these measures would reach the limits of their effectiveness, with average annual crop losses of 70-100,000 tonnes for maize and around 4,000 tonnes for sweet potato. These are still around one quarter of the losses if the adaptation measures were not adopted. The remainder of the analysis proceeds assuming that these adaptation measures are not rolled out.

2.2.2 Flood risk

Flood risk is responsible for somewhat smaller agricultural losses than drought risk. The same UNDRR analysis suggests that flood risk may be associated with average annual losses in the agriculture sector of around US$ 1.5 million at present (around 6% of total losses)[14], with no separate estimate of response costs available. While the UNDRR analysis does not provide a specific assessment of the distribution of agricultural losses from floods across events of differing severities, as noted above, the same report does identify that, at an economy-wide level, flood losses are very heavily dominated by high frequency events. This

12 The finding that response costs are lower than losses is consistent with the idea that some farmers may produce greater than a subsistence level of production but that the responses provided during a drought event would only be sufficient to allow a basic minimum of food consumption. However, it should also be noted that the estimates of response costs and losses are drawn from different analyses and are likely to have different underlying modelling assumptions.

13 The UNDRR report notes that drought tolerant versions of these crops give an advantage in drier years but result in lower yields in wet years and notes further that the overall effect of using these varieties would depend on the distribution of dry and wet years – an analysis which the report did not undertake. It recommends the use of early warning systems to identify when drought-adapted varieties are most likely to be useful, implying that the indirect cost of applying drought tolerant crops in wet years have been excluded from the calculations.

14 These are approximate figures based on the charts provided in UNDRR, CIMA Foundation (2019)

15 World Bank (2018) Increasing agricultural resilience through better risk management in Zambia. .

is corroborated by separate World Bank analysis.[15] The most severe recent flood in Zambia in 2001/02 resulted in a 70% loss of cotton production, and a loss of over one-third of maize and groundnut production.[16]

Average annual losses are only expected to increase modestly because of climate change. In contrast to drought, where climate change combined with socio-economic change, is expected to lead to average annual losses increasing by a multiple of more than three, average annual losses from floods are only expected to increase from around $1.5m to around $1.7m.[17]

2.3 Summary

Table 1 summarises the overall and agriculture losses from drought and floods. It considers both current climate and projected future climate conditions and expected socio-economic change. The results assume that no further climate adaptation/ risk reductions measures are implemented and do not consider the costs of responding to drought and flood events.

Table 1. Summary of drought and flood risk in Zambia from probabilistic analysis

	Current climate, 1979-2018	Future climate, RCP 8.5 scenario (including socio-economic change), 2051-2100
TOTAL - DROUGHT		
Average annual losses from droughts	75 million US$ (0.35% of 2015 GDP)	250 million US$ (0.11% of estimated 2050 GDP)
Total number of people directly affected by droughts (annual average)	3.26 million (18.8% of 2019 population)	6.93 million (17.9% of estimated 2050 population)
TOTAL - FLOODS		
Average annual losses from floods	25 million US$ (0.12% of 2015 GDP)	31 million US$ (0.01% of estimated 2015 GDP)
Total number of people affected by floods (annual average)	19,600 (0.11% of 2019 population)	66,000 (0.17% of estimated 2050 population)
AGRICULTURE – DROUGHT		
Direct average annual losses from droughts (crops)	29 million US$ (0.14% of 2015 GDP)	180 million US$ (0.08% of estimated 2050 GDP)
Average annual affected livestock	4.1 million (38.8% of current livestock population)	5.7 million (54.3% of estimated 2050 livestock population)
Average annual response costs, 2001/02 to 2022/23	16 million US$*	N/A
Loss in production of Cassava (as % of average crop production)	1.3%	12%
Loss in production of Maize (as % of average crop production)	2.3%	12.4%
Loss in production of Sugarcane (as % of average crop production)	1.9%	9.4%
Regions seeing largest losses from droughts	Southern	Southern
AGRICULTURE – FLOOD		
Average annual losses from floods (crops)**	~1.5 million US$ (0.01% of 2015 GDP)	~1.7 million US$ (<0.01% of estimated 2050 GDP)

Source: Authors based on CIMA, UNDRR (2019)

Note: * Based on historic data for 2001/02 to 2022/23; ** This is an approximate value as the underlying report only provides a graph and not specific value.

16 FAO (2019). Climate-change vulnerability in rural Zambia: the impact of an El Niño-induced shock on income and productivity. FAO Agricultural Development Economics Working Paper 19-02.

17 These are approximate figures based on the charts provided in UNDRR, CIMA Foundation (2019)

3 Risk Financing Options to Respond to these Risks

This section briefly sets out the importance of pre-arranging finance to support response to disasters and the concept of the 'protection gap' as a way of measuring the extent of pre-arranged finance needed. As the previous section showed, Zambia is highly vulnerable to flood and, especially, drought risk and the risks that it faces are likely to increase significantly with climate change. It is therefore important for the country to consider how it might optimally respond to these growing risks.

3.1 The Importance of Pre-Arranged Finance

Previous studies have shown that countries that recognise and plan for the fact that they will face disasters such as droughts and floods, are able to respond to these crises much more quickly and effectively than countries that do not have such plans in place.[18] In turn, a critical part of this planning is to ensure, at least in part, access to pre-arranged finance to implement these plans. This pre-arranged finance (or disaster risk finance) can help cover both the costs associated with the immediate response to a disaster and/or the recovery of losses that may be incurred because of the disaster. The alternative to pre-arranged finance is to rely on 'ex-post' measures such as borrowing, which, depending on the country context may be very challenging, and/or humanitarian assistance, which is often inadequate and slow.

There are a variety of pre-arranged finance mechanisms that Zambia could use. A basic distinction exists between risk retention and risk transfer mechanisms:

- **Risk retention mechanisms** – where the country remains responsible for meeting the necessary costs (i.e., the risk is retained) but it uses pre-arranged financial instruments to make sure that it can access finance quickly following a disaster.[19] There are several different risk retention instruments that countries can consider, including:
  - **Budget contingencies:** where a certain proportion of revenues within a budget are set aside for dealing with contingencies, including disasters. These contingencies may be explicitly defined but, more commonly, are simply left available to be used for undefined 'exceptional' events.
  - **Reserve funds:** where money is transferred into a reserve account that sits outside the budget and the transfer of resources to the fund is recognised as a spending line in the budget. In addition, funds are typically not then transferred back to the budget if unspent in that year.
  - **Contingent loans:** loans that, in advance of a disaster, are arranged to be available on specified terms following a disaster, if the disaster's severity meets or exceeds a certain threshold (trigger). Such loans are typically provided by international financial institutions.
  - **Climate resilient debt clauses:** this is a more recent proposal/instrument in which, following a disaster event, interest and principal repayments are suspended for a period of time (potentially up to 2 years) with the country being able to use the financial resources to cover response and recovery efforts.[20] Under the proposed design, the lender would still receive the same total value of interest and principal payments – as the suspended payments would accrue interest. To date, these instruments have only been applied in a few cases in the Caribbean,[21] although there is growing interest in their use.[22]
- **Risk transfer mechanism** - where the responsibility for providing financial resources in the event of a disaster is transferred to a third party, in exchange for a premium. In other words, risk transfer instruments redistribute the infrequent and potentially unmanageable total losses of a disaster event into an equivalent manageable annual cost (premium). There are a range of risk transfer mechanisms that are appropriate for transferring risks from different actors including:
  - **Micro-insurance:** insurance products specifically designed to protect poor and vulnerable households, such as smallholder farmers, from the financial impact of disasters.
  - **Commercial insurance:** insurance products used by businesses and households to cover business risks can provide protection against damage caused by disasters, as well as, sometimes, the losses resulting from the business interruption following disasters.
  - **Meso-insurance:** insurance taken out by sub-national administrative units such as municipalities.
  - **Sovereign insurance:** insurance taken out by national governments to cover disaster events. In some cases, sovereign countries will collaborate to establish a 'risk pool'. The pool retains some of the risks itself - it becomes a 'captive insurer' - and transfers other risks, through reinsurance, or other instruments, to third parties. The pool can purchase insurance more cheaply than if its members purchased it individually, as it offers a more diversified risk portfolio, and because of economies of scale and greater buyer power.
  - **Catastrophe bonds:** where an organisation (typically a sovereign government or large company) issues a bond with contract terms which mean that a portion of the principal and interest repayments on the bond are written off in the event of a disaster.

18 Clarke., D. and Dercon, S.. (2016) Dull Disasters, Oxford University Press

19 Households and businesses can also retain risks by making use of savings to help respond to the impacts of disasters.

20 Butler, M., Clark, I., Fedosova, I., Matty, S. and Babyak, D. (2023, February). Climate Resilience as a Proposed New Feature of Sovereign Debt Instruments. White Case. Retrieved from https://www.whitecase.com/insight-alert/climate-resilience-proposed-new-feature-sovereign-debt-instruments [July 2023]

21 Climate-resilience debt clauses are already used in bond issuances by Barbados and Grenada as part of their debt restructurings, where they are known as 'hurricane clauses' while in a recent bond issuance by Barbados has extended the concept to cover the impact of pandemics. See https://www.insurancejournal.com/news/international/2022/09/22/686174.htm

22 This is a risk retention instrument as interest would continue to accrue while the suspension is in place and will ultimately be expected to be repaid by the debtor.

Different pre-arranged financing instruments are more or less appropriate in meeting the costs of different types of events. In general, most analyses show that risk retention instruments are more cost effective for covering the costs associated with relatively low impact disaster events that happen more frequently. By contrast, risk transfer instruments are generally considered to be more effective in providing finance for less frequent but more severe disasters.[23] This is known as **risk-layering**.

Furthermore, the design of pre-arranged financing instruments can use different 'triggers'. The 'trigger' determines whether funds are released by a pre-arranged financing mechanism for a given event as well as the volume of these disbursements. There are a range of different triggers that can be used (see table 2).

3.2 The Protection Gap as a Measure of Pre-Arranged Finance

The term 'protection gap' can be used to describe the difference between the costs and/or losses associated with the disaster and the amount of pre-arranged financing a country has organised. Figure 5 illustrates the concept.

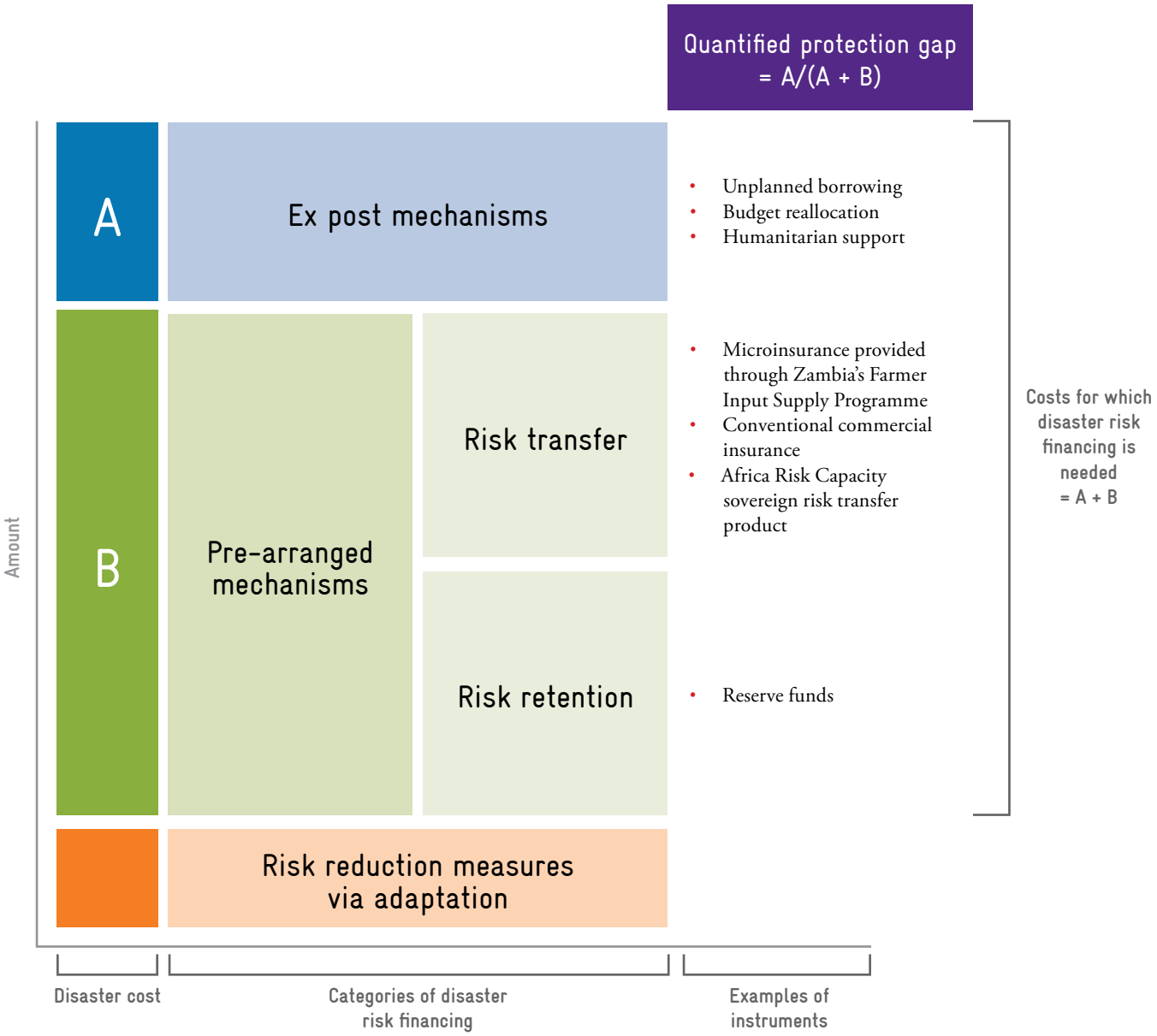
Table 2. Summary of triggers for pre-arranged financing instruments

Trigger	Description	Examples
Informed judgement	This simply requires the relevant decision-maker to state that the disaster is sufficiently severe that the pre-arranged financing mechanism can be accessed. For instance, a decision-maker may declare 'a state of emergency' upon which pre-arranged finance mechanisms can be accessed. This is most used to access risk retention mechanisms, where the capital 'belongs' to the decision maker.	Risk retention instruments e.g., reserve funds
Indemnity trigger	Traditional insurance instruments are triggered based on the reported level of loss following an event. If a certain threshold is exceeded then pay-outs are made, related to the estimated value of the loss.	Most conventional commercial insurance products.
Parametric trigger	These trigger mechanisms relate access to and volume of pre-arranged finance to an observable characteristic of the disaster event. Typical triggers might include precipitation, wind-speed, flood depth or temperature. The pay-out takes place if the trigger exceeds (or falls below) the predefined threshold/value.	Microinsurance provided through Zambia's Farmer Input Supply Programme
Modelled-loss	In cases where local observation networks may not provide enough coverage to use parametric triggers, catastrophe models can be used to simulate the expected impact of a disaster by combining available observation data (from local observations and remote sensing) to estimate the expected loss/impact of the event. If the modelled loss estimate exceeds a predefined value, then the pre-arranged finance can be released.	Africa Risk Capacity sovereign risk transfer product

Source: Authors' analysis

23 Clarke, D et al (2017) Evaluating Sovereign Disaster Risk Finance Strategies: A Framework, The Geneva Papers on Risk and Insurance – Issues and Practice, 42, 565-584

Figure 5. Conceptualisation of the protection gap metric



While there are a range of advantages to using pre-arranged finance, it may not be optimal to eliminate the protection gap. Ex-post mechanisms provide flexibility to deal with unexpected consequences of disasters and do not require financial commitments to be made ahead of a disaster event. This means that funds can be allocated elsewhere, including towards vital development goals. This may be particularly attractive to governments, households, and businesses who are confident that even after a disaster event strikes, they can access ex-post finance quickly and cheaply.

4 Estimating the Protection Gap in Zambia

4.1 Introduction

This section builds on the risk profile discussed in section 2 to understand the risk financing picture in Zambia. Using a variety of different estimates of the losses that Zambia might expect to experience from disasters, it first sets out the existing pre-arranged finance mechanism which could help respond to these losses and costs. It then provides a quantified estimate of the protection gap through considering the difference between these losses and the pre-arranged finance mechanisms in place in the country, looking first at risk retention instruments and then risk transfer instruments. Finally, it considers the extent to which both the Zambian government and Zambian farmers might be able to satisfactorily rely on ex-post financing mechanisms to help finance response and recovery efforts.

4.2 Protection Gap Estimate: Inputs

4.2.1 Losses

The section considers four different measures of the average expected losses that Zambia might experience because of disasters in the country. Ranging from the low to the high estimate, these are:

- The average annual losses associated with the impact of drought on agricultural production (crops) in Zambia. Based on the analysis undertaken by UNDRR & CIMA Research Foundation this is estimated to be around US$ 29 million.[24]
- The average annual losses associated with the impact of both drought and flood risk on agricultural production which, based on the analysis undertaken by UNDRR & CIMA Research Foundation, is estimated to be around US$ 31 million.[25]
- The total average annual losses that Zambia currently experiences because of drought and flood risk, including losses both in the agricultural sector and elsewhere in the economy, which, again based on UNDRR & CIMA Research Foundation, could sum to US$ 100 million. [26]

While the UNDRR & CIMA Research Foundation research estimates that losses could be much higher in future because of both climate change and socio-economics change, this is not included in the quantitative analysis as the estimates relate to the period beyond 2050, by which point a wide range of other factors may have changed.

4.2.2 Risk Retention: NDRT Fund and related Budgetary Appropriations

Provision for the establishment of the National Disaster Relief Trust Fund (NDRT Fund) is provided under Part V of The Disaster Management Act, 2010. Under the terms of the Act, the fund is to be used for:

- the provision of essential commodities and other relief to victims of any disaster, hazard, or emergency,
- the restoration, reconstruction and rehabilitation of areas affected by any disaster, hazard, or emergency,
- the payment of compensation due to a person according to the terms of the Act,
- the operation of Provincial Committees, District Committee and Satellite Committees in the management of disasters in their area, and
- any other matter relating to the preparedness, prevention, mitigation of, and recovery from disasters.

Funding is expected from appropriations agreed by Parliament, voluntary contributions by people and organisations, grants mobilised from within and outside Zambia and interest on investments made. As such, the Fund's design is a paradigmatic example of meeting disaster risk finance needs through a risk retention instrument.

The account for the Fund was established in 2021 but it has not been possible to access any further information concerning the Fund. According to press reports, the National Disaster Relief Fund Trust account has been opened at Zambia National Commercial Bank.[27] However, it has not been possible to acquire any further information concerning the development of the fund, its capitalisation, the rules determining when it makes pay-outs or the extent to which it may have made pay-outs. It is unclear whether the fund is operational.

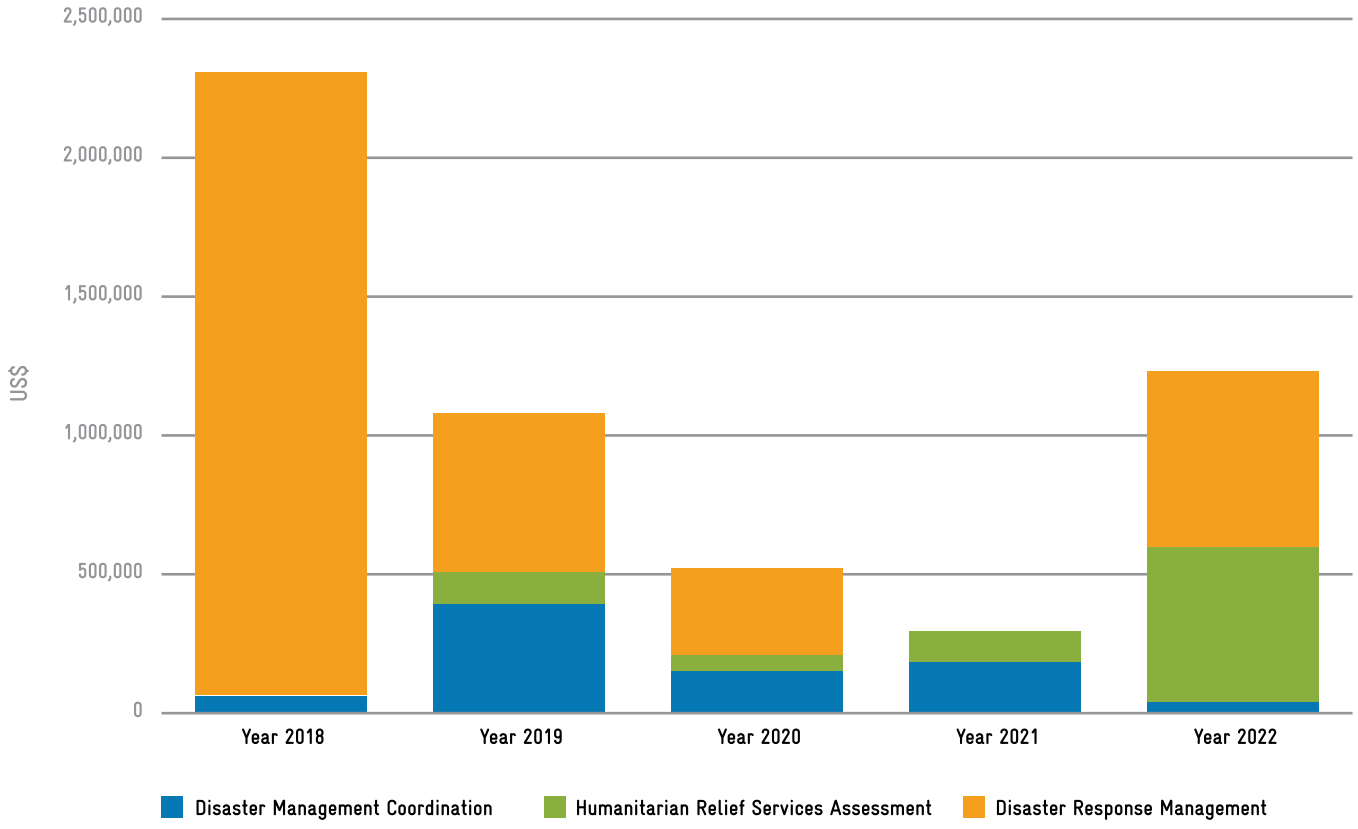
In addition, the annual budget process makes various provisions which could support disaster response. The two most important of these are:

- Programme 3402 entitled 'Disaster and Humanitarian Operations Management' implemented by the Disaster Management and Mitigation Unit
- Programme 2139 entitled 'National Food Reserves Management' which is allocated to the Food Reserve Agency under the Ministry of Agriculture.

24 UNDRR, CIMA Research Foundation (2019) Disaster Risk Profile: Zambia – 2019
25 Ibid
26 Ibid
27 Banda (2021) National Disaster Relief Fund Trust Account Opened, https://www.znbc.co.zm/news/national-disaster-relief-fund-trust-account-opened/

Around US$ 1 million per year has been allocated to the 'Disaster and Humanitarian Operations Management' programme. This consists of three elements: disaster response management, disaster management coordination, and humanitarian relief services assessment. The breakdown between these different elements over time is shown in Figure 6 below. However, while these amounts exclude the budget for management and support services, it is still possible that not all of this funding will cover the costs of response and recovery activities. These amounts are also intended to provide support in relation to all disaster types, not just flood and droughts.[28]

Figure 6. Budget allocations to disaster and humanitarian operations management programme between 2018 and 2022



Source: Authors analysis based on MoFNP Budget Data from Yellow Book

Note: Values converted from Zambian Kwacha to US Dollars using average exchange rate for the year as provided by the Central Bank of Zambia. In local currency, the highest value was 24.3 m KZ in 2018 and the lowest amount was 6.0m KZ in 2021.

28 The analysis also reviewed the outturn expenditures for this programme, as disclosed in the Annual Financial Report. However, this does not have a material impact on the figures, with an annual average difference to the budgeted amount of less than 1%.

Around US$ 64 million per annum, on average, has been allocated to the Food Reserve Agency to implement the National Food Reserves Management programme over the period 2018-2022. The Food Reserve Agency was established through the Food Reserve Act to administer the strategic food reserves, engage in market facilitation, development and management of the national storage facilities. Among many other roles, the budget for the Food Reserve Agency (FRA) would help cover the costs of any crop releases (primarily maize) that might be released by the Agency to support farmers affected by failed harvests. Over the period 2018-2022, the FRA has transferred around 35,000 metric tons of maize each year. Most of these transfers (around 60%) are through the DMMU to support affected households, while some is transferred through the Ministry of General Education to support school attendance during a disaster (around 15%), and some is sold directly to the community through the Office of the District Commissioners at a subsidised price (around 25%). The average annual amount of grain provided to the DMMU and Ministry of Education - the cost of which is understood to be covered entirely by the government - is an average of around 26,700 metric tons with a value of $4.2m.

Finally, the government has a general contingency fund to cover a wide range of unforeseen and unavoidable costs. This contingency fund generally has around 300m Kwacha allocated to it each year (around US $17.7 million using the average 2022 exchange rate).[29] This fund is expected to cover a wide range of different costs, but could be drawn upon to help with disaster response and recovery. In 2022, it is understood that the DMMU received additional allocations of around 115 million Kwacha (around US$ 6.8 million) from the Contingency Fund.

4.2.3 Risk Retention: ARDIS

The African and Asian Resilience in Disaster Insurance Scheme (ARDIS) is a further form of risk retention[30] instrument that might, in principle, be available to some Zambian households. It is a contingent loan product which, through the NGO Vision Fund International, injects MFI loans into the market immediately after a climate-related disaster (drought or storm) which exceeds a parametric trigger. Under the terms of the scheme, once the threshold is exceeded, MFIs can access up to US$ 10 million to both help manage delays in client repayments and to provide additional funding to issue new loans.[31] In total, the scheme has the potential to provide additional microfinance solutions to about 10 million people across 15 countries,[32] including Zambia. However, the extent to which the scheme specifically supports farmers in Zambia is not clear from public domain material and indeed it is not clear if the scheme is still operational.[33]

4.2.4 Risk Transfer: Africa Risk Capacity (ARC)

One of the most important pre-arranged financing instruments that Zambia has access to is the sovereign crop drought risk product for maize production provided by ARC, a regional sovereign risk pool. This is a policy that provides pay-outs to the Zambia government to support the response costs that it incurs when drought leads to low levels of maize production, using a modelled loss trigger. Zambia has taken out ARC's sovereign crop drought risk product for maize production since 2020/21. The latest policy (for the agricultural season 2022/2023) provides cover for drought in agro-ecological Regions 1 and 2,[34] which were selected using analysis of rainfall patterns to identify where the risk from drought coincides with significant maize production. The key features of the current version of the policy are provided in Table 3 below where:

- **Gross premium** refers to the total amount that needs to be paid for the insurance policy
- **Attachment point** refers to the estimated losses that Zambia needs to experience in any year before the insurance policy will make a pay-out

Table 3. Summary of Zambia's ARC policy

Policy characteristic	Value
Gross premium	1,500,000 US$
Attachment point	10,318,200 US$
Exhaustion point	86,257,299 US$
Ceding percentage	9.1%
Aggregate limit	6,965,058 US$

Source: Authors based on ARC Sovereign Policy shared by Zambia's Ministry of Finance and Planning (MoFNP)

29 1 US$ = 16.95 Kwacha

30 Despite the title as an insurance product, it is better thought of as a risk retention instrument as it provides contingent loans to microfinance institutions.

31 https://www.microcapital.org/microcapital-brief-global-parametrics-ardis-insuring-visionfund-microfinance-institutions-africa-asia-climate-disasters-enable-recovery-lending/

32 https://www.visionfund.org/our-focus/insurance/ardis

33 Vision Fund's 2023 Annual Report does not include any reference to ARDIS: https://www.visionfund.org/sites/default/files/2023-05/VisionFund%20FY22%20Annual%20Report%20Final%20as%20of%20May%2016%202023.pdf

34 Regions refer to agro-ecological regions. Region 1 are those areas where average rainfall is between 600 and 800 mm per year covering southern, eastern and western Zambia. Region II covers areas where average rainfall is between 800mm and 1000mm per year includes much of central Zambia, with most of Central, Southern, Eastern and Lusaka provinces. See: https://www.yieldgap.org/zambia#:~:text=Semi%2Darid%20Region%20I%20includes,from%20600%20to%20800%20mm

- **Exhaustion point** refers to the maximum modelled losses to which the insurance policy will be relevant i.e., any losses in excess of this amount would not be associated with an insurance pay-out
- For any losses above the attachment point, the **ceding percentage** refers to the percentage of the losses that Zambia receives as a pay-out i.e., its pay-out would be the ceding percentage multiplied by the amount by which the estimated losses exceed the attachment point
- The **aggregate limit** refers to the maximum insurance pay-out that Zambia is entitled to. This is directly given by the other variables above i.e., the aggregate limit is calculated as the ceding percentage multiplied by the difference between the exhaustion point and the attachment point.

Zambia received support from several cooperation partners to finance the premium payment. This included Swiss Development Cooperation (SDC) who provided US$ 300,000; the African Development Fund (ADF) through the Africa Disaster Risk Financing initiative (ADRiFi) who provided US$ 300,000 and the African Development Bank (AfDB) Multi Donor Trust Fund (MDTF) who provided US$ 700,000. In view of the foregoing, the Government of the Republic of Zambia (GRZ) had to pay a premium of US$ 200,000.[35]

Zambia received a pay-out of US$ 5.4 million in the 2021/2022 agricultural season in relation to a drought experienced in eight districts of the country.[36] An integral part of the ARC insurance policy is that countries must develop a contingency plan to determine how the pay-outs will be used. In the case of Zambia, the contingency plan includes both the scaling up of the existing social cash transfer scheme and the provision of food aid, emergency cash transfers and market-based interventions. Consequently, when the pay-out was received in 2021/2022, some households received a cash transfer payment, while others directly received food.

A rough estimate suggests that this product may contribute around US$ 1.0 million on average each year to addressing Zambia's risk financing needs. This is based on an estimate of how much the current policy would have paid out, on average, over the last 22 years, had it been available. The product is designed to support countries with events that occur with a frequency of 1 in 5 years or less. The historic data for Zambia suggests that, had Zambia had its current policy in place, it would have received pay-outs in 5 out of the last 22 years (once every 4 and a half years) and the average pay-out it would have received given a qualifying event would have been US$ 4.6 million.[37]

4.2.5 Risk Transfer: Other Insurance Solutions

There have been extensive efforts at introducing microinsurance that provide protection against drought and flood risk for Zambian farmers. There are three main schemes/routes to market for this microinsurance:

- **Subsidised insurance provided through the Farmer Input Support Programme (FISP).** The Government of the Republic of Zambia began the FISP programme in 2002, giving smallholder farmers a limited amount of commercial maize seed and inorganic fertiliser. The scheme has evolved over time including expanding to cover groundnuts, orange maize, common beans and cottonseed as well as placing greater focus on ensuring access to inputs such as seeds and fertiliser. Thus, FISP became a national social security program for delivering subsidies for farming inputs to small-scale farmers. Since 2015, it has also piloted the use of e-vouchers which meant that FISP (relabelled e-FISP) was administered through vouchers or coupons that allow eligible households to purchase fertiliser, hybrid seed, and pesticides at reduced prices. Furthermore, from 2016/2017 farming season, the Ministry of Agriculture and Livestock decided to include weather index insurance within the subsidy given to farmers. Specifically, before 2022/2023, farmers were expected to contribute 400 Zambian Kwacha to participate in the scheme, which triggers 1700 Zambian Kwacha of input support. Of this 2100 Zambian Kwacha of support, 100 Zambian Kwacha is used as an insurance premium, which provides 1700 Zambian Kwacha of cover. In the recent 2022/2023 agricultural season, the FISP premium and cover increased (see Box 5 in Chapter 4.3). In 2021, the Ministry of Agriculture (MOA), the International Fund for Agricultural Development (IFAD) and WFP, with support from the International Research Institute for Climate and Society (IRI) and financial partners Mayfair, Zep Re and ACRE Africa, collaborated to improve the design of the product.
- **Hybrid livestock insurance.** There is also a small hybrid livestock instance product that, as of 2022, was protecting 5,000 livestock smallholder farmers from climate-related shocks including droughts and floods that may affect pasture availability for their livestock. The World Food Programme (WFP) plans to scale up this insurance to reach 12,500 pastoralists in 2023.[38]
- **Unsubsidised microinsurance.** Approximately a further 9,000 farmers purchase unsubsidized microinsurance for crop production. The distribution of this product is supported by the Maano Virtual Farmers' application which links farmers to aggregators and allows them to access a range of different financial services including insurance. The private sector

35 Information drawn from key informant interviews, including follow up meetings, with key DMMU and MoFNP representatives

36 ICMIF (2022) Support from African Risk Capacity helps Zambia recover from extreme drought event in 2021/2022 agriculture season. Retrieved from https://www.icmif.org/news_story/support-from-african-risk-capacity-helps-zambia-recover-from-extreme-drought-event-in-2021-2022-agriculture-season/ [April 2023]

37 https://www.arc.int/africa-riskview

38 WFP (2022) Zambia Annual Country Report 2022: Country Strategic Plan 2019 - 2023. Retrieved from https://docs.wfp.org/api/documents/WFP-0000147976/download/ [July 2023]

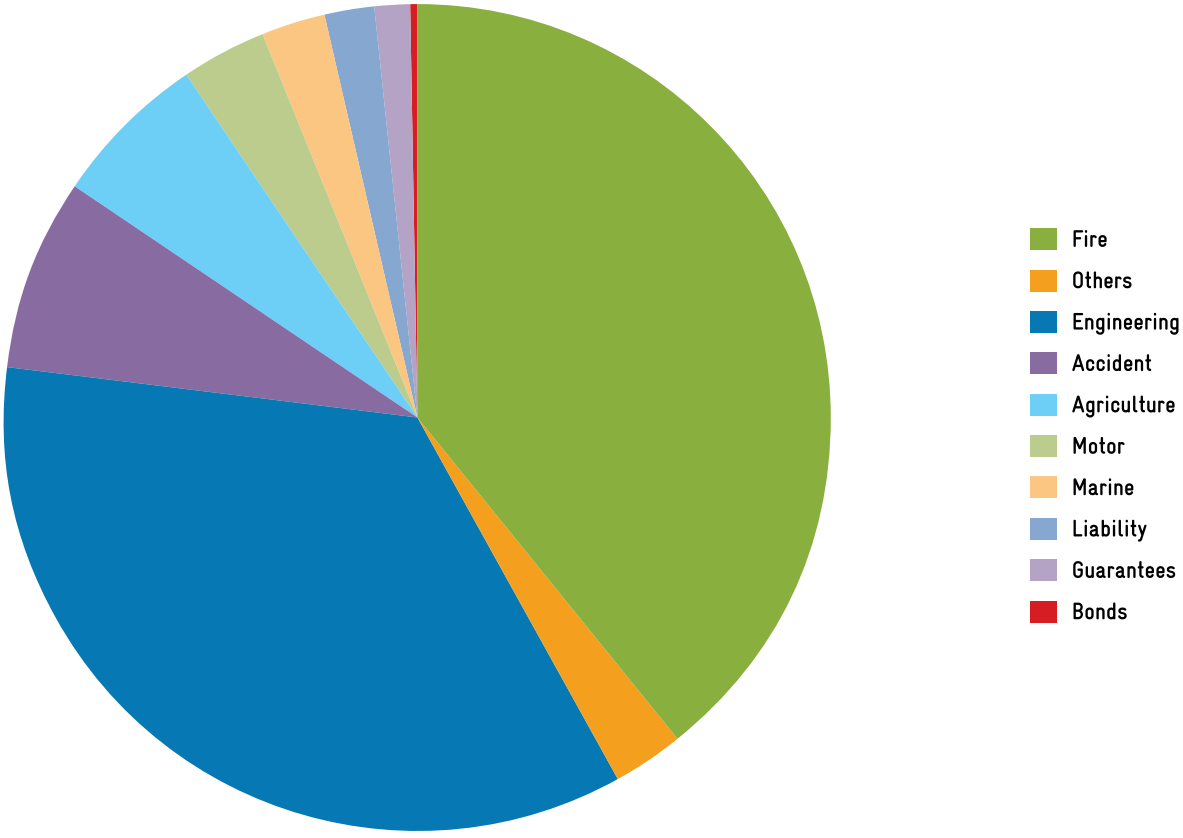
insurance providers involved in this scheme include Africa Pride Insurance, Mayfair Insurance, Zep-Re, ZSIC General Insurance Consortium and Pula Advisors.[39]

In total, this microinsurance reaches more than 1 million people. The Government of Zambia reports that 1,024,434 farmers will be targeted by the FISP in the 2022/23 growing season.[40] Adding the 9,000 farmers purchasing unsubsidised microinsurance gives a total of just over 1,033,000 farmers, excluding pastoralists. The World Food Programme reports that, in 2022, $6.2m of insurance premiums were paid and that the insurance paid out $3.5m.

There is also some agricultural insurance taken out by commercial farmers, but this does not provide protection against drought risk. It is estimated that around 600 commercial farmers, based near to Lusaka and along major railway lines, also benefit from agricultural insurance. These farmers purchase multi-peril cover which protects both crop and livestock. Around 90% of the cover taken out is for crop production. This provides protection against fire, lightning, floods. However, it does not provide protection for drought, pests, and diseases which market experts report is due to the difficulty in securing reinsurance cover for drought risk at a price considered affordable in the Zambian market. As noted in section 2.3, drought risk is a much more significant driver of losses in Zambia's agriculture sector than flood risk.

The remainder of the commercial non-life insurance market might in principle cover key climate risks but in practice it is absent. Agriculture only accounts for around 6% of the gross written premiums of non-life insurers in Zambia. As Figure 7 shows, the bulk of premiums are written for fire and engineering cover. However, unlike in many countries, the standard fire policy, issued in relation to specific buildings, does not also provide cover against flood risk (or earthquakes, termites or normal wear and tear). While policyholders have the option to add flood risk coverage, market commentators report that this is very rarely pursued as the associated premium increases are perceived as being too high. As noted in section 2.1, the bulk of losses caused by floods in Zambia are through their impacts on the housing sector, as well as the services sector (e.g., retail, professional services) where impacts will be also largely through property damage. In either case, there is little to no use of insurance products to cover these flood-related losses.

Figure 7. Gross Written Premium (GWP) by line of business in the Zambian non-life insurance sector



Source: Authors' analysis based on insurance data received from the Pensions and Insurance Authority (PIA)

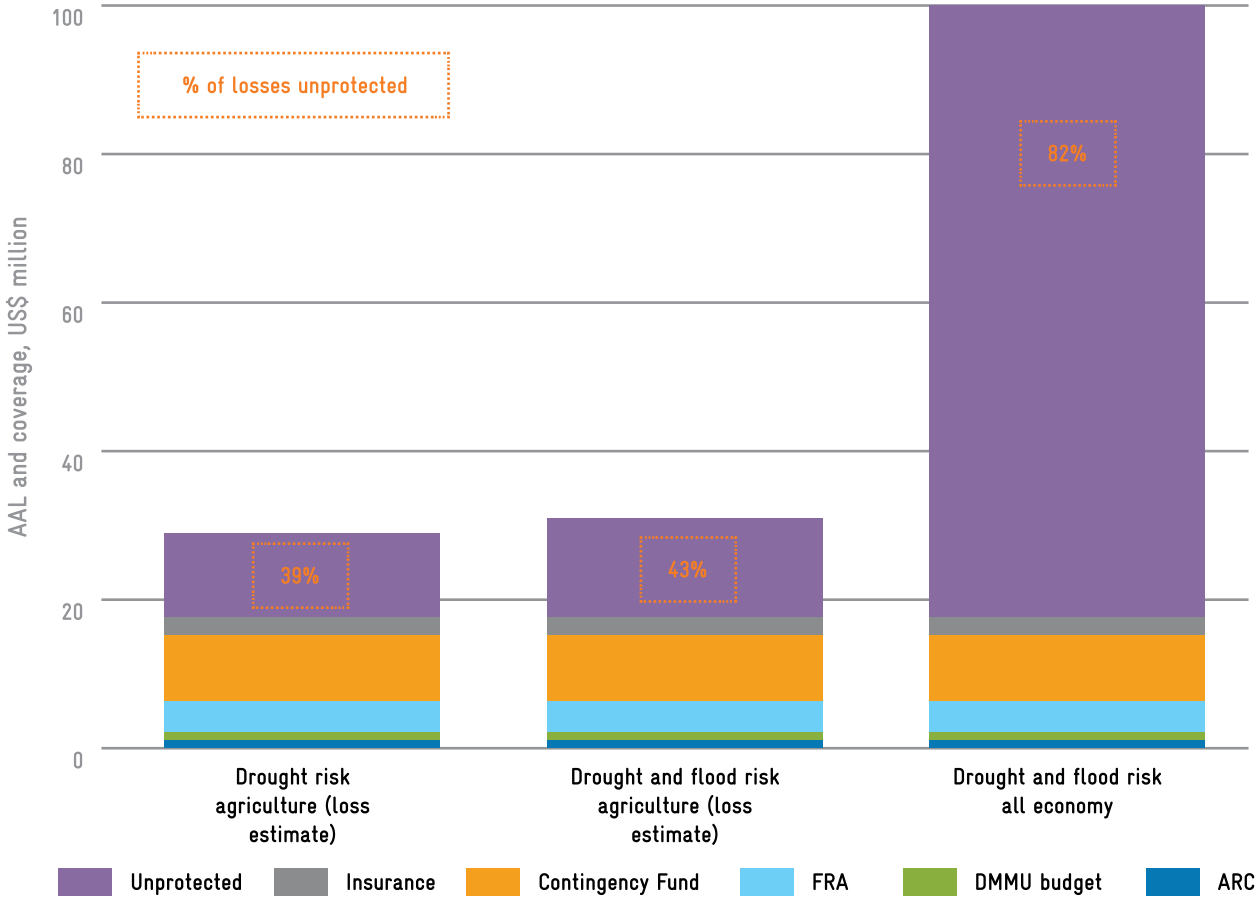
39 https://innovation.wfp.org/project/virtual-farmers-market

40 https://www.parliament.gov.zm/sites/default/files/images/publication_docs/29.09.2022%20MINISTERIAL%20STATEMENT%20ON%20FISP%20STATUS%20OF%20THE%202022-2023%20FARMING%20SEASON.pdf

4.3 Protection Gap Estimates: Outputs

Figure 8 below shows the estimates of the protection gap using each of the three measures of losses identified at the start of the section. The results suggest that, depending on the loss estimate used, somewhere between 39% and potentially as high as 82% of the losses associated with flood and drought risk in Zambia are not covered by pre-arranged financing mechanisms.

Figure 8. Protection gap estimates for Zambia



Source: Authors' analysis

The key assumptions underpinning these calculations are as follows:

- **Budgetary appropriations:** This includes a number of different constituent elements.
  - **NDRT Fund:** Given the lack of information concerning the NDRT Fund, the analysis assumes that the NDRT Fund is not currently operational and able to provide any disaster risk finance (although see Box 3 below on scenario analysis if the fund were in place).
  - **DMMU budget:** The analysis assumes that the average annual budget allocation of US$ 1.0 million towards Disaster and Humanitarian Operations Management fully supports disaster response and recovery efforts in relation to both flood and drought.
  - **Food Reserve Agency:** The analysis assumes that the average annual value of grain provided by the FRA for free to the DMMU and Ministry of Education to help respond to the impacts of drought is $4.2m, based on data for 2018-2022. The analysis excludes the value of grain sold directly to the community as the extent to which these sales are made at below market prices is unclear.
  - **Contingency Fund:** The analysis assumes that 50% of the typical contingency fund amount of 300 million Kwacha would typically be made available to support disaster recovery and response. This amounts to around US$ 8.9 million using the 2022 average exchange rate.[41] This is understood to be a somewhat higher allocation than has been available in recent years.
- **ARDIS:** Due to lack of quantitative information on the extent to which it supports Zambian households, this product has been excluded from the quantitative analysis.
- **ARC:** On average, ARC provides annual pay-outs of around US$ 1.0 million to cover losses caused by drought in the agricultural sector. This is based on estimates of what the current policy would have paid out over the last 20 years, had it been in place.
- **Insurance:** The analysis assumes that around 7.5% of the average annual agricultural losses associated with floods and droughts in Zambia are covered by insurance, i.e., US$ 2.325 million. This estimate is grounded on the basis that around 55% of Zambian crop production are attributable to farmers covered by microinsurance (given that around 80% of Zambian food production derives from smallholder farmers[42] and around 69% of those are covered by the FISP or other microinsurance products[43]) and that these farmers suffer therefore around 55% of the overall agricultural losses associated with floods and droughts, i.e., US$ 17.1 million. Within this context, the World Food Program reports that microinsurance pay-outs in 2022 were US$ 3.5 million (with corresponding premium payments of US$ 6.2 million). This amount represents 20,5% of the US$ 17.1 million average annual agricultural losses suffered by insured farmers or 11,3% of the total average annual agricultural losses due to droughts or floods. However, data from Africa Risk View suggests that 2022 was a particularly damaging year for droughts and so pay-outs are likely to be higher than on an average year and so the analysis makes a modest downward adjustment (from 11,3% to 7.5%) to account for this.

In addition, for each of the three loss scenarios considered, the analysis assumes that the pre-arranged finance that is available would only be allocated to losses associated with those risks included in the analysis. In practice, it is likely that Zambia may also suffer from other disasters in the coming years including, for example, epidemics or conflict-related displacement. In the event of these disasters arising, they will also draw on the risk finance measures outlined above, which would imply that the estimated unprotected losses associated with floods and droughts would end up being higher.

Box 2 discusses the effect of recent changes in the FISP insurance cover on the protection gap.

Box 3 discusses the sensitivity of the results to alternative assumptions concerning the capitalisation of the NDRT Fund.

41 Ibid
42 https://docs.wfp.org/api/documents/WFP-0000125456/download/
43 Based on an assumption of around 1.5 m smallholder farming households

Box 2. Effect of changes in the 2022/2023 FISP insurance cover on the protection gap

In the base case analysis, the recent changes in the FISP insurance cover for season 2022/2023 have not yet been incorporated. As the FISP premium has doubled (from 100 Zambian Kwacha to 200 Zambian Kwacha) and the cover increased from 1,700 Zambian Kwacha to 4,500 Zambian Kwacha, it can be assumed that the average annual pay-outs would also double. This in turn would mean that instead of only US$ 2.325 million (7.5%) of the average annual agricultural losses associated with floods and droughts being covered by insurance, US$4.650 million (15%) are actually covered. As Table 4 shows, this results in a slightly reduced protection gap.

Table 4. Effect of recent changes in FISP insurance cover

Scenario	Drought risk - agriculture (losses)	Drought and flood risk – agriculture (losses)	Drought and flood risk – all economy (losses)
Base case	39%	43%	82%
Increased FISP premium and cover	31%	36%	80%

Source: Authors' analysis

Box 3. Sensitivity analysis for NDRT Fund capitalisation on protection gap estimates

In the base case analysis, it is assumed that the NDRT Fund is not able to make any contribution to financing Zambia's protection needs. However, given the uncertainty regarding the status of this Fund, and recognising that it could become an important feature of Zambia's risk finance landscape in future, the analysis also considers two sensitivity analyses:

- Where the annual capitalisation of the NDRT Fund is 20% of the DMMU's budget in 2022, which amounts to around US$ 0.7 million using average market exchange rates in 2022.
- Where the annual capitalisation of the NDRT Fund is 50% of the DMMU's budget in 2022, equivalent to US$ 1.7 million using the same exchange rate assumption.

Under these assumptions, but holding all other assumptions in the analysis constant, the protection gap falls by the same amount as the assumed capitalisation. As Table 6 shows, this results in a somewhat reduced protection gap. However, the protection gap still remains sizable, ranging between 37% and 82% under the first sensitivity and between 34% and 81% under the second sensitivity.

Table 5. NDRT Fund sensitivity analysis

Scenario	Drought risk - agriculture (losses)	Drought and flood risk – agriculture (losses)	Drought and flood risk – all economy (losses)
Base case	39%	43%	82%
Sensitivity 1 (NDRT Fund capitalisation of 20% of 2022 DMMU budget)	37%	41%	82%
Sensitivity 2 (NDRT Fund capitalisation of 50% of 2022 DMMU budget)	34%	38%	81%

Source: Authors' analysis

4.4 Ex-Post Financing Mechanisms

As discussed in the introduction, a large protection gap will cause fewer concerns in countries where both governments and households/businesses find it easy to access capital (or in the case of households/businesses are able to draw upon substantial savings). As such, this section looks at the ability of both the Zambian government and Zambian households and business to be able to make use of ex post financing mechanisms in the event of disasters.

4.4.1 Sovereign Level

At the sovereign level, Zambia has, until recently, faced severe constraints in its borrowing ability, although this may change somewhat following a recent debt restructuring deal.

The country's debt level has been rising in recent years reaching 110% in 2021. As Figure 9 shows, debt as a percentage of GDP was over 100% in the early 2000s but fell quickly until reaching a low of 19% in 2010. Since then, debt rose year-on-year, with a 2019 analysis by the IMF and World Bank concluding that the risk of both overall debt distress and external debt distress was high and that public debt under current policies was on an unsustainable path.[44] Finally, in 2020, the country became the first African country to default on its debts during the COVID-19 pandemic. Financial conditions have also been made more challenging by the recent global tightening in monetary policy.

There has been official recognition of the importance of debt restructuring. IMF visits in 2023 noted that 'Zambia also needs swift resolution of its debt situation' and that '*…continued delays on debt restructuring pose real risks for retrogression, including with respect to the country's economic transformation agenda and aspirations for a better standard of living for its people.*'[45]

There has been important progress in the summer of 2023.[46] In a recent climate financing summit event in Paris, the Official Creditor Committee (OCC- formed by 16 countries) presented a debt treatment proposal for Zambia consistent with the IMF's existing programme parameters. Under these arrangements, lenders will rearrange US$ 6.3 billion in loans. The agreement specifies both a baseline and a contingent treatment that would be automatically triggered if the assessment of Zambia's economic performance and policies improves. Zambia's debt is to be rescheduled over more than 20 years with a three-year grace period during which only payments on interest are due. Zambia will pay interest rates of 1% until 2037 and a maximum of 2.5% thereafter (rising to 4% if the economy recovers faster

44 IMF (2019) Zambia: Article IV Consultation Staff Report
45 https://www.ohchr.org/en/press-releases/2023/04/un-experts-concerned-over-delay-zambias-debt-restructuring
46 https://clubdeparis.org/en/communications/press-release/the-paris-club-welcomes-zambia-s-debt-restructuring-agreement-23-06, https://nouveaupactefinancier.org/pdf/chairs-summary-of-discussions.pdf

than expected), with loan maturities extended for more than 12 years on average. The debt's face value would be unimpaired — but its net present value will be reduced by some 40%.[47]

Nonetheless, the country's ability to rely on ex-post financing is likely to be limited. While these arrangements are expected to provide significant fiscal relief to Zambia, they are also likely to be accompanied by significant scrutiny by international stakeholders. This could constrain the ability of the Government of the Republic of Zambia to rely on extensive access to ex-post borrowing as the primary approach for managing the financial costs and risks associated with drought and flood risk.

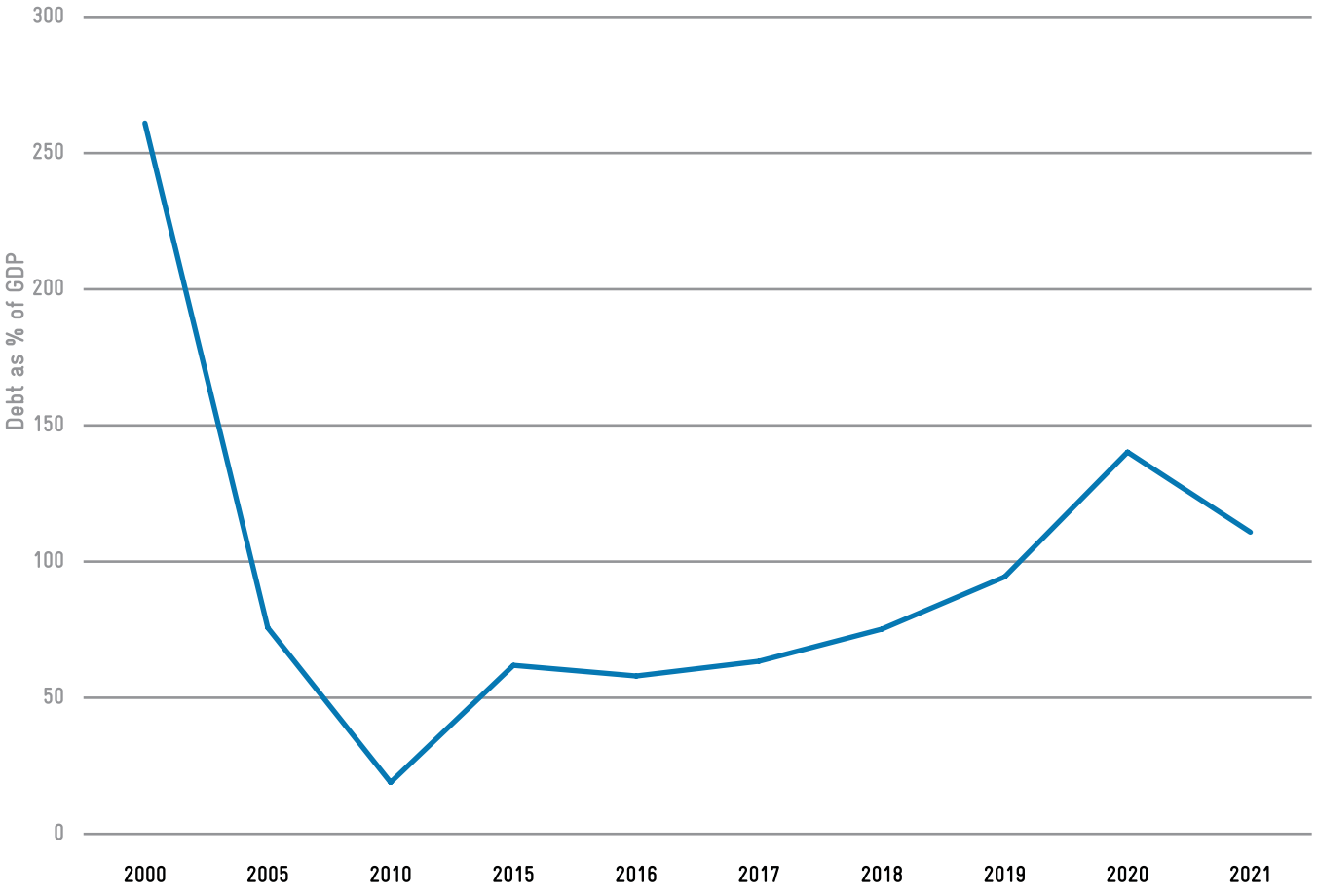
4.4.2 Household Level

The ability of Zambian households to use financial services to cope with the impact of disasters appears to have declined in recent years. Table 6 shows that, across all groups, the number of people who have access to savings has declined: whereas in 2017, 56% of women and 62% of men had savings, this had fallen to 45% and 56% by 2021, respectively. The extent to which these declines were only a temporary phenomenon associated with the COVID-19 pandemic is not yet clear. Somewhat offsetting this negative trend, the percentage of the population, and most sub-groups, with access to a bank account has risen between 2017 and 2021.[48]

Unsurprisingly, there are also differences across the country. Notably, only 30% of the poorest 40% of the population consider that they would be able to come up with emergency funds within 30 days. Only 30% of this group had savings in 2021, compared to 48% in 2016. These results should be seen in the context shown in that drought impacts are expected to be concentrated in those areas that are already suffering the highest levels of poverty.

Access to finance appears more challenging in Zambia than elsewhere in Sub-Saharan Africa (SSA). Table 7 shows that across a range of different metrics of financial inclusion, Zambia's population experiences greater challenges in accessing finance and savings than the average in the region.

Figure 9. Zambia's government debt has increased significantly in recent years



Source: Authors' analysis

47 https://www.bloomberg.com/opinion/articles/2023-07-04/zambia-s-debt-deal-is-promising-but-unfinished
48 Global Findex Database (2021)

Table 6. Household level financial protection 2021 (2017 figures in brackets)

	Bank account holders	Savings	Possible to come up with emergency funds in 30 days
Female	45% (40%)	45% (56%)	43%
Male	52% (52%)	56% (62%)	54%
15-24	45% (42%)	45% (57%)	45%
25+	51% (48%)	53% (60%)	50%
Primary education or less	33% (31%)	39% (48%)	38%
Secondary education or more	67% (60%)	64% (68%)	60%
Poorest 40%	33% (31%)	30% (48%)	30%
Richest 60%	59% (56%)	64% (66%)	60%
Rural	36%	44%	47%
Urban	63%	57%	50%
Out of labour force	33% (33%)	34% (45%)	33%
In labour force	55% (53%)	46% (66%)	54%

Source: Global Findex Database (2021)

Table 7. Measures of financial inclusion in Zambia and Sub-Saharan Africa, 2021

	Zambia	SSA average
% of population with bank accounts	49%	55%
% of population used a mobile phone or internet to make payments, buy things or send or receive money using a financial institution account	10%	15%
% of population able to access emergency funds within 30 days	48%	82%
% of population able to access emergency funds in 30 days with no difficulty	5%	14%

Source: Global Findex Database (2021)

5 Towards a CDRFI Strategy in Zambia

The analysis in the previous sections demonstrates that Zambia faces a large protection gap. Depending on the loss estimate used, there are currently no pre-arranged financing mechanisms in place to cover up to 82% of the annual average losses associated with drought and flood risk. The average annual losses associated with these risks are expected to grow with the impacts of climate change. Moreover, while the government of Zambia's fiscal position is expected to improve given the recently announced debt restructuring deal, access to debt is likely to remain a challenge. At the same time, the latest available evidence suggests that many of the Zambian population, especially the most vulnerable, are in a more financially precarious position, and less able to respond to disasters than historically and compared to other SSA countries.

This challengng context makes the planned development of a Climate Disaster Risk Finance and Insurance (CRDFI) strategy for Zambia crucial. Besides helping to refine the preliminary protection gap calculations in this report, the development of such a strategy would identify how the government intends to close the protection gap, using which pre-arranged finance instruments and over what timeframe. It would also provide a platform for discussion with development partners regarding how any identified instruments would be paid for and facilitate an informed discussion regarding which risks would not be funded by pre-arranged financing mechanisms. A robust strategy will clearly identify institutional accountabilities for implementation.

Insights from this report can help inform the development of such a strategy. The discussion below first considers the implications of the protection gap analysis for risk retention instruments in Zambia, before considering risk transfer instruments, considering each of drought and flood risk separately as appropriate. In each case, further analysis, to better understand the cost effectiveness and value for money of instruments (and the role that development partners can play in adjusting this), would need to be undertaken as part of the development of the CDRFI strategy.

5.1 Risk Retention

The protection gap analysis demonstrates a very limited use of risk retention instruments that are dedicated towards disaster risks[49], especially for drought or flood risk. As discussed above, these instruments typically offer best value for money for more frequent, less severe events. As the risk profile for Zambia discussed above identifies that these more frequent, less severe events account for the vast bulk of average annual losses associated with flood events as well as a reasonable proportion of the average annual losses associated with droughts, using risk retention instruments would be of particular importance.

There are several specific options/actions that could help support a greater use of risk retention instruments:

- To the extent that it is not already, *development and implementation of the NDRT Fund, for which there is already legislative provision, should be a priority.* This should include consideration of what a target level for funding might be; the balance of fundraising between the national budget and other sources; and determining the rules and modalities through which funding will be released.
- With the expected additional fiscal space created by the forthcoming debt restructuring, *Zambia may wish to consider the value of a contingent debt product.* This could be called down when the country declares a national emergency. For example, the World Bank's Catastrophic Deferred Drawdown product for International Development Association (IDA) countries can provide up to US$ 250 million (or 0.5% of GDP), whichever is the lower, which can be drawn down once over a three-year period, with repayment terms that are the same as standard IDA lending, and with no front-end or commitment fee.[50]
- *Zambia may wish to explore with its official creditors the possibility of adding climate-resilient debt clauses within loan agreements.* These could potentially be explored as part of the ongoing debt restructuring package or in relation to any new loans that the country may take out in the future.

5.2 Risk Transfer

There is comparatively greater use of risk transfer solutions in Zambia, but their notable gaps remain. These relate both to flood and drought risk.

In relation to flood risk, there is, at present, very little protection provided by the private insurance market,[51] nor any sovereign risk transfer arrangements in place. While flood risk is, on average, responsible for fewer losses each year than drought risk (average annual losses of US$ 25 million compared to US$ 75 million),[52] this is, nonetheless, a notable gap. It is likely that the greatest priority would be to *explore opportunities for the private insurance sector to innovate in their product range to make flood risk coverage more attractive.* This priority reflects that many of the risks are likely to be experienced by the private sector in the first instance[53] as well as the continued challenging fiscal space for the government. It should be noted that the available data suggests that the agriculture sector will see much lower losses from flood risk than other sectors, and that the losses in this sector from flood risk are estimated to only be around 10% of those from drought. This suggests that agriculture may not be a high priority sector for future development of flood risk products, and that the focus might rather be placed on increasing protection to the

49 The most significant risk retention instrument according to this analysis is the Contingency Fund. However, this can be used to support any unanticipated and unavoidable budget shortfalls, not just those related to disaster response and recovery.

50 https://thedocs.worldbank.org/en/doc/1820b53ad5cba038ff885cc3758ba59f-0340012021/original/Cat-DDO-IBRD-Product-Note.pdf

51 Beyond that provided for commercial agriculture.

52 Flood risk also appears less affected by future climate change.

53 In particular, the housing sector and service sector are expected to see the greatest losses from flood risk, with the annual losses associated with transport and other critical infrastructure being notably lower, although this does not capture the multiplier impacts of infrastructure disruptions.

housing and service sectors through extending property insurance to cover these losses.

In relation to drought risk, continued expansion of microinsurance and increasing protection provided by ARC and/or the use of ARC Replica, are both likely to be strong candidates for extending protection. Although the estimates in this report suggest that the existing agriculture microinsurance cover, which primarily protects against drought risk, makes an important contribution to covering Zambia's protection needs, it still only provides protection for around 55% of Zambian crop production and, of this production, does not fully cover the expected losses. Continued expansion of these products - just as it has been done for the FISP cover for the agricultural season 2022/2023 - is likely to be valuable. At the sovereign level, ARC provides a valuable contribution, but less than 10% of anticipated drought costs are covered by the existing policy. Further development of this cover is likely to be valuable which could be achieved in one or both of the following ways:

- Increasing the protection provided by ARC, in particularly exploring with development partners the opportunities for increasing the proportion of losses that are covered in the event of a qualifying event (i.e., increasing the ceding percentage)
- Encouraging the use of ARC Replica, whereby NGOs purchase a replica insurance policy under the same terms as the government, in order to increase coverage of the at-risk population. For example, in 2022, WFP purchased ARC replica policies that, as estimated, provided protection to 1.7 million people in Burkina Faso, Mali, Madagascar, Mauritania, The Gambia and Zimbabwe.

There may also be scope for optimising the suite of pre-arranged finance instruments. As and when (if), Zambia incorporates more risk retention instruments into its pre-arranged finance suite for drought risk, it will be valuable to explore the balance of cover provided by risk transfer versus risk retention instruments and ensure that this balance is efficient and effective. It may be that with more risk retention instruments in place, risk transfer solutions can be used for larger, more disruptive, but less frequent events, although more analysis is required before this can be confirmed. This analysis requires combining detailed probabilistic data of the costs/losses for which different forms of pre-arranged finance might be needed with a combination of market and economic variables (for example, on insurance premium amounts, interest rates and the opportunity costs of not allocating funding towards other development priorities) that help to define the relative costs of different instruments.

5.3 Summary and Next Steps

Table 8 below summarises the key insights from this analysis for Zambia's future CDRFI strategy.

The next steps include development of an implementation timeline for a CDRFI strategy for Zambia. The complexity of developing and implementing a CDRFI strategy requires thorough planning and phased development. The implementation needs to involve coordinated activities between complementary stakeholders, through phases and the involvement of various stakeholders from MoFNP, DMMU, MOA to domestic and international insurance market actors.

A stakeholder workshop took place between 16 and 17 August 2023 with a goal of promoting comprehensive risk management frameworks as a first step in developing a CDRFI strategy for Zambia. Besides validating the results of this analysis, the participants were also able to discuss the presented six steps of an implementation timeline/roadmap as shown in table 9.

Moreover, the Global Risk Modelling Alliance (GRMA)[54] was presented and representatives of the MoFNP showed great interest to apply. Engaging with the GRMA hosted by the InsuResilience Solutions Fund is highly recommendable as a successful application would unlock grant-funded modelling and data support according to the needs of the Government of the Republic of Zambia. This support could be complemented by the G7/V20-Initiative "Global Shield against Climate Risks".[55] Provided GRZ successfully joins one of the following cohorts of Global Shield partner countries to become a recipient of the Global Shield packages, GRZ could receive support with further developing risk finance instruments (e.g., those listed in Table 8) to reduce the protection gap and make Zambia more resilient against climate risk.

Table 8. Opportunities to close Zambia's protection gap

Risk	Risk retention	Risk transfer
Drought	Develop and implement risk retention instruments including: • NDRT Fund • Contingent credit • Climate resilient debt clauses	• Continue to expand coverage of agricultural microinsurance • Work with development partners to explore opportunities for greater protection through ARC (i.e., increase the ceding percentage) • Encourage the uptake of ARC Replica and/or expand coverage of ARC. • Explore need/opportunity to optimise balance of risk transfer and risk retention mechanisms (once these are established).
Flood		• Explore the development of private insurance market products for flood risk in buildings. • Continue to expand coverage of agricultural microinsurance. • Explore sovereign solutions, with a potential focus on property assets

54 https://grma.global/
55 https://www.globalshield.org/

Table 9. Proposed roadmap to develop a CDRF strategy in Zambia

Step	Stage	Comments from the workshop
01	Preparatory work to identify and set up coordination mechanisms and agreed timelines for development of CDRF strategy	• MoFNP, in collaboration with DMMU, have already taken initial steps in setting up a coordination mechanism for the development of a CDRFI strategy. • ADRiFi is currently supporting this process.
02	Rapid assessment, current situation is assessed using findings from the protection gap	• During the workshop, the protection gap results were validated as a component of this assessment. Currently, Zambia has an estimated protection gap of 82%. • Further to this, the Global Risk Modelling Alliance (GRMA) who had previously showcased their support to countries like Zambia in co-developing and enhancing access to climate and disaster risk insight, was found as a key partner to conduct probabilistic modelling and deepen Zambia's climate risk assessment beyond the agriculture sector.
03	Scope of CDRFI strategy is defined, i.e., what hazards and up to what severity level should be considered. This also includes which severity levels Zambia will not cover using CDRFI instruments, and instead rely on humanitarian support	• Like step 02, the GRMA was considered as a good partner by providing access to their open risk modelling platform to determine the severity levels and hazards that Zambia wishes to focus the CDRFI strategy on.
04	Prioritisation of CDRFI instruments by identifying a criterion for choosing instruments. Thereafter, shortlisting of CDRFI instruments can also be covered here matched to associated risks – that appear to best meet the criteria	• Steps 04 – 06 were too advanced to be discussed during the workshop. However, an interest to continue develop these steps was expressed in the workshop. For step 04, the GRMA could potentially support in identifying the costs of different CDRFI instruments and step 05 could be part of potential support under the Global Shield against Climate Risks.
05	Detailed design of the CDRFI instruments as well as identification of specific actions associated with the shortlisted instruments i.e., what triggers etc. This could be taken forward through a series of working groups for each of the shortlisted instruments/risks identified	
06	Synthesis of all the analysis into a CDRFI strategy. The analysis and process need to be well documented for reference as well as to make the CDRFI a living document	

Source: Authors from the stakeholder workshop held on 16th and 17th August 2023 in Lusaka, Zambia

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