REPUBLIC OF MALAWI

Hard Hit by El Niño:

Experiences, Responses, and Options for Malawi

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WORLD BANK GROUP

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Acronyms and Abbreviations

ACPC	Area Civil Protection Committee
ADMARC	Agricultural Development and Marketing Corporation
APES	Agricultural Production Estimates Survey
ARC	Africa Risk Capacity
ARMS	Agricultural Risk Management Strategy
CPC	Civil Protection Committee
CSO	Civil society organization
DCM	Disaster Crunch Model
DFID	Department for International Department (UK)
DODMA	Department of Disaster Management Affairs
DPRA	Disaster Preparedness and Relief Act
DRM	Disaster risk management
DRR	Disaster risk reduction
ENSO	El Niño–Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
FBS	Food Balance Sheet
FEWS NET	Famine Early Warning Systems Network
GDP	Gross domestic product
GoM	Government of Malawi
HEA	Household Economy Approach
HFA	Hyogo Framework for Action
INGO	International NGO
MGDS	Malawi Growth Development Strategy
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
MT	Metric ton
MVAC	Malawi Vulnerability Response Committee
MWK	Malawian Kwacha
NAIP	National Agriculture Investment Plan
NAPA	National Plan of Action
NCCIP	National Climate Change Investment Plan
NCP	National Contingency Plan
NDRMP	National Disaster Risk Management Policy
NGO	Nongovernmental organization
PDNA	Post Disaster Needs Assessment
SGR	Strategic Grain Reserves
SFDRR	Sendai Framework for Disaster Risk Reduction
TA	Traditional Authority
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children Fund
USAID	United States Agency for International Development
VSLA	Village Savings and Loans Association
WFP	World Food Programme

Foreword

Disasters, mainly triggered by extreme weather conditions, have become a very frequent occurrence in Sub-Saharan Africa. These disasters are a product of the El Niño–Southern Oscillation (ENSO), the largest mode of interannual variability in the climate system, the frequency of which has increased over time. Shifting patterns in weather and climate have caused rainfall anomalies, adversely impacting agriculture sectors across the subcontinent. Malawi is among the most climate-fragile countries in the world, ranking 105 out of 113 countries based on the 2016 Global Food Security Index. In recent years, the country has faced successive and compounding climatic shocks, from the worst flood in 50 years in 2015, to the strongest El Niño event in 35 years in 2016, which left 6.7 million people (39 percent of Malawi's population) in need of food assistance.

El Niño has hit Agriculture harder than any other sector, and caused agricultural production to dwindle, rendering most households vulnerable to food insecurity. The Government of Malawi (GoM) estimated that the 2015 El Niño led to an annual production loss of US$282 million within the agriculture sector out of total estimated losses of US$500 million (GoM 2016b). Consequently, overall agriculture sector production fell by 2 percent of gross domestic product (GDP), and GDP growth slowed from 5.7 percent in 2014, to 2.8 percent in 2015, and to 2.5 percent in 2016. As 30 percent of GDP comes from the agriculture sector, this recurring crisis reveals the urgent need for the GoM to take immediate and long-term actions to address this challenge. When climatic shocks strike, the economy is devastated as productive investments are diverted to address the immediate needs of food insecurity. Many of the economic gains made by the economy and farm households are swept away in the aftermath of a poor harvest.

Climate predictions indicate the likelihood of further extreme weather events in Malawi that, if not well managed, will increase vulnerability. Average temperatures are expected to increase by 1.4 to 2.0 degrees Celsius in low and high warming scenarios, respectively, by 2040. The frequency of droughts is projected to increase by up to 20 percent, for dry spells of one to six months. The frequency of heat waves is projected to increase by between 10 and 20 percent compared to the recent past (World Bank 2017b). This calls for concerted and immediate action to guide efforts to respond to extreme weather events to reduce vulnerability among households in Malawi.

Against the above background, this analytical work was designed to take a deeper look at the experience of past years to identify options, gaps, and entry points to improve future responses to El Niño and related extreme weather events. The report's recommendations are based on analysis of secondary data and primary data collected in 15 disaster-prone districts, as well as stakeholder consultations at all levels. The recommendations are meant to guide the GoM, the World Bank Group, and other stakeholders in improving preparedness and responses to El Niño, and related extreme weather events, as part of efforts to achieve medium- to long-term vulnerability reduction.

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Executive Summary

In Malawi, the impact of extreme weather events has significantly contributed to the recurrent crises of food insecurity. The extreme weather events have shifted the country's focus from improving agricultural productivity and resilience to ensuring survival, with most resources devoted toward humanitarian assistance. The country is highly exposed to multiple hazards that cause widespread shocks. In recent years, the country faced successive and compounding climatic shocks: from the worst flood in 50 years in 2015, to the strongest El Niño event in 35 years in 2016. This prompted declaration of a state of disaster and left 39 percent of the country (6.7 million people) at risk of food insecurity during the 2016/17 consumption period (GoM 2017c). The El Niño–Southern Oscillation (ENSO) is the most important driver of climatic variability in Malawi. Even though El Niño occurrences are predicted to increase in frequency, the Government of Malawi's (GoM) actions are inadequate, as disaster management is largely reactive than proactive.

The agriculture sector, which contributes 30 percent to Malawi's gross domestic product (GDP), has been severely affected by the extreme weather events. This is amplified by the overreliance on single-season rainfed agricultural production, dominated by maize-based systems that are vulnerable to climatic shocks. The annual losses from production risks alone average US$149 million per year (Giertz et al. 2015a). The agriculture sector incurs huge losses when disaster strikes, amounting to approximately 89 percent of the total losses (GoM 2016b). In response to reduced production of most crops, average prices have generally increased, fueling inflation and reduced agricultural growth, and ultimately adversely impacting the economy at large.

The Government of Malawi (GoM) has responded by putting in place various policies and coordinating institutions/structures to address extreme weather events, including increasing its responsibility for responding to the aftermath e.g. increasing support to maize purchases. However, its policies are fragmented, with inadequate resources to translate them into action, while capacity gaps further cripple increased coordination requirements. In view of this, efforts have not translated into sustained results when disasters recur, creating a vicious cycle of food insecurity and vulnerability.

This analytical work was undertaken to assist the GoM to strengthen its efforts toward effectively responding to extreme weather-related events, especially El Niño and La Niña phenomena. Specifically, the study aims to provide a critical review of how the country has responded to recent extreme weather events, draw lessons for future response planning, and identify gaps and options to strengthen preparedness and response to El Niño, La Niña, and similar weather events.

The study used a combination of primary and secondary data collected from July to September 2017. Primary data were collected through focus group discussions and key informant interviews in Malawi's 15 disaster-prone districts. Secondary data included a review of various policies, research reports, and other documents.

The key findings and recommendations from the study are summarized below:

Key Findings

Ever increasing vulnerability and costs

1. The costs of unmanaged risks are high, and will likely go higher with the absence of concerted and coordinated actions to address the gaps, as temperatures and heat waves are projected to

increase. The 2016 El Niño was the highest ever in terms of magnitude, vulnerability, and ultimately cost. Donors provided significant resources toward humanitarian response (at least 77 percent).

2. Malawi is seemingly becoming more vulnerable, and the high humanitarian costs are a drain on critical resources that could otherwise be invested in adapting agricultural food systems to climate change and increasing absorptive capacity against climate change variability. The current responses are more reactive than proactive, with significant resources devoted to maize purchases (approximately 50 percent of the agriculture sector budget), thereby offering limited options to achieve agricultural transformation, as stipulated in the National Agriculture Policy.
3. Peak periods of food insecurity consistently relate to the occurrence of extreme weather shocks. In turn, this directly reduces agricultural production, agricultural growth, and ultimately overall economic growth. Extreme weather shocks often lead to downward adjustment of national growth targets.

Increased policy evolution trends, but fragmented, with outdated legal framework for disaster risk management

1. Policy trends have evolved in response to the increased prevalence of extreme weather events. Climate change is strongly integrated and prioritized within Malawi's medium-term strategy and is mainstreamed within various sector policies (including agriculture), as well as in the development of specific policy frameworks (e.g., the national climate change policy). These policies are significantly aligned with international frameworks. This notwithstanding, the policies are fragmented, sector-specific, inadequately funded, ad hoc, and broadly framed, offering limited scope for addressing the complexity of disaster events. The experience of 2015–2016 necessitated development of a "National Resilience Strategy and Implementation Plan" that offers hope to address fragmentation gaps, while shifting the focus toward resilience.
2. The country still relies on the Disaster Preparedness and Relief Act (DPRA) of 1991, which is outdated and not aligned with Malawi's international commitments.

Disaster risk management machinery in place, albeit with weak capacity and few champions in the agriculture sector

1. High political will exists in terms of leading coordination efforts, as is the functionality of various disaster risk management institutional structures. However, the GoM's funding is unable to keep pace with the increased needs, amidst weak structures at district and community level to translate results. No specific emergency funds are in place to facilitate timely response to disasters. Despite the draft Agriculture Risk Management Strategy (ARMS), the agriculture sector lacks champions to effectively integrate disaster issues as a core issue within its work.
2. Preparedness and early warning instruments are insufficiently connected and institutionalized to contribute effectively to decision making. Early warning systems remain weak and are not well integrated within the agriculture sector. Agricultural production estimates are routinely calculated using more traditional approaches, instead of more modern techniques that improve accuracy and prediction efficiencies. The Food Balance Sheet, which is informed by agricultural production estimates, weights maize calories relatively high, does not include other cereals, roots, and tubers, and underestimates food opening balances (particularly lacking an informed private stock assessment), thereby offering imprecise information for planning. Agricultural insurance has

not been successfully scaled up due to design flaws and stakeholders' lack of awareness. In the context of limited or no funding for contingency plans, these instruments hardly inform preparedness for disaster. Acute gaps exist at district level, where contingency plans are rarely updated and are supported in an ad hoc manner.

Resilience, diversification and social protection reduces vulnerability

3. Increased evidence suggests reduced vulnerability if resilience is integrated within the humanitarian response, with more focus on shock-responsive safety nets. Given the high political will and donors' good will, expanding social cash transfers to all districts offers large potential to ensure households' resilience to disasters induced by extreme weather shocks.
4. Upscaling resilience and diversification also offers a good option to reduce vulnerability. Where efforts for joint resilience programming are in place, coordination has been good and household vulnerability to extreme weather events has reduced.

Unpredictable public interventions on the market increase vulnerability and price volatility

1. Unpredictable GoM interventions on the market have created information asymmetry, which has fueled increased maize price volatility, leading to depressed producer prices and disincentives for private sector commercial investments.
2. The Agricultural Development and Marketing Corporation (ADMARC) can increase market stability and reduced volatility if it improves its transparency on maize operations, purchases maize from farmers early (soon after harvest), and establishes correct price setting (cost recovery). This not only increases private sector confidence and participation on the market, but also reduces anticipated losses by ADMARC, a drain on public resources when it needs to be bailed out.

Recommendations

Strengthen policy and legal framework, with sufficient funding on DRM activities

1. Department of Disaster Management Affairs (DODMA should expedite the review of the DPRA, and ensure that it is aligned with the Sendai Framework for Disaster Risk Reduction and in line with existing and emerging climatic shocks.
2. DODMA/Ministry of Finance, Economic Planning and Development should set aside an emergency fund or DRM budget line that can be used to respond to disasters, rather than overreliance on donors' good will.

Strengthen/improve connectedness among early warning, forecasting and disaster preparedness tools

3. DODMA should strengthen early warning systems by developing comprehensive hazard maps and risk profiles (up to community level in disaster hotspots), and ensure that they are updated and communities are well-informed, while allocating adequate funding for this activity. The Ministry of Agriculture, Irrigation and Water Development (MoAIWD) should integrate early warning as part of agricultural extension advisory services, and ensure that it positions itself to implement and mainstream disaster preparedness and adaptation.

4. DODMA/MoAIWD should adopt use of geospatial tools, including satellites, to inform early warning (as informed by agricultural meteorological assessments such as use of geospatial tools). Appropriate capacity and partnerships should be developed at various levels to operationalize such tools, including use.
5. MoAIWD should improve the methodology used for the agricultural production estimates by incorporating use of remote sensing and automated data capture/transmission, and improve yield estimation (as guided by recommendations from pilots executed in 2014/15). In the Food Balance Sheet, estimation of the food gap should be informed by an elaborate assessment of public and private stocks and a better measure of postharvest losses; caloric consumption weights should be broadened to reflect other key cereals, roots, and tubers.

Deepen support to resilience, social protection while rebalancing investments to promote diversification

6. MoAIWD should ensure appropriate resource balance, guided and aligned with the National Agriculture Investment Plan (NAIP), while deepening resilience, as opposed to the current overemphasis on maize.
7. The GoM and development partners should scale up support toward resilience and diversification (already a strong feature in the NAIP), while ensuring coherent and joint programming. The National Resilience Strategy can offer an opportunity to guide such efforts. In the same vein, integration of resilience within the humanitarian response should be scaled up in all districts. Social protection programs (as led by the Ministries of Gender and Finance, Economic Planning and Development) should prioritize promotion of shock-responsive safety nets, which have proved to significantly reduce vulnerability against shocks.

Strengthen institutionalization of DRM within mainstream agriculture sector

8. MoAIWD should identify champions within its structures to lead in mainstreaming DRM within agriculture at all levels, while coordinating with district DRM desk officers. Funding to facilitate such work will be needed. The ARMS offer a proper guide and should be adopted to inform this.
9. MoAIWD should lead in the implementation of the National Resilience Strategy and Implementation Plan, ensure that resources are mobilized accordingly, and align coordination structures with the existing ones. As the plan has been finalized, such support needs to be mobilized from 2018-2019.

Improve transparency, predictability of market interventions and enabling environment for agriculture

10. The Ministry of Trade, Industry and Tourism should improve the enabling environment as it relates to GoM interventions on the market. Review of the Control of Goods Act needs to be expedited to guide this endeavor to improve transparency, consultation, and predictability on market interventions.
11. ADMARC should routinely provide information on its marketing plans (prices, volumes to be bought or sold) ahead of the crop selling season, and ensure cost recovery prices to avoid any anticipated losses (risk-based). Based on this, ADMARC should enter the market soon after the maize harvest to ensure smallholder farmers receive a price above the minimum price set by the GoM.

Chapter 1: Agriculture and Extreme Weather Events in Malawi

1.1 Background

Disasters, mainly triggered by extreme weather conditions, are now a constant occurrence in Sub-Saharan African countries, the economies of which rely mainly on agriculture. These disasters are manifested in the El Niño–Southern Oscillation (ENSO), the largest mode of interannual variability in the climate system (Murphy et al. 2001), the frequency of which has already increased and is likely to increase further in the countries of East and Southern Africa. Shifting patterns in weather and climate cause rainfall anomalies that adversely impact agriculture. The major agricultural vulnerability drivers include poor agricultural production, loss of livestock, high food prices, cross-border trade barriers, growing economic interdependence, and poverty. As an agro-based economy, Malawi has been one of the hardest hit countries in the region.

Agriculture is the backbone of Malawi's economy, contributing over 30 percent of gross domestic product (GDP). The sector employs 64.1 percent of the total labor force and contributes about 80 percent of the country's foreign exchange earnings. The main export crops grown are tobacco, sugar, tea, and cotton. Maize is the principal subsistence crop, cultivated by 80 percent of smallholders. Other important food crops include rice, cassava, sweet potato, Irish potato, sorghum, and millet. Malawi's agriculture sector has two main subsectors: the smallholder subsector and the estate subsector. The smallholder subsector contributes more than 70 percent to agricultural GDP, while the estate subsector contributes less than 30 percent (GoM 2006d). Smallholders mainly cultivate food crops such as maize, cassava, and sweet potatoes to meet subsistence requirements, the production of which is adversely affected by climate change. Estates focus on high-value cash crops for export such as tobacco, tea, sugar, coffee, and macadamia.

Agriculture in Malawi is vulnerable to production shocks, particularly extreme weather events, including El Niño and La Niña, which have induced increased incidences of droughts and floods. When crop harvests are cut significantly due to such shocks, many farming households, particularly in the lean period (November to March), face hunger and deplete some of their assets or turn to short-term coping strategies. In 2016,[1] El Niño-induced drought affected 24 districts in Malawi, markedly reduced maize production by 30 percent, and led to a declaration of a state of disaster. According to an agricultural risk assessment conducted by the World Bank, annual losses from shocks to production averaged US$149 million per year from 1980 to 2012 (Giertz et al. 2015). The Malawian economy is devastated when productive investments are diverted to address the immediate crisis of food insecurity to ensure survival. Many of the economic gains made by farm households are wiped away in the aftermath of a poor harvest.

Malawi's economy is not sufficiently diversified. It is dominated by maize production, which is heavily affected by climate change, leading to high economic costs. Maize is grown in a regime where 99 percent of smallholders rely on a single rainfed season. Consequently, maize production, and ultimately the agriculture sector, is characterized by low productivity due to the high risk of climatic shocks. Floods in 2015 led to estimated losses of US$335 million (5.2 percent of GDP), of which agricultural losses alone were US$68 million (GoM 2015c). This was followed by a strong El Niño-induced drought in 2016 that led

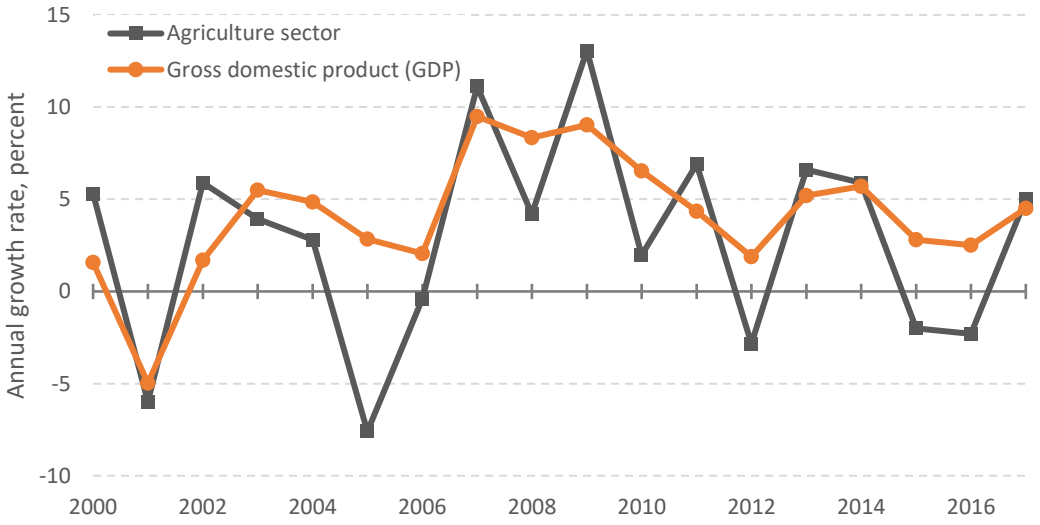
[1] The 2015/16 El Niño phenomenon was one of the strongest on record, deeply affecting the lives and livelihoods of more than 60 million people across 40 countries.

to losses of US$239 million, of which crop production alone accounted for 83 percent (GoM 2016b). Drought drove up maize prices in response to reduced production, resulting in food price inflation above 20 percent, with higher food imports and lower exports.

The costs of undermanaged risks are escalating, and will likely rise more in the absence of concerted action to address the gaps. Humanitarian costs are increasing gradually, coinciding with the occurrence of disasters. The most recent peak was in 2016, when 6.7 million people were unable to meet their food requirements after the El Niño. The country seems to be becoming more vulnerable, and the cost of addressing this vulnerability drains critical resources that could be leveraged to invest in adapting agri-food systems to climate change and in increasing absorptive capacity against climate change vulnerabilities.

Growth in the economy is correlated with agricultural performance. In years of depressed agricultural growth, GDP is similarly lower (Figure 1). Growth trends in the agriculture sector are more volatile than those of the overall economy, reflecting the sector's exposure to adverse weather-related production shocks. Total value added in the agriculture sector fell year-to-year four times between 2000 and 2014, primarily because of droughts or otherwise erratic rainfall, exacerbated in 2012 by weak economic conditions in Malawi's economy more broadly. In 2015, floods followed by droughts reduced maize production by 30 percent. Consequently, overall agriculture sector growth contracted by 2 percent of GDP, and GDP slowed from 5.7 percent in 2014 to 2.8 percent in 2015, and further to 2.5 percent in 2016.

Figure 1: Malawi's agriculture sector, economy, and annual growth, 2000–2016



Source: World Bank 2016.

Climate change has led to varying rainfall patterns, which in turn, has caused poor crop yields or total crop failure in most districts. Weather-related disasters are manifested through the late onset of rain seasons, abnormal and persistent dry conditions, high temperatures, and early cessation of rains before the crops pass through the maturity stage. Most often 15 of Malawi's 28 districts are affected by various severities of floods and droughts: 8 in the southern region (Mangochi, Machinga, Zomba, Phalombe, Nsanje, Chikwawa, Balaka, and Blantyre), 4 in the central region (Nkhotakota, Salima, Ntcheu, and Dedza), and 3 in the northern region (Karonga, Rumphi, and Nkhatabay).

Extreme weather conditions induced by El Niño and La Niña present not only a humanitarian challenge, but also a long-term development challenge, manifested by various causes of vulnerability. Factors such as poverty, inequality, environmental degradation, competition for scarce natural resources, high population growth, rapid and uncontrolled urbanization, and weak risk governance contribute to make countries and their people increasingly vulnerable to climate change and the increased frequency and intensity of weather-related hazards. The poorest, who depend directly on natural resources for food, clean water, energy, shelter, and income and who do not have access to social safety nets, are the most affected by this phenomenon. As population pressure and vulnerability rise, increased dependency on natural resources fuels increased environmental degradation, further posing a threat to sufficient rainfall to sustain agricultural production. Increased vulnerability also leads households to adopt various coping mechanisms, some of which reinforce their long-term vulnerability. The Center for Global Development ranks Malawi 8 out of 67 countries on the overall vulnerability scale (Busby, Smith, and Krishnan 2015).

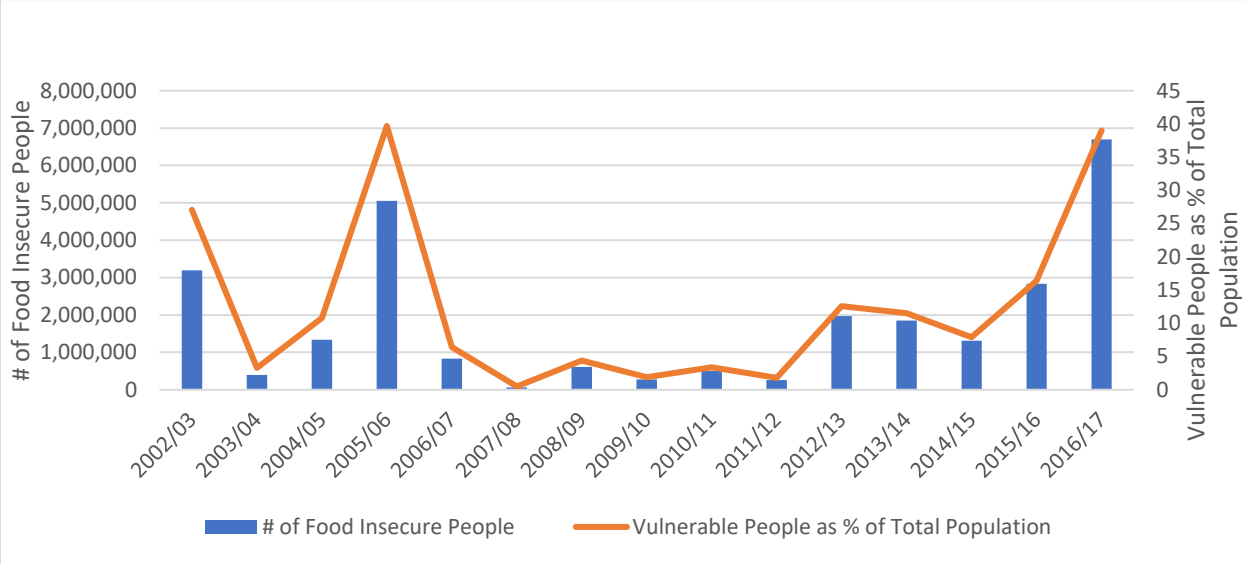
Climate predictions indicate continued extreme weather events in Malawi that, if not well managed, will increase vulnerability. Average temperatures are expected to increase by 1.4 degrees Celsius and 2.0 degrees Celsius in low and high warming scenarios, respectively, by 2040. Frequency of droughts is projected to increase up to 15–20 percent for dry spells of one to six months. Similarly, the frequency of heat waves is projected to increase between 10–20 percent compared to the current scenario (World Bank 2017b). Concerted actions are needed to guide efforts to respond to extreme weather events to reduce vulnerability among households in Malawi. This study contributes toward developing such options, based on lessons learned.

1.2 El Niño and Food Insecurity in Malawi

Malawi is among the top climate-fragile countries, ranking 105 out of 113 countries based on the 2016 Global Food Security Index (Economist Intelligence Unit 2016). Malawi experienced 6 major droughts and 20 floods events over the past 15 years, with their frequency and intensity increasing over time. In 2016, the central and southern regions of Malawi received significantly below-normal levels of precipitation, while the northern region received above-normal rains. As a result, 6.7 million people (39 percent of the population) were food insecure due to drought induced by El Niño. A similar situation occurred in 2015, when 2.8 million people experienced food insecurity due to massive floods in 15 districts, and droughts in others, that negatively affected agricultural production, particularly crops (GoM 2016a). Over the period under review, an average 1.8 million people per year were food insecure (12.4 percent of the total population) (Figure 2).

The number of vulnerable people also increased between the 2014/15 and 2016/17 consumption years. During the 2014/15 growing season, Malawi experienced delayed onset of rains, followed by heavy rains, dry spells, and an early tail-off to the rainy season. According to Africa Risk Capacity (ARC) Initiative (2016), a cumulative 18 million people were affected by droughts and floods between 2005 and 2016.

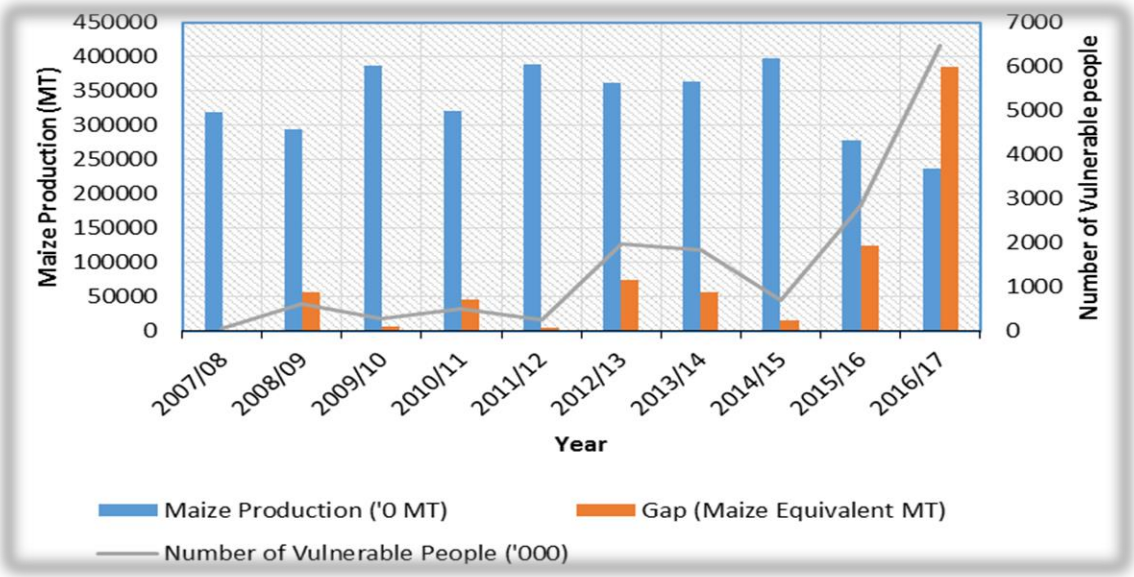
Figure 2: Number and share of food insecure people in Malawi, 2002–2017



Source: Authors' compilation from Malawi Vulnerability Response Committee (MVAC) reports.

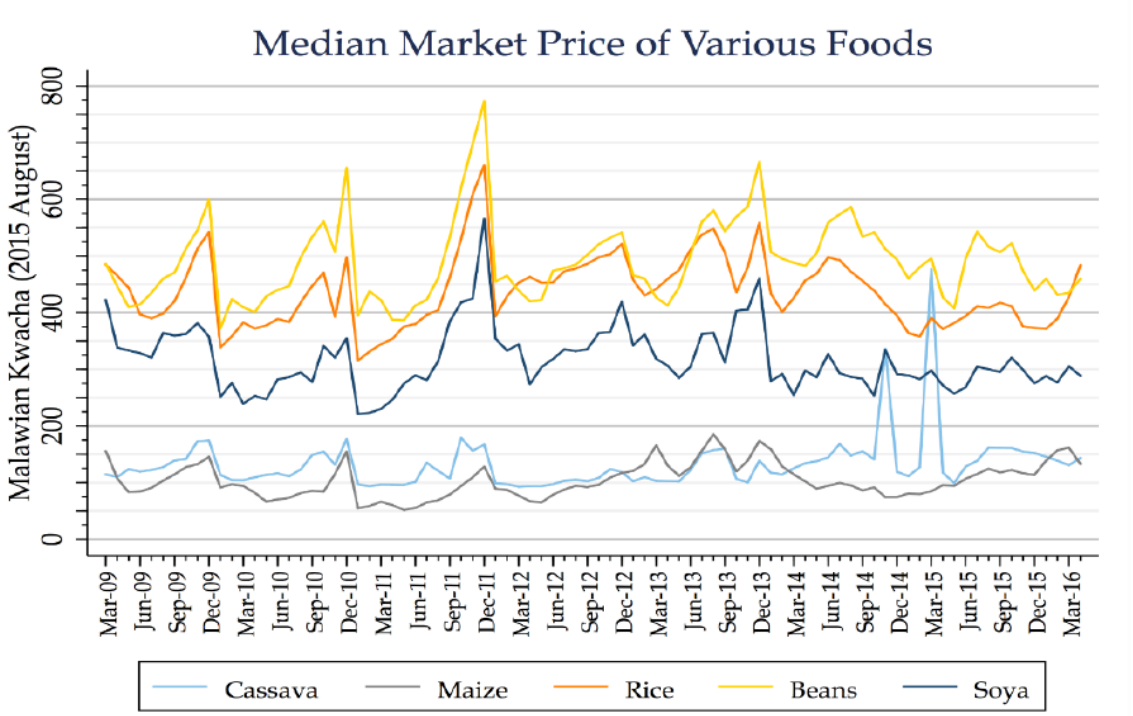
The increased number of food insecure households followed trends in the maize deficit (Figure 3). The irregular pattern of the trends was due to rainfall variability and other factors that led to a cyclic pattern in maize production. Maize production decreased from 3,978,123 metric tons (MT) in 2014/15 to 2,369,493 MT in 2016/17, while the number of food insecure people increased from 695,600 to 6.7 million over the same period. Similarly, the food insecurity gap (maize equivalent) increased from 15,830 MT in 2014/15 to 385,407 MT in 2016/17. Production of most other crops was also adversely affected, leading to increased prices and ultimately inflation, particularly for maize. The uncertainties of market interventions further influenced commodity price volatility. Figure 4 depicts the level of volatility over the past seven years in Malawi. The high peaks of maize prices are associated closely with the incidence of market interventions in response to reduced production due to extreme weather events.

Figure 3: Production and consumption trends, 2007–2016



Source: Authors' compilation using food insecurity data from MVAC reports.

Figure 4: Price volatility of major food crops in Malawi, 2009–2016



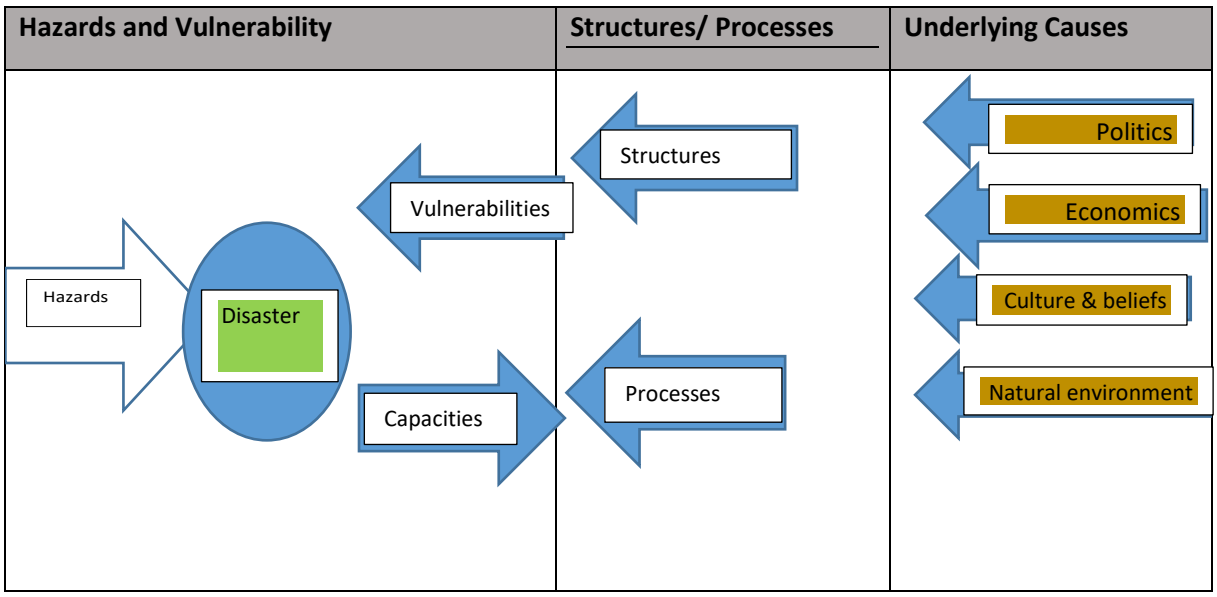
Source: MoAIWD.

1.3 Theoretical Framework

This study was conducted in 15 disaster-prone districts, purposively selected to cover all three regions of Malawi, as follows: Karonga, Chitipa, Rumphi (northern region); Nkhotakota, Salima, Mchinji, Dedza (central region); and Mangochi, Balaka, Machinga, Zomba, Phalombe, Chikwawa, Mulanje, Nsanje (southern region). The combination of methods used included a review of secondary data, stakeholder consultations, and focus group discussions with various groups at local level.

A Disaster Crunch Model (DCM) was used to understand the causes of vulnerability, structural processes, and disaster hazards to generate experiences and lessons (Figure 5). The DCM focuses on the role of community or national capacities (strengths) and vulnerabilities (weaknesses), and wider institutional factors (such as existing structures and processes) in dealing with disasters. It also identifies underlying causes shaping the occurrence, impact, and response to hazards and disasters.

Figure 5: Disaster Crunch Model



Source: Hansford, Dellor, and McPherson 2007.

The DCM starts with a consideration of hazards, which may be natural phenomena, such as a drought or a flood, or may be the result of human activity. Disasters are the result of a failure of the vulnerable community or country to contain, reduce, or minimize the hazard's impact, manifested in loss of life and/or damage to property, assets, or livelihoods. The structures and processes refer to the role of stakeholders and institutional structures and processes through which they influence decision making in disaster risk management (DRM) interventions. Each of these structures has institutional policies or implements activities that affect beneficiaries, in the process making them more or less vulnerable to hazards.

The DCM was complemented by some elements of the Food and Agriculture Organization's (FAO) DRM Model[2] to analyze the institutional architecture for DRM at the national, district, and community level. Unlike the DCM, the FAO framework provides a set of practical tools and methods to assess the structures and capacities of national, district, and local DRM institutions to improve their response effectiveness and allow for the integration of DRM into development planning in disaster-prone areas, vulnerable sectors, or population groups (FAO 2004). A Power Cube Framework (Gaventa 2005) was used to analyze the levels of power and influence of various actors within the DRM architecture.

1.4 Report Outline

The remainder of the report is organized as follows. Chapter 2 discusses the policy and institutional framework for extreme weather events in Malawi. Chapter 3 provides an assessment of preparedness instruments. Chapter 4 reviews Malawi's responses to recent extreme weather events. Chapter 5 presents the trade and market implications of extreme weather events. Chapter 6 summarizes key messages and recommendations.

[2] The FAO DRM approach is a combination of (i) the Hyogo Framework for Action (HFA), which emphasizes a shift from reactive emergency relief to proactive DRR in the predisaster stages by strengthening prevention, mitigation, and preparedness; and (ii) DRM, which combines, through a management perspective, the concept of prevention, mitigation, and preparedness with response.

Chapter 2: Policy and Institutional Frameworks to Address Extreme Weather Events in Malawi

This section presents findings of a review of policy evolution to determine the extent to which national policy frameworks integrate climate-related DRM in Malawi. Of interest is how the international policy agenda has shaped Malawi's policy landscape. The section also provides a quick overview of institutions, actors, and processes involved in preparedness and responses to guide the status of interplay, including options for coordination and collaboration. An analysis of capacity at national, district, and community level identifies options to strengthen preparedness and responses to extreme weather events.

2.1. International Frameworks

Malawi is signatory to a number of international and regional agreements related to disasters and climate change. These include the Convention on Biological Diversity (ratified in 1996); the United Nations Framework Convention on Climate Change (UNFCCC, ratified in 1994) and the accompanying Kyoto Protocol (signed in 2002); the Convention to Combating Desertification (signed in 1996); the Sendai Framework of Disaster Risk Reduction 2015–2030; the Sustainable Development Goals; the African Regional Strategy for Disaster Risk Reduction; and the Southern African Development Community (SADC) Disaster Risk Reduction Strategy (World Bank 2017b).

The international policies and frameworks developed before 2004 were mostly reactive, with strategies aimed at managing the aftermath of extreme weather events. In 2005, the Hyogo Framework for Action (HFA) (2005–2015) was adopted as a global blueprint for disaster risk reduction (DRR) efforts, with a focus on building the resilience of nations and communities to climate-related disasters. The HFA triggered the development of national DRM strategies in response to the recurrence of extreme weather events in most countries, including Malawi. Several policies were developed and aligned with the HFA (Figure 6), which shaped the national policy focus by: emphasizing measures to reduce the impact of climate-related disasters; developing the resilience of vulnerable communities; and instituting measures to substantially reduce disaster-related losses in lives, and in the social, economic, and environmental assets of communities and nations. After the expiration of the HFA in 2015, the United Nations General Assembly adopted the Sendai Framework for Disaster Risk Reduction (SFDRR) (2015–2030); the SFDRR aimed to achieve a substantial reduction in disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries.

2.2 National Policy Framework

The international policy agenda shaped the way climate issues are addressed in the national policy space. The focus shifted from climate mitigation in the 1990s (as guided by the Kyoto Protocol and other UN treaties) to reduction of losses since the 2000s (through the HFA) to the current focus on developing community resilience and early warning systems. The number of DRM-related policies and legislative instruments increased significantly from 1991 to 2017 in Malawi (Figure 6). This also reflects the extent to which issues of early warning, preparedness, response, and resilience were emphasized as the severity of extreme weather events increased.

Figure 6: Trend in DRM-related policies and strategies in Malawi, 1991–2017

Source: Authors' compilation.

The Disaster Preparedness and Relief Act (DPRA) (1991) is the oldest and most overarching legislation governing issues of disaster management in Malawi. The Act was precipitated by the Phalombe flash floods of March 11, 1991 (which impacted 128,140 people, killed between 700–1,000 people, and destroyed 30,000 hectares of crops). As it was enacted before the Kyoto Protocol, the Sendai Framework, and other recent regional frameworks, DPRA's approach is primarily reactive, rather than comprehensively covering the activities of disaster planning, response, and recovery needed in the current context.

Gaps existed in earlier policies, which de-emphasized the issues of response and resilience building, just as DRM was more reactive than proactive. However, due to the frequency and severity of impacts of extreme weather events/disasters, especially dry spells and floods, emphasis shifted toward DRM management that extended to developing preparedness strategies that required cross-sectoral approaches. This led to the development of the National Plan of Action (NAPA) in 2008, which emphasized (i) improving existing early warning systems to enhance disaster preparedness and response, and (ii) promoting climate-smart agriculture to increase resilience.

The GoM developed the National Climate Change Investment Plan (NCCIP) (GoM 2013) to provide opportunities for funding climate-related issues. Among other things, the NCCIP supported the development of the National Disaster Risk Management (NDRM) Policy (2015), the National Climate Change Management Policy (2016), and the National Agriculture Policy (2016). Most of the older-generation policies are aligned with the HFA (2005–2015)**,** the Millennium Development Goals, the United Nations Framework Convention on Climate Change, the African Regional Strategy for Disaster Risk Reduction, and the SADC Disaster Risk Reduction Strategy. These policies emphasize early warning, preparedness, and response as well as strategies for building communities' resilience to reduce the levels of damage and loss in the event of extreme weather patterns.

The new National Agriculture Policy (2017) strongly recognizes agriculture risk management and integrates this as a priority area. This is due to the high fluctuations in production stemming from climate

change, weather variability, pests, and diseases. A World Bank study on agricultural risk management estimated that production losses over the past 30 years were US$149 million per year due to systemic risks in Malawi's agriculture sector. In response, a risk management strategy for the agriculture sector (2016/17) was developed to support implementation of the risk management key result area of the National Agriculture Policy. The National Agricultural Investment Plan (NAIP) (2017), which is the implementation strategy/plan for the National Agriculture Policy, has a dedicated programmatic area on resilient livelihoods and production systems that has DRM interventions. Out of the 16 intervention areas, 4 are related to efforts to address the plight of vulnerable communities: DRM; pest and disease management; sustainable natural resource management; and sustainable irrigation development. The National Irrigation Act (revised 2016) and the National Strategy for Sustainable Development (NSSD) (2005) were developed with a greater focus on resilience building through irrigation and economic growth. The NSSD outlined core functions for different stakeholders to implement sector-specific interventions that translate into resilience building of the nation and communities.

The National Resilience Strategy (2017–2022) was developed in an attempt to break the recurrent cycle of food insecurity. The plan has four pillars: (i) resilient agricultural growth, (ii) catchment protection and management, (iii) flood control early warning and response, and (iv) household resilience. This plan provides a comprehensive approach toward deepening resilience, particularly covering agricultural and natural resource management.

2.3 Alignment of National Policies to the Sendai Framework

Although the key policy documents were developed during the HFA era, some of their elements are well aligned with the SFDRR. For instance, the National Resilience Strategy (2017) integrates all four known priority areas of the SFDRR: understanding disaster risk, strengthening disaster risk governance, investing in DRR, and enhancing preparedness for effective response (Table 1). Similarly, other policies such as the Malawi Growth Development Strategy (MGDS) III (2017), the National Disaster Risk Management Policy (NDRMP) (2015), the NCCIP (2013), and the NAIP (2017) tackled all four pillars, even if some are weakly incorporated. For example, the MGDS III and NDRMP weakly emphasize strengthening investment in DRR but are strong on the remaining three priority areas. On the other hand, the NCCIP and NAIP are very strong on strengthening DRR investments, but are relatively weak on the other three priority areas.

Table 1: Alignment of Malawi's existing policies to the Sendai Framework

DRM-related Policy	Sendai Framework Priority Area			
	Understanding disaster risk	Strengthening disaster risk governance to manage disaster risk	Investing in disaster risk reduction for resilience	Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction
Malawi Growth Development Strategy III	Yes	Yes	Yes	Yes
National Disaster Risk Management Policy	Yes	Yes	Yes	Yes
National Climate Change Investment Plan	Yes	Yes	Yes	Yes
National Climate Change Management Plan	Yes	No	No	No
National Agriculture Investment Plan	Yes	Yes	Yes	Yes
National Resilience Strategy	Yes	Yes	Yes	Yes
National Agriculture Policy	Yes	No	Yes	No

Source: Authors' compilation.

The National Climate Change Management Plan (2016) and National Agriculture Policy (2016), despite being key DRM-related policies in the country, are not directly aligned with some priority areas of the SFDRR. For instance, the National Agriculture Policy (2016) does not incorporate strategies/actions to strengthen DRR governance or disaster preparedness. Rather, it is more focused on enhancing understanding risks in terms of agricultural production and resilience building.

2.4 Policy Gaps

Proper coordination structures exist, with clear roles, but limited coordination at implementation level, with overlaps on mandates by various institutions. The assignment of roles among various players within DRM seems clear, but such clarity is not mirrored at implementation level. Despite increased interest for policies to recognize DRM, actual implementation is fragmented, with insufficient coverage of interventions. DRM and climate are not sufficiently mainstreamed across various sectors.

Enforcement of policies, plans, regulations, and frameworks has been challenging, leading to uncoordinated and unstandardized approaches to DRM. This is further exacerbated by the now outdated

legal framework, the DPRA of 1991. Various efforts are project-based, with lack of proper connectedness among interventions and of sustainability.

Inadequate budget hampers support to resilience-building activities and coordinated preparedness and response activities. No budget line exists specifically for DRM that various government institutions can use, hence affecting implementation. Preparedness and risk reduction receives very low funding, with more support on disaster responses. The resources meant to support long-term resilience are diverted to support recurrent disasters. This is also the case for government where significant attention is made to support disaster response efforts e.g. release of MK1.2 billion in 2016-2017.

2.5 Institutional Architecture for Disaster Management in Malawi

The DPRA of 1991 is the main legal framework guiding DRM implementation in Malawi (under revision). It focuses on disaster preparedness and response, and covers the composition and functions of the Commissioner's Office for the Department of Disaster Management Affairs (DODMA), the National Disaster Preparedness and Relief Committee (NDPRC), and the National Disaster Preparedness and Relief Fund. DODMA coordinates the implementation of DRM at national level. The District Executive and Civil Protection Committees coordinate DRM-related issues at district level. The Desk Officer acts as the Disaster and Relief Officer responsible for disaster impact assessment and liaison with DODMA. At area and village levels, elected chairpersons oversee DRM issues. Various platforms under DRM are summarized in this section (and shown in Figure 7).

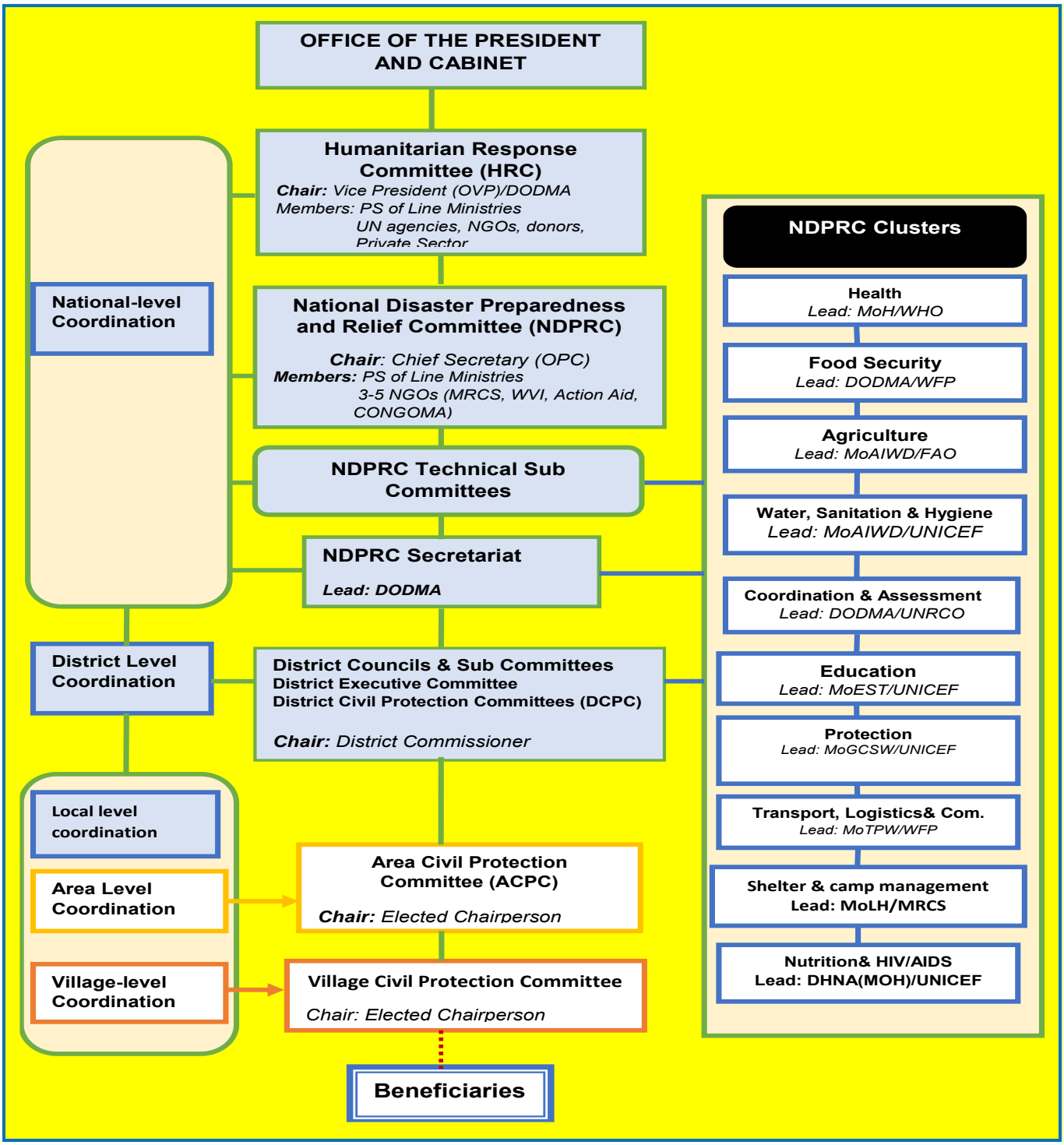
The Humanitarian Response Committee (HRC), chaired by the Vice President, is the overall committee aimed at providing policy direction for implementation of national-level disaster preparedness and response in Malawi. Its membership is drawn from sector ministries, development partners, and nongovernmental organizations (NGOs). The Office of the Vice President (under which DODMA is housed) has overall responsibility for providing political leadership (and interministerial coordination) and directing implementation of disaster responses.

The National Disaster Preparedness and Relief Committee (NDPRC), subordinate to the HRC, comprises Principal Secretaries from all line ministries and departments, NGOs, and UN agencies and is chaired by the Chief Secretary to Government. The committee provides policy direction in implementation of DRM interventions. Donors and heads of ministries and departments are co-opted into the Humanitarian Country Team (HCT, see below), which provides the highest level of coordination outside GoM coordination structures.

The Cluster System is activated in times of disaster to ensure better coordination for disaster assessment and emergency response, at operational level. Clusters include: Coordination and Assessment; Food Security; Agriculture; Water, Sanitation and Hygiene; Health; Nutrition and HIV/AIDS; Education; Shelter and Camp Management; Protection; and Transport, Logistics and Communication. These clusters are led by the GoM and co-led by UN agencies and the Malawi Red Cross Society. Box 1 lists activities undertaken by the Agriculture and Food Security Clusters in 2016.

The Humanitarian Country Team (HCT) comprises heads of UN agencies, international and local NGOs, the GoM, and the Malawi Red Cross Society. This team is chaired by the United Nations Resident Coordinator. HCT is part of the cluster approach.

Figure 7: Institutional arrangements for DRM in Malawi



Source: Redrawn based on Babu et al. 2017.

Box 1: Activities performed by the Agriculture and Food Security Clusters in 2016

The Agriculture Cluster is co-chaired by the MoAIWD and FAO. Its members mainly come from various implementing NGOs, civil society organizations (CSOs), and development partner representatives. In 2016, the cluster:

- Developed a response plan for the Agriculture Cluster (focused on distribution of seeds, fertilizers, irrigation, livestock, and private sector maize production). A total of 1.85 million people were targeted, with a response cost of US$30.8 million.
- Harmonized approaches for package for beneficiaries, and targeting criteria.
- Coordinated support of various players, and mobilized resources based on financial gaps.
- Coordinated implementation actions –e.g., distribution of seeds, fertilizer, roots/tubers, irrigation.
- Developed a database of who is doing what with respect to response activities.
- Coordinated a program on intensified maize production by the private sector.
- Monitored implementation of response activities and ensured reporting on progress.

The Food Security Cluster is co-chaired by DODMA and the World Food Programme (WFP). Its members are drawn from NGOs, Ministry of Finance, Economic Planning and Development, development partners, and the private sector. This is the biggest cluster in terms of need. It is tasked to provide direct support to food insecure households (through WFP) and a cash based-based response through the International NGO (INGO) Consortium (led by Save the Children). In 2016, the cluster:

- Developed a response plan for the Food Security Cluster. A total of 6.7 million people were affected and targeted (28 percent were supported under a cash-based response, the rest under food-based transfers), with an overall cost of US$307.8 million.
- Coordinated food- and cash-based responses.
- Discussed implementation updates, approaches, and challenges.
- Discussed any request for drawdowns to support the humanitarian response.
- Coordinated food security assessments as related to cluster activity (e.g., dry spell response).
- Monitored implementation of response activities and ensured reporting on progress.

Both clusters report to the National Disaster Preparedness and Relief Committee, with matrix reporting to the Humanitarian Country Team (HCT).

Source: GoM 2017c.

The key gaps associated with Malawi's institutional architecture for disaster management are as follows:

- Lack of finances, particularly at district level, impede the structure's functioning, leaving support at the mercy of the various NGOs that support the districts. This is due to the lack of a national budget line for DRM.
- DODMA representation is weak, which impacts effective coordination among various sectors. In most cases, disaster officers are junior staff members, with little power and limited resources to effectively perform their roles; the position even remains vacant in some districts. Coordination and reporting mechanisms are lacking between such officers and various sectors at district level.

- Civil Protection Committee (CPC) structures are mostly active in districts where NGO project activities serve as the Malawi Vulnerability Response Committee (MVAC) humanitarian response programs. Area Civil Protection Committees (ACPCs) were established in most disaster-prone Traditional Authorities (TAs). Chairpersons of ACPCs are elected by the committee members. Village Civil Protection Committees (VCPs) operate at village level.

2.6 Institutional Capacity Assessment

2.6.1 National-Level Human Resource Capacity Assessment[3]

The increased frequency of disasters and their subsequent impacts places DODMA in a critical position, such that coordination is a paramount task. A functional review of DODMA undertaken in 2012 eventually led to the Disaster Risk Management Policy developed in 2015. The functional review outlined job descriptions for the approved positions in the structure but did not provide corresponding personnel specifications. Hence some expertise is missing in DODMA (for example, specialists for geographical information system (GIS), engineering, water resources management, public health, etc.). DODMA's in-house capacity is inadequate to effectively carry out its coordination mandate, as elaborated in the NDRMP (GoM 2017c). Table 2 presents the results of a SWOT analysis of DODMA and the DRM architecture in Malawi.

Although the agriculture sector is the hardest hit sector and its policies recognize climate change issues, the capacity to translate policy into action is low. Food security risk management was one of the key priority areas of the agriculture sector wide approach (investment plan), the focus of which was mostly maize-based initiatives. A review of the agriculture sector revealed that approximately 50 percent of the national agriculture budget is spent on maize (through the Farm Inputs Subsidy Programme (FISP), maize purchases by ADMARC, and restocking the Strategic Grain Reserves (SGR)). With support from donors, the SGR guidelines were reviewed to improve the SGR's response to addressing emergency and non-emergency operations. Even though the sector developed an Agriculture Risk Management Strategy (ARMS) in 2016, the lack of champions to translate it into action poses a threat for effective implementation.

Inefficiency prevail as regards to identifying, assessing, monitoring, and mapping disaster risks at all levels, with clear roles among stakeholders but overlaps at implementation. Although some efforts have been made by different stakeholders to carry out vulnerability assessments, these have been small-scale and project-based. The current tools for disaster risk assessment and risk profiles are less systematic to guide operational planning. Some attempts were made to develop risk profiles and hazard maps, but these are not fully operationalized, at times are not updated, and are ad hoc. With World Bank support, recent efforts were made to build capacity to develop a Post Disaster Needs Assessment (PDNA) and to mainstream this within the core work of DODMA. Following the 2015 floods, a PDNA on floods was undertaken, and another one on drought in 2016. This, not withstanding, there is clear roles for players within the DRM structure i.e. DODMA as custodian of disaster risk management policy, Department of Climate Change and Meteorological Services for early warning systems, surveys for risk mapping, and water resources for flood information. However, at implementation level, some overlaps on the roles remain a challenge for effective coordination.

[3] A SWOT analysis was used to assess the capacity of DODMA as a coordination institution to ensure that it effectively carries out its mandate.

Table 2: SWOT analysis of DODMA and DRM architecture in Malawi

STRENGTHS	WEAKNESSES
1. High political will (leadership from Office of President and Cabinet). 2. Existence of institutional structures/dialogue platforms (various sectors involved). 3. Policies and frameworks in place, mostly recent and incorporate DRM and climate change. 4. Existence of DODMA as a recognized leading institution (by law), sitting within Office of President and Cabinet. 5. Clear roles among players within DRM architecture	1. Inadequate staff (and technical capacity) at DODMA compared to expanding mandates of increasing severity of disasters. 2. Delayed release of funds to respond to disasters, with limited readily available DRM budget line for response. 3. Inadequate physical resources, equipment technological advancement, emergency operational centers. 4. Poor coordination and information flow from national to district and community.
OPPORTUNITIES	**THREATS**
1. Good will/support from donors, various projects in place. 2. High on national agenda (MGDS III priority #1: Agriculture and Climate Change Management). 3. Adoption of shock-responsive safety nets (and expanded social protection scope across the country). 4. High demand dimension due to worsening climate change effects (with increased severity of droughts, floods, and other disasters).	1. Outdated DRM law (1991) that does not accommodate expanded mandates of DODMA and increased severity of disasters, and is not fully in line with international protocols. 2. Poor road conditions, affecting delivery of relief items during disasters. 3. Increased environmental degradation, leading to more severe droughts and floods. 4. High donor dependency in most projects on DRM and climate change. 5. Uncoordinated and parallel interventions among stakeholders.

Source: Adapted from Capacity Development Plan for DODMA (2015).

2.6.2 District- and Community-Level Human Resource Capacity Assessment

Positions for DRM officers were to be established under the Planning Units in all 28 districts. However, recruitment has not yet taken place. Positions of DRM officers have not yet been established in urban councils. Currently, non-established positions of Assistant District Disaster Risk Management Officers (ADDRMOs) exist only in the 15 disaster-prone districts. The rest of the districts and urban authorities only have Desk Officers. According to DODMA (2015), the current positions of ADDRMOs are junior staff, and do not give incumbents the necessary clout to coordinate and advise either GoM or NGO stakeholders. Furthermore, Desk Officers are not very effective given the demands of their substantive appointments and lack of resources for DRM.

In disaster-prone districts, CPCs are established as the technical committee for the District Executive Committee responsible for DRM, but are active mostly during disasters (i.e., reactive). CPC members are trained mainly by NGOs on their roles and responsibilities following a training manual developed by DODMA. However, the CPCs are not equally active across districts. Due to lack of capacity and resources, CPCs are active mostly where NGOs are active in the district to facilitate training or development of action plans for DRM preparedness and response. Similarly, at community level, ACPCs and Village Civil Protection Committees (VCPCs) are established as first points of contact in a disaster. These structures are mostly functional in disaster-prone districts. Most of the non-prone districts and Urban Councils do

not have functional committees. The structures are dominated by male leaders, despite wide evidence that women are more adversely affected by DRM activities.

Despite the existence of CPCs, the engagement of agricultural stakeholders is sporadic and limited. This is despite the fact that most response and contingency plans are agriculture-based. Such disconnect leads to lack of ownership of the priorities, which are as mostly led by DRM considerations, while implementation is mostly led by agricultural constituents. Clear responsibilities among actors at district level are needed, while ensuring that DRM is strongly integrated among sectors (agriculture in particular); the role of DRM should merely be to ensure coordination among various players and vertical links to DODMA. Where DODMA focal points came from the agriculture sector, improved coordination and ownership was observed in some cases. The agriculture sector happens to be the most decentralized, with structures (including infrastructure) all the way down to community level (extension planning areas) in all districts in Malawi.

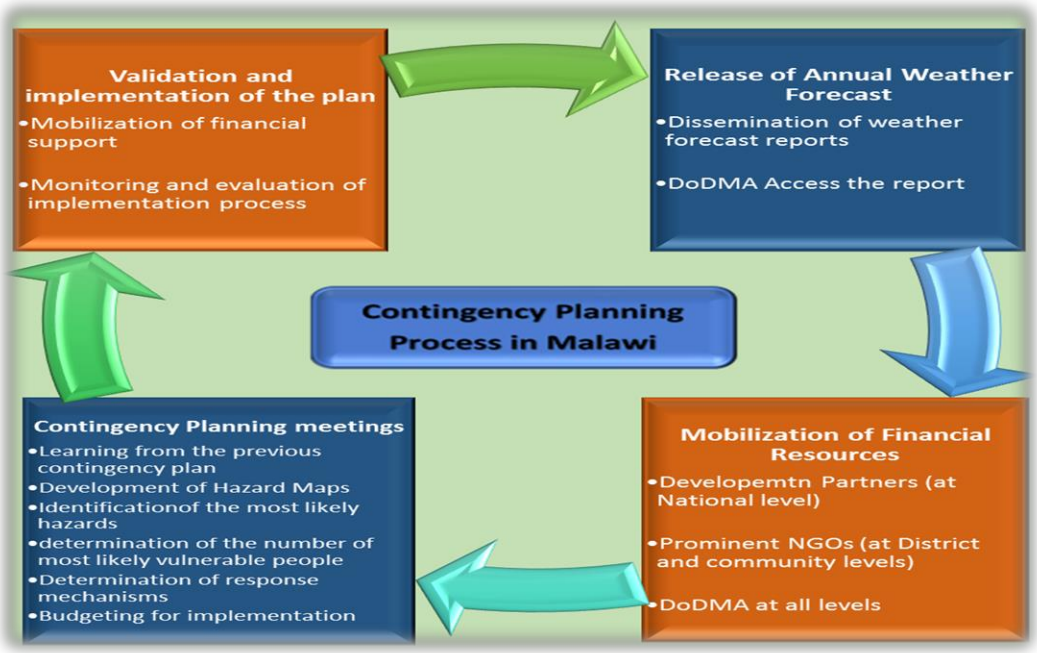
Chapter 3: Assessment of Disaster Preparedness Instruments

Several disasters in Malawi have revealed the country's lack of preparedness, mainly due to poor or insufficient contingency planning (FEWS NET 2004). In some cases, contingency plans are developed and shelved without being reviewed, while others are not implemented due to funding constraints. Where such plans exist, there is little evidence of full operationalization in practice. Various disaster preparedness instruments have been applied to predict weather, strengthen readiness, and ultimately reduce the anticipated effects of disasters. This chapter reviews Malawi's status of and efforts made in contingency planning as well as experiences in implementing various disaster preparedness instruments.

3.1 Contingency Planning Processes in Malawi

Contingency planning is a management tool used to ensure adequate arrangements are made in anticipation of a crisis; its application in Malawi has yielded mixed experiences. In line with good UN practice, the contingency planning process in Malawi begins with the release of annual weather forecasts, which then inform the process of consultations and development of contingency plans, while resources are mobilized to support the processes and actions in the contingency plans. Once the contingency plans are developed, they are validated and monitored across implementation (Figure 8).

Figure 8: National- and district-level contingency planning process in Malawi



Source: GoM 2015.

Contingency plans are developed through the Cluster System (coordinated by DODMA), with less bottom-up integration, but implementation is hampered by inadequate financing. DODMA mobilizes financial support from the GoM for the contingency planning process. The NCP is drafted by government ministries and departments, UN agencies, the Malawi Red Cross Society, and NGOs, led by DODMA. The NCP is supposed to support district-level contingency plans, yet district representation is limited (GoM 2009). Instead, district plans are drafted by the clusters at national level, coordinated by DODMA. Interestingly, some districts develop contingency plans that are not related to the NCP. Key informant

interviews revealed districts' lack of awareness of the NCP, although they were aware of district contingency plans. Mabaso, Siambala, and Manyena (2013) observed that Malawi's NCP is never followed by districts during an actual disaster response. The main challenge has been lack of financial support to implement the NCP, as the response focus has been reactionary rather than proactive.

District contingency plans suffer from lack of funding, and are often supported by key NGOs supporting DRM work, with less influence from the NCP. District contingency planning involves the cluster-led departments, NGOs, District Civil Protection Committees, and ACPCs. Usually, NGOs provide funding for the planning process but the process is led by a DODMA official, usually the Disaster Risk Response Officer (DRRO). The GoM's resources and leadership capacity are inadequate to effectively coordinate and monitor the development and implementation of contingency plans. Mabaso, Siambala, and Manyena (2013) cited best practices from Mozambique that strengthen coordination and promote transparency and mutual trust between national and local levels; there, subnational-level organizations develop guidelines and plans that inform Mozambique's NCP. In Malawi, using district contingency plans to inform the NCP would enhance coordination and promote increased inclusivity, ownership, transparency, and accountability.

3.2 Quality of Contingency Plans and Their Use

All disaster-prone districts in Malawi develop disaster contingency plans. During disasters, the contingency plan acts as a reference for the number of people affected and for the quantity and cost of materials needed in response and recovery efforts. However, some districts' contingency plans were not updated:

- In Phalombe, the plan was first prepared in 2004 and updated in 2016/2017. In Nsanje, the contingency plan was first prepared in 2008 and updated in 2015/2016.
- Chikwawa had draft contingency plan for 2015/2016 that was never finalized because of inadequate resources.
- Zomba had a draft contingency plan for 2016/2017 that was not finalized due to lack of resources.
- A national floods contingency plan was developed in 2006 in a participatory process, but never referenced when major floods took place in 2015.

The involvement of the District Social Welfare Office, Community Development Office, and Social Protection cluster representatives from village level helps to ensure that gender is mainstreamed in contingency plans. Some communities have their own contingency plans; others have flood risk maps developed with assistance from the DRRO. Among other things, these contingency plans describe areas to be used as safe zones during floods, preliminary response plans to any weather-related disasters, and contact addresses for all critical district authorities, including the District Commissioner, DRRO, NGOs' DRR Officers, and others.

Agriculture and food security dominate the NCP's priorities. In the 2017 NCP, the Agriculture and Food Security Clusters comprised 53 percent of the overall contingency budget (approximately US$98,772), of which 51 percent was exclusively for food security. Agriculture Cluster interventions included sensitization campaigns on disaster preparedness in prone districts, including livestock vaccination campaigns, water/catchment management, facilitation of distribution of agricultural inputs (seeds, fertilizers, vaccines, pesticides, and dewormers), irrigation, crop diversification, and livestock promotion. Food Security Cluster interventions included food security assessment, provision of immediate food/cash assistance to food insecure populations affected by disasters, and coordination of activities.

3.3 Indigenous Knowledge

Indigenous knowledge is becoming officially recognized as potentially useful for predicting hazards and disasters. According to the GoM (2015f), four indigenous knowledge practices have been confirmed to have some scientific backing, and hence are acceptable for use. Box 2 provides an example of some indigenous knowledge used in practice.

Box 2: Indigenous knowledge practices used in Malawi to predict weather-related hazards

While some local indigenous knowledge can be verified scientifically, most has no scientific bearing on the occurrence of floods and droughts. Four have been verified scientifically:

- The migration of frogs and hippos to riverbanks and floodplains, away from fast-flowing rivers, portends severe flooding. Generally, frogs and hippos are able to notice increases in the flow velocities of rivers, and move away to avoid being washed away by floods. This observation was manifested during the 2015 floods that wreaked havoc in the Lower Shire Valley – most of the frogs and hippos moved out the Shire River. People who observed this moved to dry land in good time, avoiding being swept away by flash floods
- The blowing of strong southeast trade winds over an area during the rainy season is a sign that dry spells will be prevalent during the season. The rainy season in Malawi is characterized by the prevalence of the Inter Tropical Convergence Zone (ITCZ) and the dominance of northeast trade winds, which are generally weak and bring rain to the entire country.
- The prolonged blowing of northeast trade winds brings high rainfall and therefore a high chance of flooding.
- When Chosos' (a type of wild bird) nests point to the north, the rainy season will be dominated by southeast trade winds; hence little rain will fall and droughts will prevail.

Source: Field case study.

In communities with no or limited access to advanced scientific applications, advanced local knowledge will continue to be used. Given the lack of advanced weather forecasting mechanisms, many communities continue to rely on indigenous knowledge systems. The challenge is how local communities can be supported to effectively transfer to new generations those aspects of the indigenous knowledge that have proved to be instrumental in DRM interventions at the local level. Failure to transfer intergenerational knowledge will leave newer generations unable to absorb, understand, and carefully interpret local signs to inform weather forecasting scenarios.

3.4 Preparedness and Response Instruments

This section reviews the key national preparedness instruments used in Malawi to respond to extreme weather events (

Table 3). It also analyzes the extent to which Malawi has adopted these instruments and their impact in practice.

Table 3: Main preparedness and response instruments used in Malawi

Preparedness and Response Instrument	Examples
Early warning systems	• Weather forecasts • Automated weather stations • Satellite images and maps • Hydrological monitoring systems • Malawi Vulnerability Assessment • Agricultural Production Estimates Survey (APES)
Hazard and safe zone mapping	• Contingency plans • Flood risk mapping • Evacuation centers
Agricultural insurance	• Malawi Maize Index (MMI) • Africa Risk Capacity (ARC) • Weather index insurance
Social safety nets/targeted food and cash transfer programs	• Food distribution program • Cash transfer program • Inputs for assets • Food for work
Flood mitigation	• Dykes • Dam construction • Gully reclamation structures

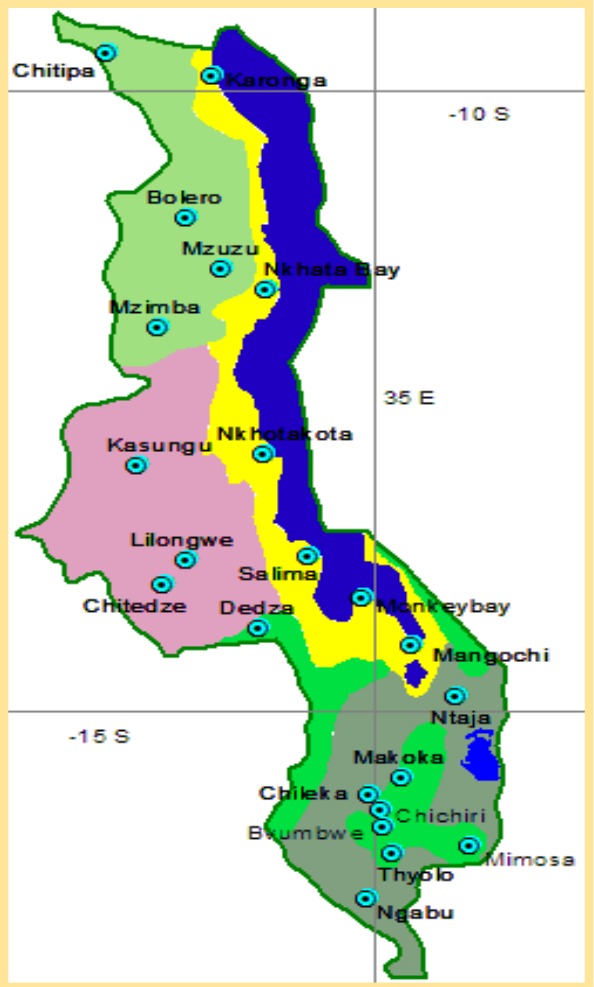
3.4.1 Early Warning Systems

3.4.1.1 Weather Forecasts

The Department of Climate Change and Meteorological Services (DCCMS) is the lead national institution on meteorological issues. It collates, analyzes, and disseminates weather data. Dissemination is done widely though radio, newspapers, local television, website, emails, YouTube, and social media like WhatsApp, Facebook, and Twitter. A major challenge is the quality of weather information. When rains and droughts are forecasted, they still fall short of precision in terms of timing, amounts, and geographical zones of occurrence. Sometimes there are predictions of El Niño, La Niña, and La Nada (no events) in the same year, which is confusing. However, in general, the accuracy of weather forecasting has gradually improved.

Malawi currently has 22 full meteorological stations (Figure 9) that collect weather data regularly. The minimum data collection frequency per station is two per day at one-man stations and only on Saturdays and Sundays. Currently, the two airport stations (Lilongwe and Blantyre) collect weather data continuously (i.e., 24 hours per day).

Figure 9: Main meteorological stations in Malawi



Source: Met website (www.metmalawi.com).

3.4.1.2 Automated Weather Stations

The GoM, with support from the World Bank-funded Shire River Basin Management Programme, installed 32 automatic weather stations and two special weather observing systems at Kamuzu International Airport and Chileka Aviation Station. By 2017, the country had about 50 automatic weather stations placed across the country. However, functionality has been a big challenge as only 12 are reported to be fully operational. The remaining are not functional due to lack of system upgrades, currently underway,[4] as well as to vandalism. DCCMS lacks weather radars that would help to accurately forecast weather events in specific locations. These challenges, coupled with the lack of skilled meteorological personnel at both district and community level, all result in gaps in the collection, compilation, and use of weather information at all levels.

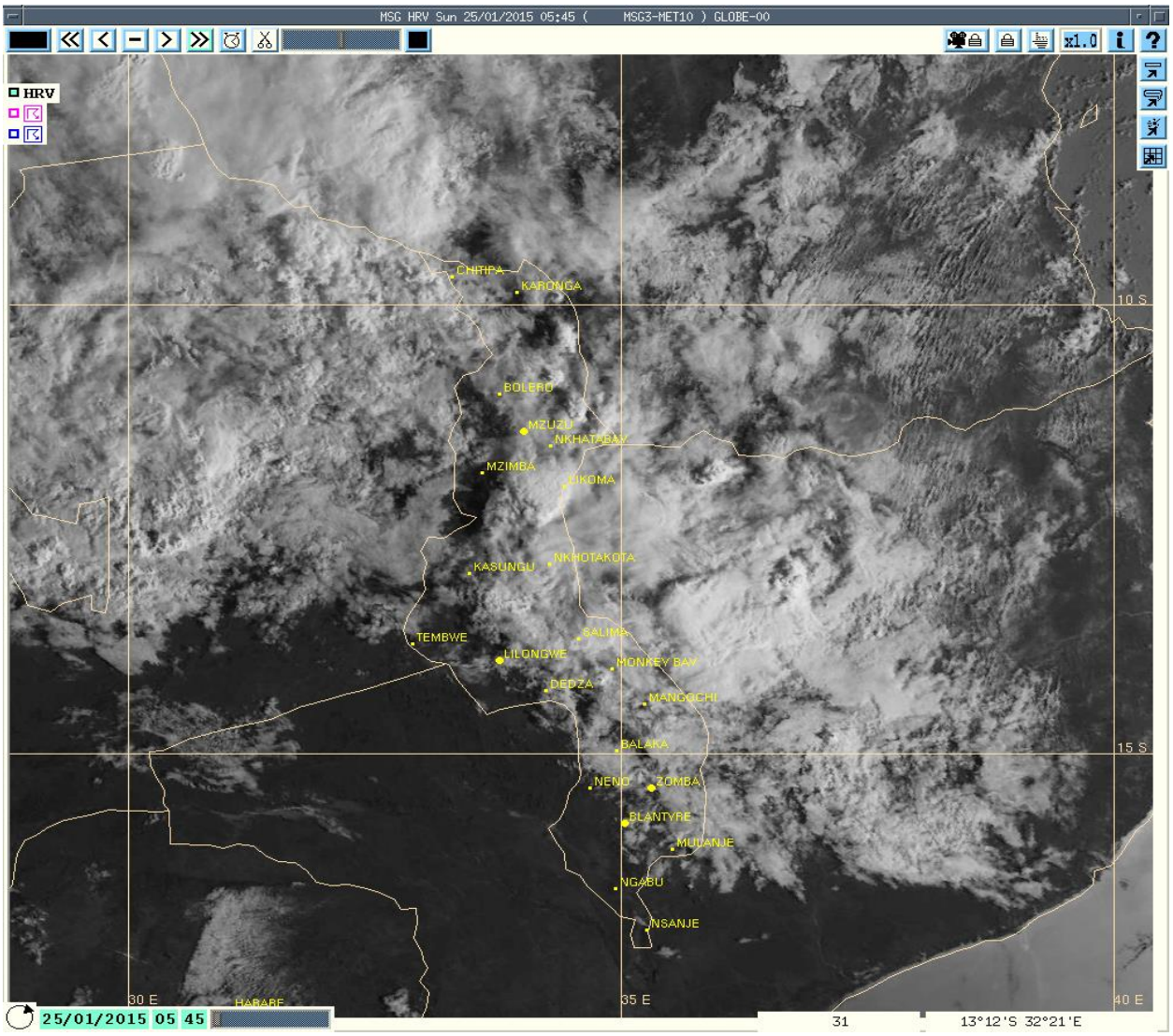
3.4.1.3 Satellite Images and Maps

Satellite images and maps and other satellite systems are a fundamental component of Malawi's weather monitoring and forecasting processes. The DCCMS has a satellite receiver that receives data from the second-generation series of satellites. The satellite images are updated every 24 hours. Besides general weather monitoring, the satellite images have been used in various agricultural insurance schemes to predict rainfall patterns. The Africa Risk Capacity (ARC) Initiative recently used satellite rainfall

[4] Supported by the World Bank-funded Shire River Basin Management Programme, which involves installation of data loggers for data downloading, and coming up with a sustainability plan for automated weather stations.

values as a basis to determine the customization under the Water Requirement Satisfaction Index (WRSI). Similarly, Monsanto seed company introduced a weather insurance policy on seeds, informed by satellite weather data, from 2017 to hedge farmers from adverse weather conditions. Infrared images are generated in the same manner.

Figure 10: Cloud picture of Malawi from satellite image



Source: http://www.metmalawi.com/satellite/visible.php

3.4.1.4 Hydrological Monitoring Systems

For a long time, Malawi has installed river gauges at different zones in critical rivers for monitoring water levels during the rainy season. Flood forecasting and monitoring is mainly instituted in the Lower Shire River, a flood-prone area. The "Flood Warning System for the Lower Shire Valley" combines rainfall observations and forecasts from DCCMS with observations of river levels at four hydrological stations in the Lower Shire Basin: Ruo at Sandama (14D3); Ruo at Sinoya (14D1); Shire at Chiromo (1G1); and the Shire at Chikwawa (1L12). Observations from the gauges are disseminated manually by gauge observers to DODMA and the MoAIWD using cellphones. The decision to issue warnings is then decided on a four-

stage alert system using predefined threshold values. Warnings are issued through press and other media. However, this system has a number of systemic operational limitations: (i) manual readings and reporting via telephone/SMS are prone to errors; (ii) lead times are limited to the travel time from gauge stations to flood-prone areas; (iii) forecast accuracy is limited by the accuracy of the gauge-to-gauge correlations and the assessed impact of rainfall on these correlations; (iv) forecasts are not provided to end users in a timely and systematic way; (v) warnings are sometimes delayed due to administrative procedures; and (vi) daily collection of readings is not currently possible and hence delays occur.

Efforts to build capacity at different scales were observed at district level in conjunction with DODMA and other stakeholders. Examples include establishment of a Disaster Response and Recovery Section in disaster-prone district councils that installed hydrometric scales or river gauges in upland and low-lying areas; these help communities (VCPCs) to monitor water levels to predict flooding. Through the DRR office, rain gauges installed in some communities are monitored by VCPCs trained in weather interpretation. Some NGOs have taken broader measures to strengthen communities' capacity in forecasting through construction and installation of river gauging structures. They have also provided communities with drums, whistles, and cellphones through which upstream communities warn their lowland counterparts of possible flooding after observing water levels in the river gauges. This is a form of strengthening and spreading awareness communication among communities.

Figure 11: A twin-brick course line extending from Shire River at Gome 1 Irrigation Scheme in Nsanje district

Source: Field photo.

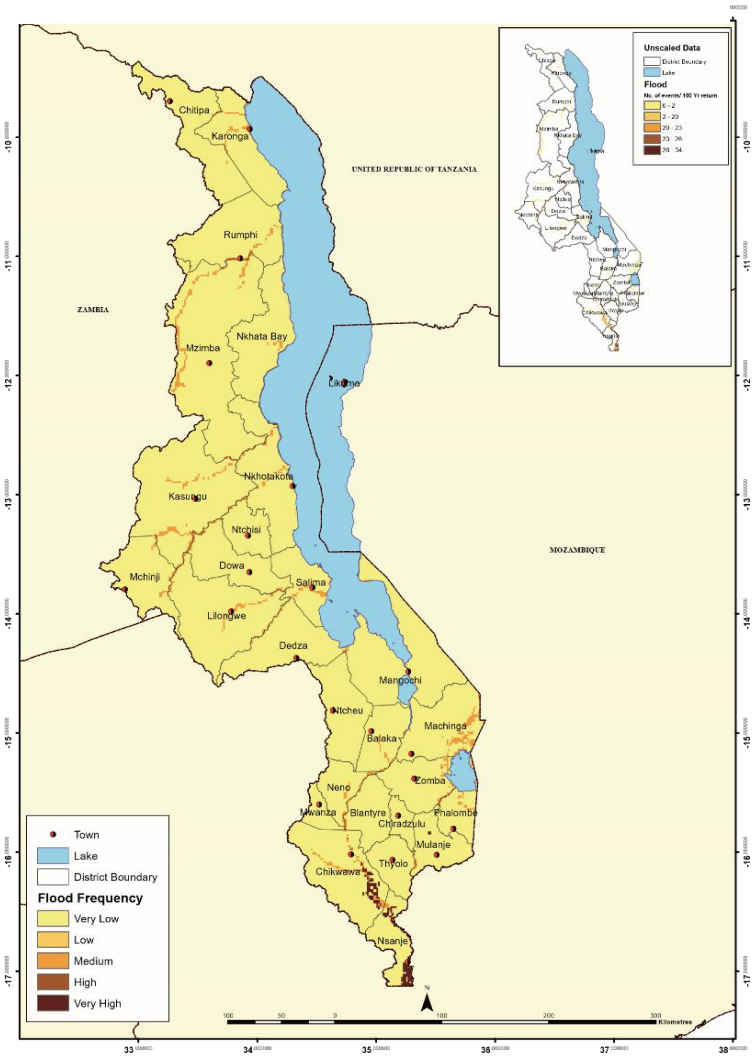
Note: This is a river gauging system that allows observation of water levels as water rises along the course line.

3.4.2 Flood Risk Assessment and Hazard Maps

In Malawi, flood risk/hazard maps offer a useful tool to understand patterns of hazards, vulnerability, and risk to climate change at multiple scales, but they are applied at small scale and mostly project-based. Flood risk and hazard maps were prepared by DODMA at national level and by Disaster Risk Response Officer (DRRO) at district/community level (Figure 12). Maps are prepared as part of vulnerability assessment mapping, an activity that accounts for all possible hazards such as floods, droughts, earthquakes, disease outbreaks, landslides, wildfires, etc. They usually form part of the contingency planning process that guides disaster response.

The spatial hazard risk and vulnerability assessments and allied mapping methods are useful tools for understanding patterns of hazards and vulnerability to extreme weather events at multiple scales, from local to national. Maps based on socioeconomic, climate, and biophysical data and information have become part of the standard toolkit for communicating impacts, vulnerability, and adaptation and climate risks. So-called "hotspots" maps are often used to direct attention to areas where impacts are expected to be greatest and potentially require adaptation interventions.

Figure 12: Flood risk map for Malawi



Source: Malawi Hazards and Vulnerability Atlas, 2015.

Hazard maps contain hazard incidence by geographical area and by exposed population. In some districts, flood risk/hazard maps are also produced for specific locations, such as those prone to floods (e.g., at the TA level), to inform community-level decision making. The ACPCs in such areas are trained on how to read and interpret maps to citizens. However, application of hazard maps and risk profiles is not yet fully institutionalized, and often such tools are not updated. Coupled with this are challenges of lack of capacity and equipment to execute quality maps. The World Bank is currently supporting the GoM to update and develop comprehensive risk profiles and hazard maps for the entire country.

Hazard and risk assessment is the foundation upon which all emergency planning efforts in a community are built. The Regional Centre for Mapping of Resources for Development was asked to help DODMA build capacity through development of the Malawi Hazard and Disaster Risk Identification and Mapping System. The system's aim is to improve the understanding of hazard, risk, and vulnerability in Malawi. The project

developed a hazard and disaster database, available as an atlas and an online visualization for Malawi, and will ultimately transfer the maintenance and hosting of the database to stakeholders within Malawi. The Malawi Hazard and Disaster Risk Identification and Mapping System provides analysis to help users better understand potential threats facing a community. By pinpointing the location, extent, and magnitude of past disasters or emergency situations, and by examining knowledge of new or emerging risks, it is possible to determine the probability of such events occurring and the vulnerability of people and property. Further, by viewing this information along with relevant land use, economic, and demographic information from a well-prepared risk profile, emergency managers can make assumptions about those segments of a community that might be impacted by various types of incidents. Other hazard and vulnerability maps also exist in Malawi (Table 4).

Table 4: Existing hazard/vulnerability maps in Malawi

Stakeholder (National-level)	Existing hazard/vulnerability maps
Geological Survey Department	Geohazard maps (landslide, earthquake)
Climate Change and Meteorology Department	Weather maps, temperature and rainfall maps
Land Survey Department	Agricultural practices, topography, water levels at lakes, rivers
Forestry Department	Forestry maps, wildlife maps
National Statistics Office	Census maps, poverty maps
FEWS NET	Food security maps, weather hazards maps (floods, dryness, drought)

Source: UNDP/COOPI 2012.

Some institutions have considerable experience in hazard mapping (e.g., Geological Survey Department and FEWS NET), even though such capacity is inadequately institutionalized. The main challenges relate to limited capacity to use and interpret the maps, inadequate infrastructure and tools (hardware and software), and ultimately, limited resources. The situation is worse at district level, where equipment like GIS and remote sensing is nonexistent.

3.4.3 Evacuation Centers

Evacuation centers[5] act as safe zones for people fleeing from disasters; but in normal times they are used for some social services. During disasters DODMA supports the erection of tents across affected areas to shelter evacuated households. This support is coordinated through the Shelter and Camp Cluster and supported by various stakeholders. When evacuation centers are not being used for disasters, they act as community convergence centers where NGOs deliver trainings and other capacity-building initiatives. The GoM (under the China-Malawi/UNDP project) constructed evacuation centers in Karonga, Salima, Mangochi, and Nsanje districts to host future evacuees (Figure 13). These evacuation centers are part of the UN's support to enhance the country's DRM capacity, using financial assistance from the Chinese government. The centers will be used for income-generating activities and as classrooms for children when there are no disasters occurring. In the absence of evacuation centers, schools, churches, health centers, and maize mills often serve as shelters, disrupting their normal operations.

[5] Each evacuation center accommodates a maximum of 200 people and has separate rooms for men and women, a store room, and an office room.

Figure 13: Evacuation center in Karonga district supported under the China-Malawi UNDP project

Source: UNDP 2018.

3.4.4 Dykes and Gully Reclamation Structures

Dykes are strategically constructed to prevent floodwater from affecting some section of an area, such as a village or farms. The GoM has constructed dykes for years; e.g., the Likangala dyke in Zomba was constructed in 1967. Other dykes constructed include: the North Rukulu dyke in Karonga; Nkasi, Mwaye, and Nsija Rivers dyke in Machinga; and Phalombe dyke at Namasoko in Phalombe. Local leaders encourage people to repair dykes themselves because there is no more support from the GoM or NGOs to repair them. As such, local people pack sand/soil in bags to reinforce the dykes in those areas (Figure 14). Some NGOs provide cement and wire to construct gully reclamation structures in critical areas to reduce siltation and subsequent flooding downstream.

Figure 14: Community Leaders and researchers on a sandbag-reinforced dyke on the edge of Likangala River in Zomba

Source: Field photo.

3.4.5 Agricultural Production Estimates Survey (APES)

Malawi has collected agricultural production data since 1983, covering all major crops and livestock, with observed inefficiencies. Collection of APES data involves the use of stylized sampling techniques to ensure random sampling of farming households for the crop estimate survey. A two-stage stratified, systematic sampling plan is used to sample the Primary Sampling Unit for the major crops. The first step

involves identification of major crops from 25 percent of the blocks[6] in each Extension Planning Area (EPA), with the blocks themselves sampled using a systematic random method. The second step involves identification of a Secondary Sampling Unit of farming households drawn from the selected blocks. Sampling of these households starts with listing all households in each given block, serially listing them, and then using a systematic random method to list 20 percent or not more than 15 households. From this sampling process, the overall sampling fraction represents about 5 percent of all farming households. Actual data collection involves Agricultural Extension and Development Officers (AEDOs) measuring and recording the household garden area planted with crops. Using this sampling method, the MoAIWD produces three rounds of agricultural production estimates every year.

Notwithstanding the rigor of the APES methodology, concerns have arisen that it is not the best practice for collecting agricultural production data, because:

- It is labor-intensive for the limited number of frontline agricultural extension workers.
- Limited ICT and inadequate advanced equipment lead to poor information management and data errors.
- The data collection process allows for adjustments to the data by different stakeholders.
- A large number of staff (more than 2,000) are needed to conduct the crop estimates, making the exercise too costly.

The first crop estimates are a guess of what farmers intend to grow during the season. The second round of the data collection process is considered unreliable as it is based on data from immature field crops that cannot accurately estimate output and can be subjective. The third crop estimates, which involve weighing the crop harvest, should be the most useful data for determining household vulnerability to plan for response. Unfortunately, this round is conducted considerably after the annual budget session. Thus, the major challenge related to the national budget process is that it starts shortly after the end of the agricultural season, making it difficult to plan for emergencies that might occur from extreme weather events.

Given these limitations, the MoAIWD piloted two new methodologies in the 2014/15 agricultural season with support from the Agriculture Sector Wide Approach Support Project (ASWAp SP). The pilots used remote sensing[7] and satellite imagery to improve agricultural production estimates in 2014. The specific methods piloted were (i) Area Frame designed by Airbus, and (ii) Point Frame by ITA & EFTAS. These were compared with the List Frame (traditional APES methodology). Table 5 shows the results of a comparative assessment of the three methodologies.

[6] According to the GoM, 2008 APES Manual, each EPA consists of sections and individual sections comprise eight agricultural blocks. The block is the Primary Sampling Unit used in the APES.

[7] Remote sensing is only now being piloted in Malawi, but was adopted for collection of agricultural production statistics in the 1970s in the United States and other countries with the launch of the Landsat MSS satellite (Global Strategy 2015).

Table 5: Comparison of crop production estimate methodologies

Parameter	Area Frame (Airbus)	Point Frame (ITA & EFTAS)	List Frame (traditional APES)
Image/hectarage estimation	Uses high resolution (6m) satellite imagery	Uses good satellite maps, varies from year to year	Uses sample plot measurements
Yield estimation	Very precise – includes objective yield assessment, in addition to farmer interviews Uses moisture sensors	Limited to farmer interviews and limited objective assessment	Weighing scales used to measure crop cuttings yield on sample plots No measurement of moisture
Timeliness	Timely, results by May	Timely, results by May	Not timely, results beyond May
Cost	Relatively cheaper (over 4-year period) Less transport requirements Initial investment of purchase of satellite imagery costly, but can be used for 5 years	Relatively cheaper (over 4-year period) High transport requirements	More costly, high sample size (over 4-year period) High transport requirements
Labor intensity	Less labor-intensive – requires 2 staff per district for 20 days to capture 3,000 points	Relatively less labor-intensive – requires 40 surveyors for 6 weeks to capture 24,000 points.	More labor-intensive (about 2,000 extension officers involved)
Crops	Used for maize only	Used for maize and other major food crops	Covers all major crops, livestock
Capacity	Staff in the MoAIWD trained Some equipment in place (additional data analysis training needed)	Staff in the MoAIWD trained Some equipment in place (additional training on data analysis and methodology needed)	Capacity of the MoAIWD in place, as traditionally applied since 1983, with existence of agricultural extension workforce
Data transmission, errors	Real-time data transmission (tablets) Less scope for errors No scope for manipulation	Real-time data transmission (tablets) via cloud server Less scope for errors No scope for data manipulation	Does not use tablets (real-time), mostly paper-based Aggregation at various levels Scope for data manipulation

Source: Analysis from GoM 2015b.

Results of the pilots showed that the Point Frame method was superior in estimating hectarage, while the Area Frame method was superior in estimating yield. The latter included objective yield assessments in addition to farmer interviews, on which the former relies. Significant improvements were observed in electronic data transmission when information was transmitted directly from tablets to servers (the "cloud"), with less scope for manipulation and errors. This is unlike the traditional APES, which is done manually, with a lot of aggregation of data at various levels. Another significant improvement with the satellite imagery methods is the lower labor intensity needed to carry out the exercise. This frees agricultural extension workers to do other important tasks, rather than spending most of their time on crop estimates. Another advantage is the earlier release of the findings, which can inform the GoM on actions needed in anticipation of disasters from extreme weather events. This is critical for planning.

Based on the above results, the key recommendations are to:

- Adopt the Point Frame (ITA & EFTAS) methodology for hectarage estimation
- Adopt the Area Frame (Airbus) methodology for yield estimation
- Adopt electronic, real-time data transmission
- Develop an electronic database, with the central server at the MoAIWD, to receive and aggregate data on a real-time basis
- Adopt the use of moisture sensors
- Build the MoAIWD's capacity to implement these methodologies

3.4.6 Food Balance Sheet (FBS)

The MoAIWD computes and releases information on the national food security situation using the Food Balance Sheet (FBS), which guides the design and implementation of humanitarian responses, and places high weights on maize. The major concern with the current FBS computation is that it is based on the assumption that 73 percent of calories consumed are from maize. However, some IFPRI studies using Integrated Household Survey data have established that 66 percent of calories consumed are from maize (Babu et al. 2017). The figure used matters, as shown below, and has important implications, as the FBS information is often used as a starting point for consideration of food insecurity disaster declarations.

Babu et al. (2017) undertook a comprehensive review of the current formula for FBS computation. They changed assumptions about the maize caloric consumption weight and postharvest losses, and added wheat into the FBS. Table 6 shows how the total food gap changes as a result of changes in these factors. Reducing the maize caloric consumption weight from 73 percent to 66 percent translates into a 20 percent reduction in the national food gap, from 834,000 MT to 666,000 MT. Furthermore, maintaining the 73 percent maize caloric weight but assuming improved postharvest loss conditions for maize to 10.7 percent from 12.9 percent translates into a 6 percent reduction in the total food gap (to 782,000 MT from the original 834,000 MT).

The analysis shows that Malawi could improve its food gap estimate by reconsidering its assumptions about the maize caloric consumption weight while working to reduce its maize postharvest losses. Other options to improve the FBS include: (i) proper estimation of opening stock balances (often understated), informed by an elaborate assessment, including of private sector stocks; and (ii) inclusion of other food crops (e.g., roots, tubers, and rice).

Table 6: Changes in total food gap with changes in maize caloric consumption weight and postharvest losses

	Original (Sept. 2016 version of FBS)	Caloric weight	Postharvest loss
Maize caloric weight (%)	73	66	73
Food use (maize) (MT)	2,788,086	2,520,735	2,788,086
Maize postharvest loss (%)	12.9	12.9	10.7
Net production (maize) (MT)	2,063,828	2,063,828	2,115,957
Total food gap (MT)	(834,083)	(666,034)	(781,954)

Source: Adopted from Babu et al. 2017.

3.4.7 Agricultural Insurance

Various crop insurance programs have been attempted in Malawi, with mixed experience. They have often been proven expensive to the GoM, with low demand and uptake by targeted farmers. Incentives to invest in agricultural insurance have been limited as the threshold levels set are often too high to trigger payments. The greatest challenge has been to design a sound insurance product that meets the requirements of farmers, while ensuring effective demand. This section outlines three key agricultural insurance initiatives undertaken as an option toward preparedness to extreme weather events in Malawi.

3.4.7.1 Malawi Maize Index (MMI)

The GoM has purchased macro-level insurance derivative programs since 2008, with maize as a target crop. These programs aim to: (i) improve drought risk assessment and early warning tools; (ii) identify contingent sources of financing that can be used to support responses; (iii) strengthen the GoM's risk management capacity; and (iv) improve planning and budgeting for national disasters. The technical work

on macro-level weather insurance began in 2004, with the World Bank's response to the GoM's request for funding insurance in the event of severe drought. The Malawi Maize Index (MMI) was viewed as the best ex ante approach to disaster (as opposed to handouts). Implementation of the MMI program began when the GoM purchased an insurance contract with coverage against severe drought risk during the rainfall season in 2008. The model that Malawi used was based on the yield satisfaction index, a modification of the Water Requirement Satisfaction Index (WRSI) developed by FAO. The model uses daily rainfall as an input for forecasting maize yield but monitored in dekads (10-day periods). Under this insurance scheme, payments are triggered according to prespecified and agreed conditions based on an index, with premiums paid in advance. The MMI was designed with a linear payout measured by the number of index units below the strike price. In the 2011/12 growing season contract, for example, the unit payouts were US$147,000. This meant that if the index at the end of the season was 89, the GoM would receive a payout of US$147,000; if the index was 80, then a payout of US$1.47 million would be made, with a potential maximum payout of US$4.1 million.

Despite the prevalence of localized droughts, the overall trigger was not met in 2011/12, as heavy rainfall caused floods in other parts of the country. In fact, Malawi did not receive a payout in the entire four-year period (2008–2012), as the overall index was above 95 percent (or 95 MMI units). This led to the conclusion that the triggers might have been set too high.

3.4.7.2 Africa Risk Capacity (ARC) Initiative

The ARC Initiative is an insurance risk pool whose objective is to capitalize on the natural diversification of weather risk across Africa by allowing countries to manage their risk as a group to respond to probable but uncertain risks. Malawi officially joined the ARC Initiative in 2014, among the first participating countries. ARC allows subscribing countries to select the level at which they wish to participate by selecting the amount of risk they wish to retain and financing the coverage they would want from ARC for droughts of varying severity. ARC uses its core product, called Africa Risk View, to cover drought in participating countries. Africa Risk View combines agricultural drought early warning models with data on vulnerable populations and builds a standardized model for estimating food insecurity response costs.

From 2013 to 2015, the World Bank supported Malawi to customize the Africa Risk View model, as well as capacity building and institutionalization of the ARC technical working group. The GoM approved and signed up for the ARC policy in 2015, followed by a premium payment of US$4.7 million, in anticipation of a maximum payout of US$30 million. The season coincided with the worst drought in 2016. However, the preliminary model simulation results indicated that no payout would be triggered. Ground truthing was conducted to confirm and revisit model parameters, revealing differences, particularly regarding the duration of maize varieties used by farmers. Eventually a payout of US$8.1 million was made.

Both the MMI and the ARC model use country-level triggers to determine payouts, a challenge as the country does not have a homogeneous climatic zone. Consequently, the GoM only receives a payout when a severe drought affects all agricultural ecological zones in the same season, a rare phenomenon. Generally, the southern region has a different rainfall pattern than the central and northern regions. The Upper Shire River, for example, experiences droughts almost every year and people are always in need of humanitarian aid. The insurance models do not capture this if the other agricultural ecological zones receive good rainfall. Thus, it would be prudent to review the models and adjust the trigger levels according to Malawi's agricultural ecological zones.

3.4.7.3 Micro Insurance and Other Models

Malawi piloted the first weather index insurance at micro level in 2005 with funding from the World Bank and technical assistance from MicroEnsure and the World Bank's Commodity Risk Management Group. The pilot ran from 2005 to 2010, implemented by financial institutions and farmers' associations. The insurance scheme targeted smallholder farmers growing commercial crops. The initial phase covered groundnut farmers followed by those growing both maize and groundnuts before moving to tobacco farmers. No payout was triggered, as there were design flaws, with lack of proper education to stimulate demand for insurance.

WFP and Oxfam America used the initial success of HARITA[8] to build the Rural Resilience Initiative (R4), launching the model at a large scale in multiple countries. The R4 represents risk reduction, risk reserve, risk transfer, and risk taking. It is a new model for building resilience using existing government-owned and -led productive safety nets to reduce disaster risk and to deliver a mechanism to expand insurance and other financial services. Its fundamental principal is to link labor-based safety nets, which provide cash or food in exchange for work or household assets, and community risk reduction activities, which protect assets against disasters and improve agricultural productivity. Instead of WFP providing food or cash to communities for work, WFP pays a premium as insurance on behalf of targeted households. This gives agricultural insurance coverage to poor households that ordinarily could not afford it, without them having to pay a premium directly. The model has been tested and found to work in Ethiopia, Senegal, Malawi, and Zambia. In Malawi, WFP is implementing the R4 program in Balaka district. The insurance has triggered some payments to insured farmers, although at a small pilot scale.

Insurance companies in Malawi are reluctant to offer agricultural insurance due to the risk, as farmers' uptake is very low. This leaves most farmers with little or no option of transferring risk. Nonetheless, traditional coverage is not uncommon for most commercial farmers, although most policies are limited to coverage for fire and/or floods. One of the oldest insurance companies (National Insurance Company of Malawi) has a new innovation for a multi-peril crop insurance dubbed *Mtetezi* (Protection) that is offered to tobacco farmers. *Mtetezi* protects tobacco farmers against (i) loss or damage to the crop as a result of hail, windstorm, floods, and excessive rainfall, and (ii) damage caused while tobacco is in transit to the auction floor. Although the coverage is open to all farmers, the focus has been on those borrowing from commercial banks, as it easier to sell the product bundled with loans. Generally, uptake of insurance is low for all insurance schemes, as evidenced by the low penetration rate (3 percent).

The World Bank first piloted weather index insurance in Malawi in 2005 to reduce the impact of drought faced by smallholder farmers ex ante. Stakeholders involved in the pilot study included: National Smallholder Farmers Association of Malawi (NASFAM); Opportunity International Bank of Malawi; Malawi Rural Finance Company (defunct); Insurance Association of Malawi; and the Malawi Meteorological Department (which provided historical weather data). The pilot worked to the advantage of farmers as payouts were made at the end of the season. These payouts were triggered as a result of dry spells in Lilongwe district.

[8] The Horn of Africa Risk Transfer for Adaptation (HARITA) is an integrated risk-management framework developed by Oxfam America, the Relief Society of Tigray, and their partners. HARITA has broken new ground in the field of rural risk management by enabling Ethiopia's poorest farmers to pay for crop insurance with their own labor. HARITA has shown promising results and has grown from 200 households in one village in 2009 to over 13,000 enrolled households in 43 villages in 2011, directly affecting 75,000 people.

In the 2007/08 growing season, a tripartite lending model was introduced in weather index insurance to address side-selling issues and give leverage to financial institutions to recover their funds. In this model, financial institutions worked with farmers' associations that were on outgrower schemes or contract arrangements with an agribusiness company. The latter provided extension services and guaranteed a market while banks provided financial resources for inputs. Farmers accessed the loan in kind through inputs obtained through the agribusiness, and sold their crops at an agreed price to the agribusiness, which paid farmers through the bank. Through this arrangement, banks could deduct the loans before remitting the balance to farmers.

3.4.7.4 Lessons Learned in Agricultural Insurance

Agricultural insurance works well where other systems are functioning, with strong public–private partnerships. Agricultural insurance has significant potential to help reduce agricultural risks where production, financing, processing, and marketing are well functioning and integrated. Insurance can be a suitable risk management option, but it cannot solve problems related to agricultural production inefficiencies. Good public–private partnerships arrangements are key given the high fiscal burden of premiums; hence support from other public agencies and donors is still needed.

Packaging and delivery channels are crucial for the success of an agricultural insurance product. Selling insurance as a standalone product is a difficult task, hence the old adage: *"No one wakes up in the morning wanting to buy insurance."* People do not plan to buy insurance, despite being aware of the risks they face daily. The success of a sales proposition depends on how the product is packaged. This is why weather index insurance has not been sold as a standalone product in Malawi, but as a bundled product with agriculture credit. In Malawi, Opportunity Bank worked with NASFAM as an aggregator in delivering weather index insurance to farmers.

Agricultural insurance is a powerful tool for a sustainable farmer's livelihood. The weather index insurance program in Malawi not only addressed food security but also proved to be a livelihood solution, as farmers had access to farm loans that translated to food on their tables and cash in their pockets from crop sales. The cropping combination of maize and groundnuts was ideal for farmers as both food and cash crops were covered by weather index insurance.

Product awareness and financial education are the key to successful implementation of an agricultural insurance scheme. When product awareness and financial education precede implementation, insurance uptake is high. Few people have financial knowledge about how insurance works. As such, people develop a negative attitude toward insurance. Addressing their misperceptions is thus necessary before an insurance scheme begins.

Chapter 4: Responses to Extreme Weather Events

DODMA is responsible for the development of the Food Insecurity Response Plan (FIRP), which provides details on the number of food insecure people, their location, proposed actions, resources required, accountability, and implementation arrangements. FIRP is informed by or aggregated from the response plans developed by the clusters. Those response are informed by the results of the Malawi Vulnerability Assessment Committee (MVAC), which provides details on the number of vulnerable people in each affected district. The MVAC's results are released around April/May and later updated around October after factoring in the final results of the APES.

4.1 Vulnerability Assessments

MVAC is a consortium of the GoM, NGOs, and UN agencies in Malawi. It works to provide accurate and timely information on food insecurity, thereby informing policy formulation, development programs, and emergency interventions to reduce food insecurity and vulnerability (Giertz et al. 2015). The MVAC was historically funded by different donors, particularly the UK Department for International Department (DFID) and the European Union. The GoM has spent minimal financial resources to support MVAC operations. Babu et al. (2017) observed that the MVAC's current capacity to sustainably implement a revised assessment process is questionable given institutional and funding issues around MVAC operations. MVAC data collection and analysis was based on the Household Economy Approach (HEA) methodology developed in 1995. HEA was used to predict short-term changes in access to food by translating Amartya Sen's entitlement theory to obtain information for appropriate action (ibid). The HEA approach therefore helps to quantify the number of people that fail to obtain enough food, but also suggests possible approaches to intervention. After the MVAC results are released, WFP commissions a market assessment on behalf of DODMA. These two reports inform the combination of response mechanisms (i.e., the balance of food- versus cash-based transfers) as part of the development of the FIRP, the main resource mobilization instrument.

In the past few years, concerns regarding the MVAC included: the reliability of food insecure population statistics; the methodological approaches used; and the financial sustainability of the institution. During the consultations, some stakeholders expressed the concern that since the MVAC is mostly funded by development partners such as UN agencies, they may have some influence over the statistical outcomes. Specifically, the concern is that MVAC statistics on food insecure households are sometimes inflated to justify some stakeholders' interests in the humanitarian sector. To this effect, reference was made to the infamous 2016/17 "maize gate scandal," believed to have emanated from inflated MVAC statistics on the number of food insecure households requiring food and cash assistance. The HEA methodology has been criticized for putting insufficient value on cereals, legumes, and vegetables, while not integrating nutrition strongly as part of the measures for vulnerability. As of 2017, the HEA was replaced by the Integrated Phase Classification (IPC), a standard tool developed by FAO that addresses shortfalls associated with the HEA methodology.

4.2 Food- and Cash-Based Responses

The results of the MVAC and the market assessment guide Malawi's food insecurity responses. The market assessment determines where markets are working and therefore cash-based responses are feasible. On average, 28 percent of food insecure people were given cash to purchase food in areas where grain supplies were available, as guided by the market assessment. The cash response is coordinated through the INGO Consortium led by Save the Children. The remaining 72 percent were assisted through

food-based transfers, all for a period of approximately four to five months (November to March/April each year).

The food-based response is coordinated by WFP, co-lead of the Food Security Cluster, under DODMA leadership. Guided by the MVAC results and market assessment, WFP delivers food-based rations to affected households, using implementing NGOs on the ground. The ration pack includes 50 kg of maize, 10 kg of pulses, and 1.84 kg of oil per household. Households with children under two years old receive an additional 6 kg of super cereal. Throughout the response, WFP submits monthly reports showing the status of the distributions; these are discussed in various cluster and platform meetings. The cash-based response is coordinated by the INGO Consortium.

Any drawdown for MVAC support is approved by the SGR and the Maize Marketing Committee, co-chaired by the Principal Secretary of MoAIWD and DODMA, with members drawn from donors (including WFP), private sector, Ministry of Finance, Economic Planning and Development, ADMARC, and the National Food Reserve Agency. The SGR operates with funding from the GoM and donors. The minimum grain stock in the SGR used to be 75,000 MT but recently increased to 217,000 MT in the revised SGR guidelines. The SGR stock is used for buffer stock, emergency, safety nets, and market stabilization. The National Food Reserve Agency, which manages the SGR, submits monthly information on grain stock levels. On the commercial maize markets, ADMARC is a key player in determining prices; it handles approximately 50,000 MT per year, with maize positioned in 337 outlet markets spread across the country for subsidized sales. The market stabilizes when ADMARC enters the market at a good time; for example, in 2016/17 maize market prices stabilized at around MKW 250/kg.

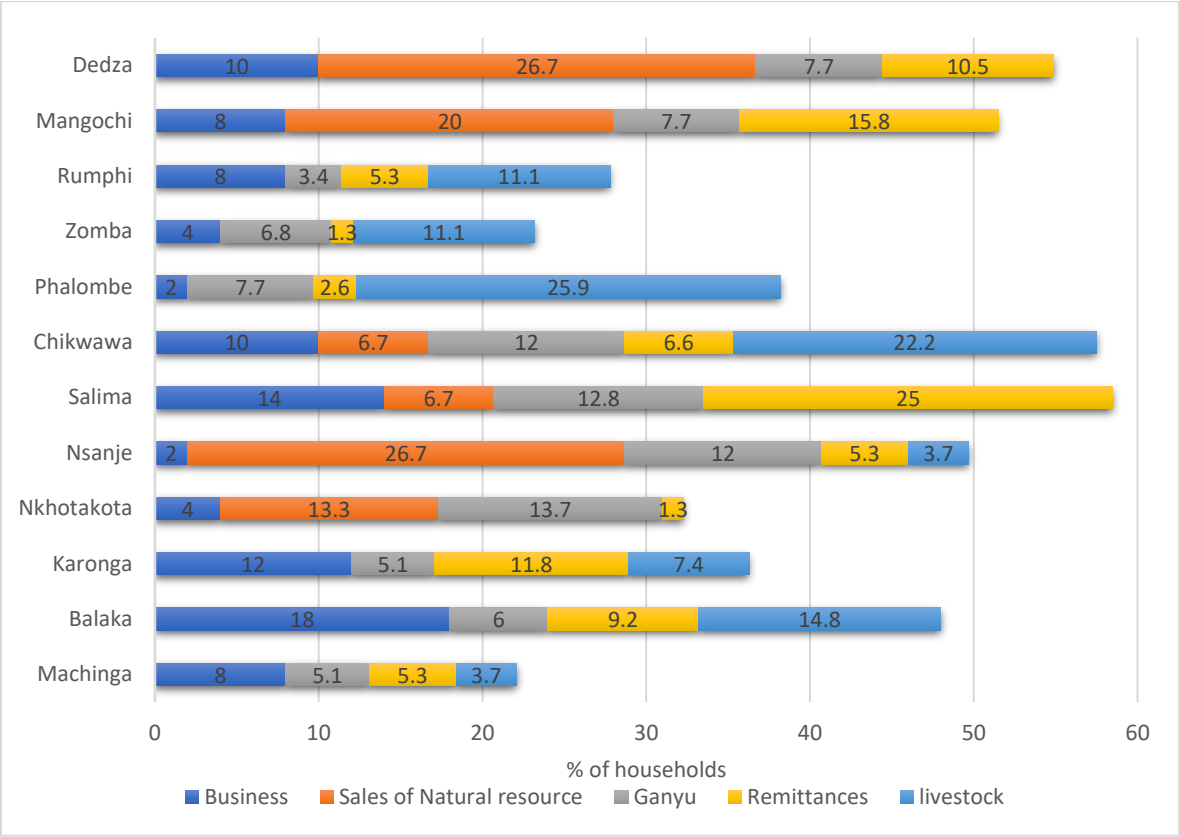
4.3 Smallholders' Coping Strategies

Overall, the number of vulnerable people in Malawi is generally increasing as a result of climate change. Consequently, smallholder farmers are adopting various adaptation strategies[9] to mitigate the effects of rainfall variability and low food production. Figure 15 shows some of the main coping strategies adopted by sampled farmers, by district.

Households clearly adopt many coping strategies, some of which are destructive, such as sale of natural resources (such as charcoal) and livestock. The sale of natural resources is a popular strategy among households in Dedza and Nsanje (27 percent), Mangochi (20 percent), and Nkhotakota (13 percent) districts. Sale of livestock is popular among households in Phalombe (26 percent), Chikwawa (22 percent), and Balaka (15 percent) districts. Short-term seasonal labor *(Ganyu)*is the main coping strategy among households in Balaka (18 percent) and Karonga (12 percent) districts. Reliance on remittances is the most important coping strategy among households in Salima (25 percent), Karonga (12 percent), and Dedza (11 percent) districts, and border districts of Mangochi (16 percent).

[9] Adaptation strategies are long-term coping measures used by households when faced with unwelcomed events, whether expected or unexpected.

Figure 15: Household coping strategies, by district, Malawi



Source: Survey data.

4.4 Social Protection and Resilience Responses

Social protection programs target the ultra-poor as a way of building their resilience to and early recovery from food insecurity. These mainly include the Farm Inputs Subsidy Programme (FISP), public works, cash for work, inputs for assets, and social cash transfer programs. Under the FISP, targeted beneficiaries (approximately 900,000 households) receive coupons to purchase subsidized agricultural inputs such as fertilizer (2 50-kg bags) and seeds (5 kg of maize and 2 kg of legumes). Under public works, beneficiaries do some form of work to receive cash or food, while others receive cash for work. Social cash transfers target the poorest 10 percent of households, mostly the elderly and women. The social cash transfer program is being rolled out to all districts in Malawi.

The cash component of the humanitarian response is implemented by the INGO Consortium, led by Save the Children, with membership including Concern Worldwide, Goal Malawi, Oxfam, and United Purpose. The central feature of the humanitarian response by the INGO Consortium over the years has been provision of complementary interventions (along with cash transfers) to promote the long-term resilience of affected households to future food insecurity shocks. However, the design and implementation of resilience programming within the humanitarian response is modified every year based on lessons from the previous year's operations.

In the past few years, the resilience component of the INGO MVAC response focused more on the promotion of village savings and loan associations (VSLAs) to allow project beneficiaries to save some

of the cash receiving during the response to buy productive assets. As time went on, other resilience-building activities were introduced, including the provision of seeds. In a 2015/16 INGO Consortium MVAC response, for example, beneficiaries were linked to implementing partners' other long-term development interventions in their respective communities. These included irrigation farming, intercropping, conservation agriculture, nutrition interventions, DRR programs, and VSLAs, among others. The external evaluation of the 2015/16 MVAC response confirmed that linking beneficiaries to long-term programs, especially VSLAs, was essential to promoting long-term resilience. The provision of cash allowed beneficiaries to save part of the cash with VSLAs and to accumulate household assets, which is essential in building resilience. Box 3 shows some of the benefits of linking resilience-building activities to the humanitarian response in Malawi.

Several social protection programs funded and implemented by development partners are adapting to reflect the need for stronger resilience and DRR (e.g., prevention, mitigation) in their design. This is a key aspect of the broader approach to shock-sensitive social protection, which aims to prevent or mitigate the impacts of seasonality and climate shocks, as well as to improve shock response. The GoM has been driving a strategic discussion with key stakeholders on how to learn from these experiences, with a focus on strengthening and linking social protection and humanitarian systems to make them more "shock-sensitive." This thinking allows social protection and humanitarian sectors to work together along the resilience spectrum – from prevention to preparedness, response, recovery, and long-term development. The objective is to enhance the capacity of individuals, communities, and national systems to become more resilient, foster wellbeing, and break the cycle of hunger and humanitarian crises in Malawi.

Evidence shows that some social protection programs play a protective role in supporting food security in the lean season. For example, social cash transfers have had positive effects on school attendance during the lean season (the peak hunger period), particularly for girls in higher grades (GoM 2017d). The recent impact evaluation of the Social Cash Transfer Program demonstrated that cash transfers can help protect beneficiary households from food insecurity in the lean season. The role of savings and access to loans are also important programming features to mitigate the impacts of future risks: households can set money aside in advance of seasonal food insecurity – or save it for use in the event of a future shock.

Box 3: Benefits of resilience building: INGO Consortium humanitarian response

In 2017, the INGO Consortium, led by Save the Children, commissioned an analysis of the benefits of the resilience-building activities that were part of the 2016/17 National Food Insecurity Response in Malawi. Building on lessons learned from previous responses and longer-term programming, the INGO Consortium targeted a subset of the total MVAC caseload with a tailored package of complementary or "wrap around" interventions. These interventions were designed to boost household capacity (especially productive capacity), fast track recovery, and support longer-term resilience building, thereby contributing to breaking the cycle of hunger in Malawi.

A subset of MVAC beneficiaries was selected to participate in the resilience-building activities. These beneficiaries were required to work in their own field (practicing the various agricultural techniques) for at least 18 days per month to qualify for a monthly transfer of around MWK 14,400. Lead farmers, working in partnership with government extension workers and the implementing partner, were responsible for verifying that this condition was met before the transfer was made to the beneficiary. These conditionalities were much more intense prior to the planting season (September–November), while during the lean season (January–April) the conditionalities were relaxed (i.e., the conditionality was nonbinding to ensure the humanitarian imperative was upheld).

The analysis found that:

- Average maize yields for the 2016/17 season were significantly higher for beneficiaries who received cash and other resilience-building activities, compared to those who received cash only.
- Beneficiaries who received cash transfers and the resilience-building package are likely to subsist with own food for seven months in the 2017/18 consumption year, compared to beneficiaries who received only cash transfers (five months), a statistically significant difference.

Source: Makoka and Mbendela 2017.

Resilience and diversification is receiving increased attention from the GoM and donors as an option to address medium- to long-term vulnerability to extreme weather events. The GoM and development agencies, especially local and international NGOs in Malawi, are undertaking various development initiatives that aim at promoting households' resilience to future livelihood shocks.[10] Some of the key interventions include diversification, promotion of drought-tolerant crops, road maintenance, reforestation, woodlots, small-scale irrigation, and inputs for assets. In response to the high susceptibility of maize to climate change (besides its high input requirements), emphasis on promoting diversification has increased. As a result, increased production and yield increases have been observed for sweet potatoes, Irish potatoes, cassava, legumes, and sorghum. Growing drought-tolerant crops has assisted in strengthening household resilience and reducing vulnerability. The research system[11] has responded positively by breeding various drought-tolerant crop varieties. However, the key gap on resilience activities is the fragmented approach to implementation. Where coordination has improved, good results

[10] The World Bank is supporting the Malawi Floods Emergency Recovery Project (MFERP) and the Malawi Drought Recovery and Resilience Project (MDRRP), which both promote resilience. As part of deepening resilience and diversification, the World Bank (with funding from Norway, the European Union, USAID, Flanders, Irish Aid, and DFID) is supporting the Agriculture Sector Wide Approach Support Project.

[11] Through the Department of Agricultural Research Services (DARS) and the Consultative Group on International Agricultural Research (CGIAR).

have arisen (Box 5). The development of a National Resilience Strategy presents an opportunity to harness and increased coordination among various interventions to achieve maximum and long-term impacts.

Box 4: The Enhancing Community Resilience Programme

Since 2011, a consortium led by Christian Aid Malawi has implemented the Enhancing Community Resilience Programme (ECRP) in 11 districts of Malawi. Other key consortium members are Care International Malawi, ActionAid Malawi, and the Centre for Environmental Policy and Advocacy (CEPA). The six-year program (August 2011 to 2017) targeted 820,000 direct beneficiaries to improve food security, reduce vulnerability, and strengthen their resilience to natural disasters and climatic hazards. The program is funded by the United Kingdom's Department for International Development (DFID), Norwegian Ministry of Foreign Affairs, and Irish Aid.

The goal of the ECRP is to eradicate extreme poverty and hunger while contributing to the Sustainable Development Goals. The major objective of the program is to increase resilience of vulnerable communities to climate variability and change. The ECRP promotes a variety of interventions that link resilience to development. These include village savings and loan associations (VSLAs), disaster risk reduction (DRR) and early warning systems, conservation agriculture, agroforestry, small-scale irrigation, and small-scale livestock development, among others.

A review of the ECRP shows that the initiative has been very effective in linking development work with resilience building to ensure that households are food secure as well as resilient to future food insecurity and livelihood shocks. This is so not only because the project activities have been well received by beneficiary communities, but also because of the positive food security and livelihood improvement outcomes being realized.

Source: Makoka and Mbendela 2017.

Inputs for assets and public works programs have also gained momentum toward reducing vulnerability and improving household resilience. Inputs for assets programs provide access to inputs (maize seeds and fertilizer) in exchange for labor delivered to improve productive assets. This creates jobs while simultaneously repairing and restoring community infrastructure as well as indirectly improving households' resilience. Such assets mainly include small irrigation schemes, feeder roads, soil and water conservation, forestry, and water supply as prioritized by district councils. In some limited instances, cash for work has also been used. Development partners, including the World Bank, provided significant support in this area. For instance, two current projects (floods and drought) are reaching 380,000 vulnerable households in drought- and flood-affected districts (US$29 million). This builds on previous support from the Irrigation and Rural Livelihoods Agriculture Project (closed in 2015, with an approximate investment of US$40 million toward inputs for assets). Figure 16 depicts an example of assets restored as part of a public works program that led to improved connectivity to various points, including agricultural markets.[12]

[12] Similar recovery interventions have been supported by various donors; e.g. DFID, Irish Aid, Norway, African Development Bank, USAID, WFP, FAO, and the European Union.

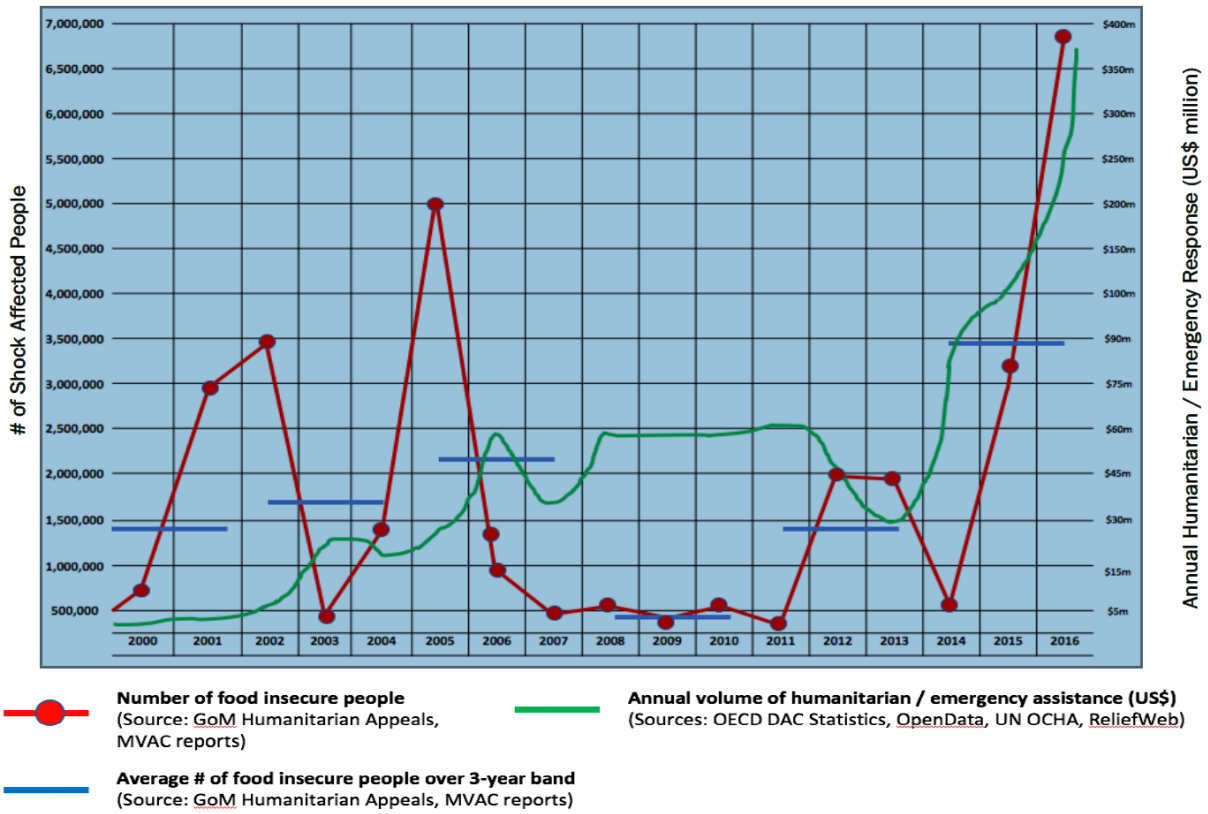
Figure 16: Katole Bridge in Thyolo district before and after a public works program

Evidence from previous public works programs shows significant impacts on jobs created, as well as improved agricultural productivity among participating households. The key lesson learned is the need to improve the quality of community assets created through public works programs, as well as to ensure that the assets created meet sector norms and standards, while ensuring sustainability. This can be improved by ensuring that adequate capacities are available at the local level to support project implementation, and ensuring that standards and frameworks are provided to guide implementation.

4.5 Analysis of Humanitarian Response Costs

The severity and occurrence of natural disasters has increased over time, posing a threat to Malawi's economy as resources are diverted to support emergency operations at the expense of other critical priorities. At the macroeconomic level, El Niño reduced the country's GDP by 2.8 percent and increased inflation as a result of high cereal prices (World Bank 2016). Figure 17 shows the humanitarian costs incurred over the past 17 years.

Figure 17: Humanitarian costs incurred in Malawi, 2000–2016



Both vulnerability and costs of responses have spiraled upward. Both reached their highest level in 2016/17 (after the worst El Niño in the history of Malawi), with another peak in 2015 due to heavy floods. Most of the costs (approximately 77 percent) were supported by various donors – for instance, in 2016/17, donors funded approximately US$303 million out of the US$395 million. The remaining 23 percent came from the GoM and other direct support from various NGOs. Lead time in the response to the emergency appeal has been good, at approximately two months. As part of response delivery, WFP played a key role in distributing food assets (using local and international NGOs on the ground), while the INGO Consortium led the cash-based response.

In response to the 2015 floods, which affected 1,150,000 people, displaced 336,000, and killed 104, the GoM requested the World Bank to conduct a comprehensive Post Disaster Needs Assessment (PDNA) for floods, in partnership with UNDP and the European Union. On this basis, the Malawi Floods Emergency Recovery Project (MFERP) was designed and approved (US$80 million) to restore immediate needs following devastating floods. Following the subsequent drought in 2016, the PDNA for drought was developed, resulting in approval of the Malawi Drought Recovery and Resilience Project (US$104 million), aimed to address early recovery and resilience. Other development partners (notably the African Development Bank, the International Monetary Fund, China, DFID, USAID, Norway, WFP, and Japan) contributed with cumulative support of US$230 million.

4.6 Political Economy Perspectives to Disaster Planning and Responses

Disaster prevention and response occur in a political space and the relevant actors work in a political space. This section analyzes the political economy of disaster response in Malawi to assess the extent to which the response has been influenced by the interrelationship between politics and the economy.

4.6.1 Development Partner Interests and Perspectives

The disaster management space is dominated by several active external actors that include: multilateral donors like the UN agencies and the World Bank; key bilateral donors (USAID, DFID, and Irish Aid); and INGOs (Save the Children, Goal Malawi, ActionAid, Concern Worldwide, and Malawi Red Cross). The role of clusters in the humanitarian response has also been important to ensure wide consultations and inputs from various stakeholders. Donors support approximately 77 percent of the humanitarian response, actively ensuring that the response is carried out effectively. In view of high resource dependency, donors also play an active role in implementation of the Food Insecurity Response Plan (FIRP), including decisions on purchases of maize and other food stuffs, procurement modalities, and the use of various NGOs to implement the response. For instance, donors have influenced procurement modalities such as the use of commodity exchanges, NRFA, Purchase for Progress (P4P), and at times importing from other countries (through WFP). Some have influenced the use of nonstate actors to channel their support toward the response.

The Humanitarian Country Team (HCT) has been influential in its ability to mobilize resources and ensure coordination for disaster response in Malawi. UN agencies and other members have been influential in directing disaster responses in partnership with DODMA. For instance, during the flooding in Karonga in April 2017, UNICEF, working with DODMA, employed drones to survey flood-affected areas and verify the extent of crop and infrastructure damage (UNICEF 2017). WFP routinely leads in the implementation of food-based responses (on behalf of DODMA). In this pursuit, additional resources are mobilized to support operations/twinning costs as well as include oils, pulses, and super cereal (in addition to normal maize), in line with international humanitarian best practices.

4.6.2 Government Interests and Perspectives

The Office of the Vice President provides the political will that is instrumental in disaster response. The GoM recently advocated to mainstream resilience within the humanitarian response, as guided by the National Resilience Strategy, and to adopt shock-responsive safety nets. The disaster response is coordinated through the National Disaster Preparedness and Relief Committee, which comprises cabinet ministers, principal secretaries, senior Malawi Defense Forces, police officials, and leading NGOs (such as World Vision and Malawi Red Cross Society). This ensures strong governmental leadership at the highest level to coordinate the response. The police and army also play an important role in disaster response in Malawi. During the 2015 floods, the Malawi Police held sensitization meetings targeting displaced people in camps. The sensitization focused on prevention of gender-based violence in camps, child protection and safety, and general security issues in camps. Likewise, the military provided rescue services to flood-affected communities.

4.6.3 Civil Society and Other Non-Public Interests and Perspectives

NGOs are very influential in disaster response in the disaster-prone districts of Malawi. But the strong presence of NGOs that focus on disaster response creates a potential moral hazard – if the GoM anticipates that actors on disaster response will spend more on response, then it will be less willing to allocate its own resources on preparedness and response (Bussell and Fayaz 2017).

Levels of disaster preparedness are usually higher when more disaster-oriented NGOs are present (Bussell and Fayaz 2017). In districts such as Nsanje, Chikwawa, Karonga, and Phalombe, many CSO actors are focusing their efforts on disaster preparedness, including capacity building of civil protection structures, flood early warning systems, and other initiatives to promote community preparedness**.** Discussions with various district stakeholders showed a tendency for many NGOs, churches, and other group to appear only during flood disasters and to disappear soon afterwards. For example, in the TAs of Mkhumba (Phalombe) and Ngokwe (Machinga), participants questioned why many institutions only show interest during the time of response to floods. Based on resource availability, some NGOs play an active role in district-level responses, and in determining the extent of response mechanisms. This occurs when the GoM does not have sufficient budget at district level for such roles.

4.6.4 Analysis of Levels of Power

The Power Cube Framework, as described by Gaventa (2005), presents a dynamic understanding of how power operates. The framework was used in this study to group the actors involved in contingency planning processes in Malawi according to the levels of power they hold (Table 7).

Table 7: Stakeholder matrix for power influence at national and district level

		LEVEL OF POWER			
		LOW		**HIGH**	
INFLUENCE		***National***	***District***	***National***	***District***
	LOW		Civil Protection Committees (Village, Area-level)		
		National	***District***	***National***	***District***
	HIGH	DODMA INGOs MoAIWD FEWS NET Department of Climate Change Research Institutions	Government departments Political leadership (Members of Parliament, Ward councilors) Traditional leaders	Office of Vice President UN (WFP, UNDP, UNICEF) Donors (DFID, USAID, Irish Aid, World Bank) Political leaders	District Executive Committee (Director of Planning, DODMA Officers) District Civil Protection Committee NGOs

Source: Authors' analysis based on Gaventa 2005.

The Power Cube Framework distinguishes the degree of power in three categories: (i) visible power (conventional understanding of power negotiated through formal rules and structures, institutions, and procedures); (ii) hidden power (actual controls over decision making and the way powerful people/institutions maintain their influence and often exclude concerns of other less powerful groups); and (iii) invisible (internalized) power (influences how people think of their place in society and explains why some are prevented from questioning power relations).

The results show that at national level, the Office of Vice President, UN agencies (WFP, UNDP, and UNICEF), donors (DFID, USAID, the World Bank, and Irish Aid), and political leadership have high influence and power. On the other hand, key technical stakeholders facilitating implementation have high influence but low power (e.g., DODMA, government ministries). At district level, the stakeholders that have more power and influence include the District Executive Committee (particularly the District Commissioner, Director of Planning and Development, DODMA DRM Officers), District Civil Protection Committees, and NGOs. The sector departments, political leaders and traditional leaders have more influence but less power.

While DODMA has a lot of influence and power on disaster planning and response at the district level (through DRM/Desk Officers), this key institution on contingency planning does not seem to have a lot of power at the national level. Although it is highly influential, DODMA's power is limited by its dependence on financing from external sources. As this report proposes, DODMA must be able to operate without dependence on external support to effectively coordinate disaster processes in Malawi.

Chapter 5: Trade and Market Implications of Extreme Weather Events

This chapter analyzes the effect of El Niño on trade and commodity prices. The direct effect of extreme weather, droughts, and floods is to reduce the production and supply of grain, which ideally leads to increased producer prices. Maize, the country's staple food, has been the hardest hit, with repercussions on household vulnerability, increased inflation, and reduced GDP. Economic productivity is suppressed after disasters. For instance, projected growth in Malawi's GDP was revised from 5 percent to 2.8 percent following the 2015 floods (World Bank 2016). In view of this, the GoM has put in place various interventions on the market, mostly in a bid to reduce price volatility and achieve food security. This section analyzes the effects of such interventions to provide options for the GoM to better respond to El Niño through the market.

5.1 Domestic Maize Market Policy Developments and Implications

High climate variability conditions such as erratic rainfall conditions, delayed onset of rains, prolonged dry spells, and floods have had not only production effects but also food marketing policy implications. Given the resultant low food production conditions seen during the years of poor weather conditions, the GoM intervened in the grain market to stabilize prices and supply on the market. The GoM's use of food price stabilization policies is based on a longstanding concern about the effects of price instability and, particularly, high food prices on poor rural and urban consumers (Jayne 2012). A market study by Edelman (2016) on the impact of export bans and minimum farm gate prices calculated measures of volatility for two discrete periods of 2004 to 2015: (i) months during which Malawi did not have a maize export ban; and (ii) months when such a ban was in place. The results showed that in 8 out of 12 Malawian markets, prices were more volatile when export bans were in place compared with when they were not. The conclusion was that for Malawi, export bans are not strongly associated with more stable prices (Eldelman 2016).

Maize prices in Malawi are more variable compared to those in neighboring countries (Figure 18**), and significantly lower** (Figure 19). The GoM deployed the military at the borders to enforce the export ban and deter informal exports, resulting in depressed producer prices. Their gradual decline created a big outcry from smallholder farmers as well as the private sector.

Figure 18: Variability in maize prices (avg. 2005–2016)

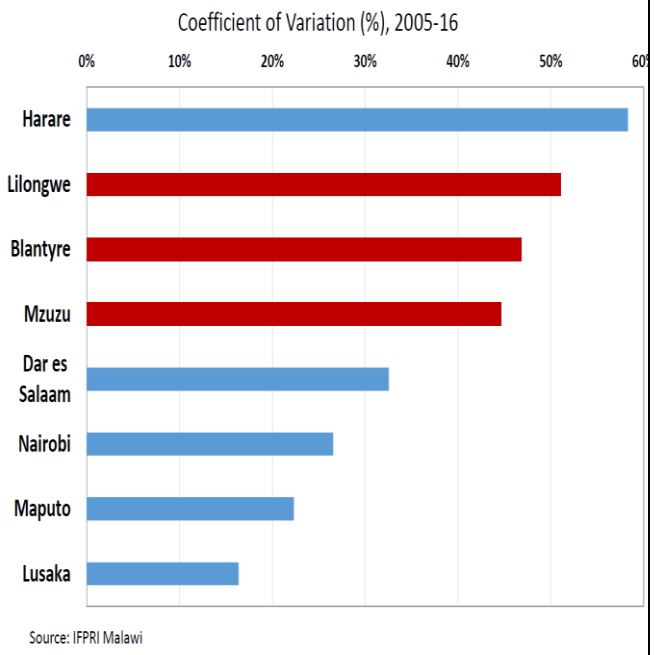
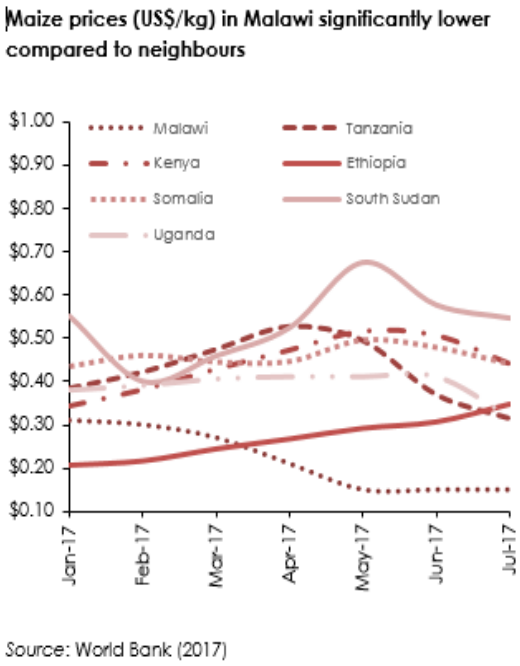


Figure 19: Maize prices in Malawi and neighboring countries



5.2 The GoM's Role in Maize Marketing through Parastatal Organizations

The GoM's intervention in the maize market is now largely focused on stocking and drawing down grain from ADMARC and the National Food Reserve Agency. The limited role of the GoM in maize marketing is due to implementation of Structural Adjustment Programs starting in the early 1980s that had significant market reforms. These included commodity price decontrols, removal of agricultural input subsidies, and permission for private sector participation in agricultural markets besides ADMARC. Given these reforms, some positive gains were realized in the economy in terms of private sector participation. Jayne (2012) found that private traders are the main buyer of maize from smallholders, accounting for roughly 75 percent of all maize sold, while intravillage sales accounted for 17 percent and ADMARC for 8 percent. The funding ADMARC receives from the GoM following the adjustment agenda is either for purchase of government maize or is payment for facilitating FISP activities.

Box 5: Stabilizing maize prices in the midst of a food crisis

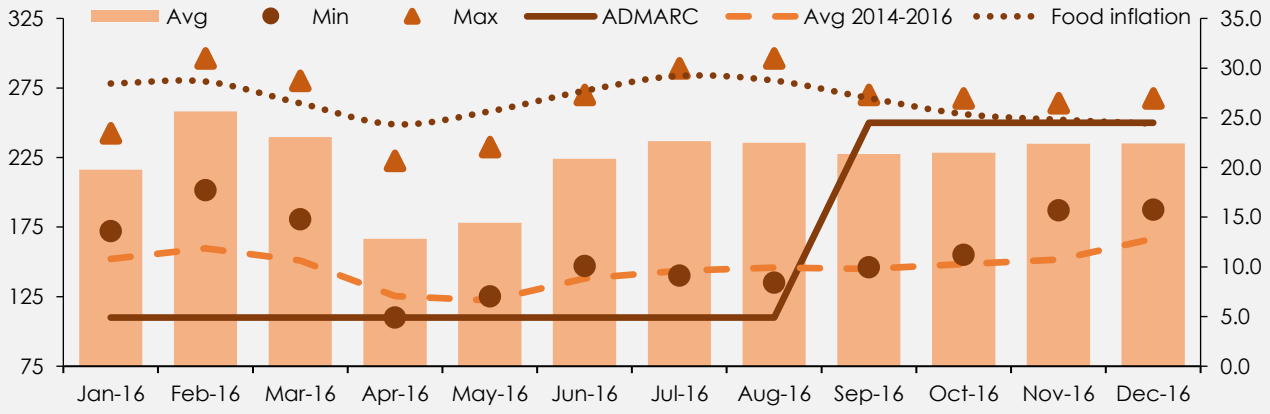
Malawi is increasingly affected by susceptibility to adverse weather conditions that trigger food shortages. Its heavy reliance on rainfed agriculture is often aggravated by poor policy responses in times of food crisis. It has become customary for the GoM to intervene in the maize market during food crises through ADMARC and the National Food Reserve Agency to buy, distribute, and sell maize throughout the country. The GoM often sets a maximum price for all agricultural products, including maize, sold in ADMARC depots. Other public sector interventions intended to address food insecurity include the Farm Input Subsidy Programme (FISP), the promulgation of minimum farm gate prices to encourage maize production and to restrict maize exports.

Despite these interventions, Malawi's maize market remains extremely thin, with few buyers and sellers relative to the number of producers. Only about 8.5 percent of farmers are outright sellers of maize, 8.9 percent operate as buyers and sellers, and 55.3 percent purchase maize only to supplement their own stocks. When markets are thin, small disruptions and interventions in supply and demand can result in large movements in market prices. Thus, the GoM's interventions often have the opposite of the intended effect, undermining its own objective of stabilizing prices and improving food security.

Recent maize market intervention measures produced very different results. During the 2015/16 lean season, the GoM intervened by setting the price for maize sold through ADMARC facilities at MWK 110/kg, two-and-a-half times cheaper than the prevailing market price. However, the unavailability of the commodity at ADMARC depots demonstrated ADMARC's challenges to support its price, and higher market prices prevailed. This also impeded domestic trade, as market participants were exposed to the risk of ADMARC undercutting them by selling at a price below cost. In addition, much of the subsidized maize sold by ADMARC ended up in the hands of traders, who then sold it at much higher market prices. Thus, this intervention was largely ineffective in terms of its stated goal of providing relief to the food insecure during this critical period.

Figure 20: Maize prices more stable in 2016/17 lean season compared to 2015/16

Maize prices, MWK /kg (LHS); food price inflation, percent (RHS); monthly data during 2016



In contrast to this ineffective measure, during the 2016/17 lean season, there is evidence that the humanitarian crisis triggered some behavioral changes among public institutions, with a subsequent positive response by the private sector. In the face of considerable political pressure, ADMARC committed to a published retail price of MWK 250/kg of maize. While this was a substantial increase from the price of MWK 110/kg established in the previous season, it was set at a level that balanced the institution's need to recover

costs with the risk that a higher price would drive a greater number of consumers to seek humanitarian relief. Private trade in maize from neighboring countries, especially Mozambique and Zambia, was very active, in addition to the parallel market that exists throughout East and Southern Africa to circumvent maize export bans.

Thus, breaking with recent historical practice, ADMARC's prices were close to the market rate, which left the wider market uninterrupted. An analysis of the average price of maize over the past three years shows that ADMARC prices have been consistently set below the three-year average. For the first part of 2016, prices were also set below the minimum price across the various markets (Figure 19). When the GoM sets a price that is lower than the prevailing market price and has the stock, vendors tend to buy out the maize from ADMARC for resale, equalizing the market prices, at the expense of the intended beneficiaries. On the other hand, when the GoM sets a price without appropriate stock levels and when the market is aware of this, the market is unresponsive.

The market intervention price set by ADMARC during the 2016/17 lean season was in line with market forces, ensuring price stability and subsequently a deceleration in the rate of inflation. A substantial increase in the ADMARC price to MWK 250/kg not only brought its price above the average market price, the price was also closer to the maximum price offered in the various markets. This resulted in a sustained fall in maize prices, which has been a significant factor driving the ongoing declining trend in food inflation since September 2016 and consequently the deceleration in the headline inflation rate.

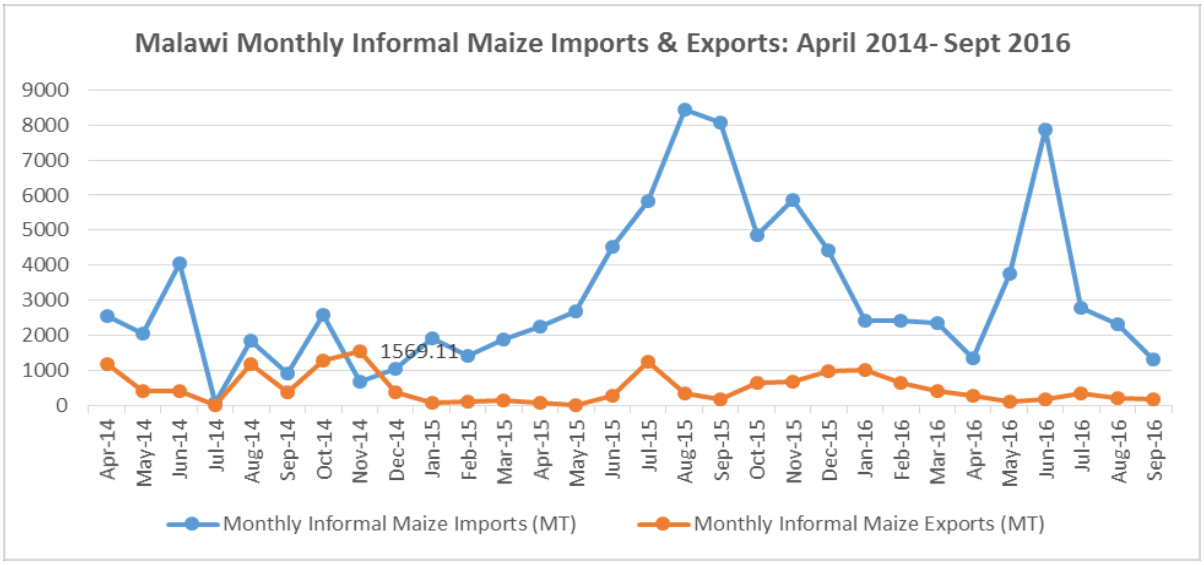
Unless Malawi diversifies its crop production, maize production will remain critically important to the achievement of food security. Therefore, improving the availability of this commodity and the performance of maize markets is crucial to the achievement of food security in the context of rainfed agriculture and natural disasters. Producers need to be encouraged to engage and invest in maize production and marketing. However, this can only be achieved once producers are assured of a reasonable degree of stability and predictability in maize markets; the most critically important measure to achieve this is the minimization of distortions to the market.

Source: World Bank 2017a.

5.3 Informal Maize Imports and Exports

Irrespective of the trade restrictions that the GoM has put in place over the past years, the flow of maize in and out of Malawi is bi-directional, with imports exceeding exports. Informal maize imports are high during the harvest months of May–August because the period coincides with harvest time in neighboring countries such as Mozambique, Zambia, and Tanzania, particularly the southern part. Figure 21 shows the informal exports and imports of maize.

Figure 21: Trends in informal maize imports and exports by month, 2014–2016



Source: Msiska 2016.

During the period April 2014 to September 2016 Malawi had more informal maize imports than exports; this means that sometimes the country's positive food security conditions are the result of maize inflows from neighboring countries that complement domestic production (Box 6**).** This implies that if neighboring countries, which also periodically impose maize export restrictions, were to strongly enforce their own maize export restriction into Malawi, the country's food security conditions would be negatively affected. In some years, Malawi gets more than 40,000 MT of net maize imports, which contributes to its national food security outcomes (Msiska 2016).

Box 6: Malawi's bi-directional informal trade of maize with neighboring countries

Key informant interviews with traders and other stakeholders during the study revealed that at the border area of Mkanda in Mchinji district, maize moves into Malawi from Zambia. In fact, maize traders from Malawi conduct an open maize market operation where traders buy maize in bulk from Zambia at Sawala. According to discussions with some sellers from Zambia, most farmers in Zambia do not apply chemical fertilizers and use low-cost technologies, including local maize varieties. As such, most maize is sold to Malawi, a high-cost producer of maize.

On the other hand, in the TA Ngokwe in Machinga, a Village Civil Protection Committee vice chairperson who is also a Child Protection Officer for the area told the study team that cross-border trade occurs between Malawi and Mozambique. During normal circumstances (good harvest), people from Malawi cross the lake to sell produce in Mozambique, including maize and legumes. During food insecurity, people cross the lake to buy produce (maize and legumes) from Mozambique. People from Malawi always cross the lake to buy farm inputs in Mozambique, where they are said to be cheaper and more accessible. No ADMARC or any agro-dealer operates near the area. During Farm Input Subsidy Programme (FISP) coupon redemption, people usually fail to buy inputs due to longer distances; thus vendors come to buy coupons from them. In 2016, 75 percent of over 1,000 coupon recipients did not redeem their coupons and strangers came in multitudes to buy the coupons. Fertilizer coupons were sold at prices ranging from MWK 8,000 to MWK 12,000.

Source: Field case study.

The informal maize trade flow statistics confirm that regional trade in food commodities is an inevitable solution to climate change-induced food insecurity outcomes in East and Southern Africa (ESA). However, experience has shown that ESA member states impose maize export bans each time they have surplus or notice deficits in neighboring countries that threaten their own food security situations. This defeats the spirit of the regional integration agenda, in which free flow of goods and services, including food commodities, is the desired outcome. The current policy behavior by ESA member states, including Malawi, is rather surprising considering that each time an ESA member state faces a food crisis, the solution usually lies in securing imports from neighboring countries on which they ban exports when they have their own surplus production.

Chapter 6: Conclusion and Recommendations

Malawi is highly exposed to multiple hazards that cause widespread shocks, with climate and weather risks the most significant. The country was the third most affected in the world in the Climate Risk Index for 2015. In recent years, the country faced successive and compounding climatic shocks – from the worst flood in 50 years in 2015 to the strongest El Niño event in 35 years, which prompted declaration of a state of emergency and left 39 percent of the country at risk of food insecurity during the 2016/17 consumption period. ENSO is the most important driver of climatic variability in Malawi. Climate and weather predictions indicate increased severity in the future, meaning that "business as usual" is not an option.

This analytical work was designed to provide a critical review/reflection of how the country responded to these recent extreme weather events and to draw lessons for future response planning. Key messages and recommendations are as follows.

6.1 Key Messages

The key messages arising from the study are summarized as per categories below:

Ever increasing vulnerability, in magnitude and costs

1. The costs of unmanaged risks are high, and will likely go higher with the absence of concerted and coordinated actions to address the gaps, as temperatures and heat waves are projected to increase. The 2016 El Niño was the highest in terms of magnitude, vulnerability, and ultimately cost. Donors provide significant resources toward the humanitarian response (at least 77 percent), with relatively low funding from national governments.
2. Malawi is seemingly becoming more vulnerable, and the high humanitarian costs are a drain on critical resources that could otherwise be invested in adapting agricultural food systems to climate change and increasing absorptive capacity against climate change variability. The current attitude seems to be "business as usual" and reactive, with significant resources devoted to maize purchases (approximately 50 percent of the agriculture sector budget), thereby offering limited options to achieve agricultural transformation, as stipulated in the National Agriculture Policy.
3. The peak periods of food insecurity consistently relate to the occurrence of extreme weather shocks. In turn, this directly reduces agricultural production, agricultural growth, and ultimately overall economic growth. Extreme weather shocks have often lead to downward adjustment of national growth targets.

Increased political will, policy evolution trends, but fragmented, with outdated DRM legal framework

4. Policy trends have evolved in response to the increased prevalence of extreme weather events. Climate change is strongly integrated and prioritized within Malawi's medium-term strategy and is mainstreamed within various sector policies (including agriculture), as well as in the development of specific policy frameworks (e.g., the national climate change policy). These policies are also significantly aligned with international frameworks. This notwithstanding, the policies are fragmented, sector-specific, inadequately funded, ad hoc, and broadly framed, offering limited scope for addressing the complexity of disaster events.
5. The country still relies on the Disaster Preparedness and Relief Act (DPRA) of 1991, which is outdated and not aligned with Malawi's international commitments. The experience of 2015-

2016 necessitated development of a single "National Resilience Strategy" that offers hope to address fragmentation gaps, while shifting the focus toward resilience.

6. High political will exists in terms of leading coordination efforts, as is the functionality of various disaster risk management institutional structures. However, the GoM's funding is unable to keep pace with the increased needs, amidst weak structures at district and community level to translate results. No specific emergency or NRM funds are in place to facilitate timely response to disasters. Despite the draft Agriculture Risk Management Strategy (ARMS), the agriculture sector lacks champions to effectively integrate disaster issues as a core issue within its work.

Inadequate connectedness of early warning, disaster preparedness instruments

7. Preparedness and early warning instruments are insufficiently connected and institutionalized to effectively contribute to decision making. Early warning systems remain weak and are not well integrated within the agriculture sector. Agricultural production estimates are routinely calculated using more traditional approaches, instead of integrated, modern techniques that improve accuracy and prediction efficiencies. The Food Balance Sheet, which is informed by agricultural production estimates, weights maize calories relatively high, does not include other cereals, roots, and tubers, and underestimates food opening balances (particularly due to lack of an informed private stock assessment), thereby offering imprecise information for planning. Agricultural insurance has not been successfully scaled up due to design flaws and stakeholders' lack of awareness.
8. Acute gaps exist at district level, where contingency plans are rarely updated and are supported in an ad hoc manner.

Resilience, diversification and social protection reduces vulnerability

9. Increased evidence suggests reduced vulnerability if resilience is integrated within the humanitarian response, with more focus on shock-responsive safety nets. Given the high political will and donors' good will, expanding social cash transfers to all districts offers a large potential to ensure households' resilience to disasters induced by extreme weather shocks.
10. Upscaling resilience and diversification also offers a good option to reduce vulnerability. Where efforts for joint resilience programming are in place, coordination has been good and household vulnerability to extreme weather events has reduced.

Unpredictable public interventions on the market increase vulnerability and price volatility

11. Unpredictable GoM interventions on the market have created information asymmetry, which has fueled increased maize price volatility, leading to depressed producer prices and disincentives for private sector commercial investments.
12. When Agricultural Development and Marketing Cooperation (ADMARC) improves its transparency on its maize operations, the result is early purchase of maize from farmers (soon after harvest), correct price setting (cost recovery), increased market stability, and less price volatility. This not only increases private sector confidence and participation on the market, but also reduces anticipated losses by ADMARC, a drain on public resources when it needs to be bailed out.

6.1 Recommendations

In view of the above findings, the GoM, the World Bank, and other stakeholders might consider the following recommendations:

Strengthen policy and legal framework, with sufficient funding on DRM activities

1. Department of Disaster Management Affairs (DODMA should expedite the review of the DPRA, and ensure that it is aligned with the Sendai Framework for Disaster Risk Reduction and in line with existing and emerging climatic shocks.
2. DODMA/Ministry of Finance, Economic Planning and Development should set aside an emergency fund or DRM budget line that can be used to respond to disasters, rather than overreliance on donors' good will.

Strengthen/improve connectedness among early warning, forecasting and disaster preparedness tools

3. DODMA should strengthen early warning systems by developing comprehensive hazard maps and risk profiles (up to community level in disaster hotspots), and ensure that they are updated and communities are well-informed, while allocating adequate funding for this activity. The Ministry of Agriculture, Irrigation and Water Development (MoAIWD) should integrate early warning as part of agricultural extension advisory services, and ensure that it positions itself to implement and mainstream disaster preparedness and adaptation.
4. DODMA/MoAIWD should adopt use of geospatial tools, including satellites, to inform early warning (as informed by agricultural meteorological assessments such as use of geospatial tools). Appropriate capacity and partnerships should be developed at various levels to operationalize such tools.
5. MoAIWD should improve the methodology used for the agricultural production estimates by incorporating use of remote sensing and automated data capture/transmission, and improve yield estimation (as guided by recommendations from pilots executed in 2014/15). In the Food Balance Sheet, estimation of the food gap should be informed by an elaborate assessment of public and private stocks and a better measure of postharvest losses; caloric consumption weights should be broadened to reflect other key cereals, roots, and tubers.

Deepen support to resilience, social protection while rebalancing investments to promote diversification

6. MoAIWD should ensure appropriate resource balance, guided and aligned with the National Agriculture Investment Plan (NAIP), while deepening resilience, as opposed to the current overemphasis on maize. The development of the National Resilience Strategy and Implementation can guide in such endevour.
7. The GoM and development partners should scale up support toward resilience and diversification (already a strong feature in the NAIP), while ensuring coherent and joint programming. The National Resilience Strategy can offer an opportunity to guide such efforts. In the same vein, integration of resilience within the humanitarian response should be scaled up in all districts. Social protection programs (as led by the Ministries of Gender and Finance, Economic Planning and Development) should prioritize promotion of shock-responsive safety nets, which have proved to significantly reduce vulnerability against shocks.

Strengthen institutionalization of DRM within mainstream agriculture sector

8. MoAIWD should identify champions within its structures to lead in mainstreaming DRM within agriculture at all levels, while coordinating with district DRM desk officers. Funding to facilitate such work will be needed. The ARMS offer a proper guide and should be adopted to inform this.
9. MoAIWD should lead in the implementation of the National Resilience Strategy and Implementation Plan, ensure that resources are mobilized accordingly, and align coordination structures with the existing ones.

Improve transparency, predictability of market interventions and enabling environment for agriculture

10. The Ministry of Trade, Industry and Tourism should improve the enabling environment as it relates to GoM interventions on the market. Review of the Control of Goods Act needs to be expedited to guide this endeavor to improve transparency, consultation, and predictability on market interventions.
11. ADMARC should routinely provide information on its marketing plans (prices, volumes to be bought or sold) ahead of the crop selling season, and ensure cost recovery prices to avoid any anticipated losses (risk-based). Based on this, ADMARC should enter the market soon after the maize harvest to ensure smallholder farmers receive a price above the minimum price set by the GoM.

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