



# Malawi 2023 Tropical Cyclone Freddy Post-Disaster Needs Assessment

Government of Malawi. April 2023



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# Foreword

In early March 2023, Malawi experienced one of the worst tropical cyclones on record. Tropical Cyclone Freddy developed in the Western Indian Ocean and moved eastwards, influencing torrential rains over the southern part of Malawi. Following the heavy rains, multiple flood events were reported in Blantyre, Mulanje, and Thyolo districts on March 12, 2023. On March 13, 2023, flash floods led to multiple debris flows and other landslides in Blantyre, Chiradzulu, Mulanje, and Phalombe districts.

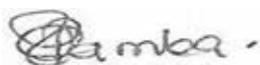
The disaster events of 2023 negatively affected people's lives, livelihoods, and the country's socioeconomic infrastructure, pushing more people into poverty. In total, 16 local authorities were directly affected. An estimated 2,267,458 people were affected, including 659,278 people who were displaced (336,252 female; 323,026 male), 679 killed, and over 530 people declared missing by mid-March 2023.

The devastating heavy rains and floods caused substantive damage and losses to social services, followed by the productive and infrastructure sectors. The disaster impact was highest in the housing sector, with about 260,681 houses damaged or destroyed. The floods extensively washed away and submerged houses; swept away roads, bridges, and power supply and irrigation infrastructure; and damaged and washed away crops, which were at the stage of maturation. Power supply was interrupted for more than three days in Chikwawa and Nsanje districts and in some parts of Blantyre District.

The Malawian government responded swiftly with rescue and relief operations and saved many lives by rapidly mobilizing various forces, including to provide disaster shelters and other necessities. Various humanitarian actors provided relief and short-term recovery activities; over 1.8 million people were assisted. I am grateful to the governments of Botswana, Mozambique, Tanzania, and Zambia, among others, and to the development partners, Malawian government departments, private sector entities, and individuals that provided support in various forms during the immediate response phase. Most disaster sites remained without shelter, however, leading to displaced people being accommodated in school classrooms, which compromised access to safe water and sanitation and disrupted learning for students.

The purpose of undertaking a comprehensive Post-Disaster Needs Assessment was to quantify the physical damages and economic losses and to estimate recovery and reconstruction costs. The assessment has revealed a total disaster effect of \$506.7 million, while the total cost of recovery and reconstruction is \$680.4 million.

The government focus in the reconstruction phase will be on resilience building to minimize the effects of future extreme weather events and other disasters. We look forward to more support from development partners, the private sector, and individuals. I must stress that the recovery and reconstruction phases following this disaster will be guided by the Disaster Risk Management Act (2023). With the implementation of this new Act, it is expected that Malawi will be able to reduce disaster risk and mitigate the impacts of disasters effectively and efficiently.



Colleen Zamba

**Secretary to the President and Cabinet  
Government of Malawi**

# Acknowledgments

The Malawi Post-Disaster Needs Assessment (PDNA) for the 2023 floods following Tropical Cyclone Freddy was commissioned by the Government of Malawi through the Department of Disaster Management Affairs with support from the World Bank, United Nations Development Programme (UNDP), and European Union. The exercise was requested with the intention to assess the impacts and needs after Tropical Cyclone Freddy hit Malawi from March 11 to 14, 2023, resulting in devastating effects in 16 local authority areas.

On March 14, 2023, the Government of Malawi, through the Ministry of Finance and Economic Affairs, submitted a formal request for World Bank assistance to conduct a systematic impact and needs assessment to understand the economic impact of the floods. On March 20, 2023, the Department of Disaster Management Affairs submitted a request to the World Bank for a PDNA to fully understand the impacts of the present disaster, determine and quantify the corresponding multi-sectoral needs and develop long-term solutions and resilience to similar disasters in the country.

The Government of Malawi would like to thank the development partners and organizations that participated in the PDNA: Ministry of Finance and Economic Affairs, Ministry of Agriculture (Crops Development, Irrigation, Animal Health and Livestock Development, and Fisheries departments); Ministry of Local Government Unity and Culture; National Planning Commission; Ministry of Natural Resources and Climate Change (Environmental Affairs Department, Department of Climate Change and Meteorological Services); Ministry of Lands (Department of Housing); Ministry of Gender, Community Development, and Social Welfare; Ministry of Water and Sanitation (Department of Water Resources, Department of Water Supply and Sanitation); Ministry of Education; Ministry of Health; Ministry of Energy (Electricity Supply Commission of Malawi, Electricity Generation Company Limited, and Department of Energy Affairs); and Ministry of Transport and Public Works (Department of Buildings, and Malawi Roads Authority); Ministry of Trade and Industry, United Nations Children's Fund; United Nations Human Settlements Programme; United Nations Development Program (UNDP); United Nations Entity for Gender Equality and the Empowerment of Women; United Nations Population Fund; Food and Agriculture Organization of the United Nations; World Food Programme; International Labour Organization; United Nations Office for Project Services; Joint United Nations Programme on HIV/AIDS; Concern Worldwide; and the Malawi Red Cross Society. The assessment team comprised close to 100 officers and development partners in total, and the dedication and sacrifice they displayed to ensure credible results within a short period of time is very commendable.

The design of the PDNA mirrored that of a rapid impact assessment of the recent floods: as well as use of existing data from similar assessments that were ongoing, the PDNA relied on existing data from the various local authority offices. As such, the assessment team would like to extend its appreciation for all the support that the district and city councils and the Office of the District Commissioners and Chief Executive Officers rendered directly, or indirectly through various sectors and departments. The information provided and the support given to the teams that visited the districts to collect data and conduct verifications has been invaluable.

The assessment team would also like to extend its gratitude to the directors of planning and development from all 16 local authorities, who participated in validating the results of the assessment. Your reflections and contributions assisted in ensuring the quality, timeliness, and credibility of this report.



Charles Kalemba  
**Commissioner for Disaster Management Affairs**

# List of Acronyms

AfDB	African Development Bank
APES	Agriculture Production Estimates Survey
AIDS	Acquired Immunodeficiency Syndrome
BBB	Building Back Better
BDA	Building Damage Assessment
BOP	Balance of Payments
CAADP	Comprehensive African Agricultural Development Programme
CBCCC	Community Based Child Care Centre
CBFEWS	Community Based Flood Early Warning Systems
CBC	Community Based Organization
CFSVA	Comprehensive Food Security and Vulnerability Assessment
CHAM	Christian Health Association of Malawi
CMAM	Community Management of Acute Malnutrition
COMESA	Common Market for Eastern and Southern Africa
CPC	Civil Protection Committee
CRED	Centre for Research on Epidemiology of Disasters
CSO	Civil Society Organization
DAHLD	Department of Animal Health and Livestock Development
DaLA	Damage and Loss Assessment
DCCMS	Department of Climate Change and Meteorological Services
DCP	District Civil Protection Committee
DDPs	District Development Plans
DEM	District Education Manager
DFID	Department for International Development
DHMT	District Health Management Team
DHS	Demographic and Health Survey
DIS	District Information Systems
DNA	Damage and Needs Assessment
DNCC	District Nutrition Coordination Committee
DODMA	Department of Disaster Management Affairs
DRMA	Disaster Risk Management Act
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSWO	District Social Welfare Office
DRP Act.	Disaster Relief and Preparedness Act
EAD	Environmental Affairs Department
ECDs	Early Child Development Centres
ECLAC	Economic Commission for Latin America and the Caribbean
EFSA	Emergency Food Security Assessment
ENENCO	Electricity Generation Company Limited
ENN	Emergency Nutrition Network
EOC	Emergency Operations Centre
EPA	Extension Planning Area
ESCOM	Electricity Supply Commission of Malawi
EU	European Union
EWS	Early Warning System

FAO	Food and Agricultural Organization
FBO	Faith Based Organization
FEWS	Flood Early Warning System
FEWSNET	Famine Early Warning System Network
FISP	Farm Input Subsidy Programme
GAM	Global Acute Malnutrition
GBV	Gender Based Violence
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
GFS	Gravity Fed Systems
GHI	Global Hunger Index
GIS	Geographical Information System
GoM	Government of Malawi
GNI	Gross National Income
GSD	Geological Survey Department
GVH	Group Village Headmen
HA	Hectares
HCT	Humanitarian Country Team
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
IDP	Internally Displaced Persons
NRS	National Resilience Strategy
IDSR	International Strategy for Disaster Reduction
IEC	Information Education and Communication
IFAD	International Fund for Agriculture
IFPRI	International Food Policy Research Institute
IHS	Integrated Household Survey
ILO	International Labor Organization
IMF	International Monetary Fund
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IPPs	Independent Power Producers
IRAP	Integrated Rural Access Planning
LDF	Local Development Fund
MDF	Malawi Defense Force
MDG	Millennium Development Goals
MGDS	Malawi Growth and Development Strategy
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
MOEST	Ministry of Education Science and Technology
MOGCSW	Ministry of Gender, Children, Disability and Social Welfare
MOH	Ministry of Health
MoLGRD	Ministry of Local Government and Rural Development
MRCs	Malawi Red Cross Society
MVAC	Malawi Vulnerability Assessment Committee
MW2063	Malawi Vision 2063
MSMEs	Micro Small and Medium Enterprises
NABOP	National Accounts and Balance of Payment
NCIC	National Construction Industry Council
NDPRC	National Disaster Preparedness and Relief Committee

NEOC	National Emergency Operations Centre
NEP	National Environment Policy
NER	Net Enrollment Rate
NFIs	Non-Food Items
NGOs	Non-Governmental Organizations
NHP	National Housing Policy
NNPSP	National Nutrition Policy and Strategic Plan
NRU	Nutrition Rehabilitation Unit
NSO	National Statistical Office
ODF	Open Defecation Free
ODSS	Operation Decision Support System
OPC	Office of President and Cabinet
PDNA	Post Disaster Needs Assessment
MPHC	Malawi Public Health Committee
PLWA	People Living with Aids
PWDs	Persons with Disabilities
PLWHIV	People Living with HIV
PWP	Public Works Program
REOC	Regional Emergency Operations Centre
SAM	Severe Acute Malnutrition
SARCOF	Southern Africa Regional Climate Outlook Forum
SEP	Social Economic Profile
SDGs	Sustainable Development Goals
SGBV	Sexual and Gender Based Violence
SME	Small and Medium Enterprise
SOP	Standard Operating Plan
SRH	Sexual Reproductive Health
SRHR	Sexual Reproductive Health and Rights
STI	Sexually Transmitted Infection
SVADD	Shire Valley Agriculture Development Division
SWAp	Sector-Wide Approach
SWG	Sector Working Group
TA or T/A	Traditional Authority
TCF	Tropical Cyclone Freddy
TWG	Technical Working Group
UBR	Unified Beneficiary Register
UN	United Nations
UNDP	United Nations Development Programme
UNOPS	United Nations Office for Projects Services
UNFPA	United Nations Population Fund
UNICEF	United Nation Children’s Fund
UNRCO	United Nations Office of the Resident Coordinator’s Office.
UN Women	United Nations Women Entity for Gender Equality and Empowerment of Women
VDC	Village Development Committee
WASH	Water, Sanitation and Hygiene





# Executive Summary

**Malawi has been experiencing increased frequency, intensity, and magnitude of extreme weather events.** Since 1980, more than 50 disasters associated with hydrometeorological events, including storms, floods, landslides, and droughts, have been reported in Malawi, affecting millions of people. Over twenty-five disasters associated with severe rainfall events (floods, landslides, and storms) have occurred in the last decade alone and have exhibited an incremental upward trend in terms of the number of people affected.

**These frequent disasters impose on the country large costs for repairs and rebuilding, diverting scarce resources from other development needs.** The 2015 floods resulted in 278 deaths, 638,000 people affected, and physical damages and economic losses of \$335 million (\$422 million when adjusted to 2023 dollars), while the 2019 floods resulted in 60 deaths, 975,000 people affected, and damages and losses of \$220 million (\$257 million in 2023 dollars) (CRED n.d.; Government of Malawi 2015, 2019). The effects of Tropical Cyclone Idai, in 2019, placed Malawi in the top five countries worldwide most affected by extreme weather events, according to the Global Climate Risk Index (Eckstein, Künzel, and Schäfer 2021). More recently, Tropical Storm Ana and Tropical Cyclone Gombe (2022) resulted in 64 fatalities and 945,934 people affected.

**Unfortunately, extreme weather events are projected to increase in frequency and severity in Malawi in future, making the country even more vulnerable to climate-related disasters.** High rates of deforestation and land and watershed degradation further contribute to increased flood and landslide risk. The *Malawi Country Climate and Development Report* shows that climate change impacts could result in very large annual gross domestic product (GDP) losses—as high as 20 percent by 2040 under ‘business as usual’— and that climate change is likely to exacerbate existing social and economic inequalities, particularly for the vulnerable (World Bank Group 2022). In 2021/22, the national poverty rate stood at 50.7 percent, with many poor people (56.6 percent) living in rural areas. In Malawi, the level of inequality is high, with the Gini coefficient standing at 0.379 in 2019/20. Thus, disruptions to livelihoods resulting from natural disasters and other causes are likely to widen the gap between the poor and the well-off.

**Tropical Cyclone Freddy hit Malawi as the country was facing one of the worst cholera outbreaks in recent history, as well as high food insecurity at the peak of the lean season.** More than 50,000 cholera cases and 1,700 cholera deaths had been reported in Malawi prior to the cyclone, and even though a decline in cases had been observed, the situation is likely to worsen as result of the impacts of Tropical Cyclone Freddy. Additionally, 3.8 million people were facing acute food insecurity—Integrated Food Security Phase Classification (IPC) Acute Food Insecurity (AFI) Phase 3: Crisis—at the peak of the hunger season and Tropical Cyclone Freddy has worsened the situation (Famine Early Warning Systems Network, 2023).

## Tropical Cyclone Freddy

**In March 2023, Malawi was severely affected by Tropical Cyclone Freddy.** Following the heavy rains, multiple flood events and landslides were reported in Balaka, Blantyre, Chikwawa, Chiradzulu, Machinga, Mangochi, Mulanje, Mwanza, Neno, Nsanje, Ntcheu, Phalombe, Thyolo, and Zomba local authorities. More than 2,267,458 people were affected, including more than 659,278 displaced, with 679 deaths, 537 missing, and 2,186 injured. It is estimated that among the total affected population, 1,308,064 are women and girls of reproductive age and about 100,297 of these are pregnant women. A great number of the fatalities following Tropical Cyclone Freddy were due to landslides in the Southern Highlands. This scenario differs from the impacts of similar recent cyclones, where flooding caused most of the fatalities.

**The record-breaking Tropical Cyclone Freddy led to extreme rainfall and flooding and catastrophic debris flows (also known as mudslides).** The highest rainfall amounts were reported in Nkhulambe, a village in Phalombe: 241 mm (March 12, 2023), 458.6 mm (March 13), and 363.2 mm (March 14). Maximum rainfall rates exceeded 39 mm per hour over the Nkhulambe area, which consecutively received 241.0 mm, 458.6 mm, and 363.2 mm of rain on March 12, 13, and 14 respectively. The cumulative four-day total of 1,078 mm was higher than the average annual amount for the station.

**Tropical Cyclone Freddy made a huge impact in Malawi's high-lying districts and a great number of the casualties was due to landslides in the Southern Highlands, which in some cases wiped away entire communities, including infrastructure.** A significant number of casualties emanated from the landslides in the Southern Highlands unlike previous cyclone where fatalities were mostly attributed to floods. The Southern Highlands of Malawi, being hilly, have a comparatively high potential of landslide occurrence. This movement of earth that comprises soil, rock, debris, and vegetation is among other things caused by rain. Prior to

cyclone Freddy, parts of the Southern Highlands including Blantyre had been receiving rains of high intensity that caused flash floods. Unlike Tropical Cyclone Idai (2019), the major impacts of which were more pronounced in the Lower Shire valley and associated low-lying areas, Tropical Cyclone Freddy made a significant impact in the high-lying districts of Blantyre, Chiradzulu, Mulanje, Phalombe, Thyolo, and Zomba. Furthermore, the fatalities caused by the impacts of recent similar cyclones were largely due to flooding.

**On March 13, 2023, the Government of Malawi, in consideration of the impact of the heavy rains, floods, and strong winds associated with Tropical Cyclone Freddy, declared a state of disaster in the Southern Region's 16 local authorities.** Immediately after the disaster, the government activated its cluster system to coordinate flood response and conducted a rapid needs assessment to determine immediate lifesaving response needs. An interagency assessment followed, the findings of which were published and informed the development of the Tropical Cyclone Freddy Emergency Response Plan, to be implemented for a period of three months. The government finalized the development of the Emergency Response Plan on April 5, 2023, estimating the cost of the immediate humanitarian response needs at \$143.6 million. The Emergency Response Plan recognizes several categories of response interventions, including food security; agriculture; nutrition; protection; water, sanitation, and hygiene; education; health; shelter and camp management; and coordination clusters.

**To enable a full understanding of the effects and impacts of the disaster, the Government of Malawi, in line with international best practice, initiated a Post-Disaster Needs Assessment (PDNA) to inform recovery and resilience-building interventions.** In collaboration with development partners, the government conducted the PDNA in all the affected 16 local authority areas during the first two weeks of April 2023, to jointly assess the effects and impacts of Tropical Cyclone Freddy and to identify the needs for recovery. The PDNA evaluated the effects of the

cyclone in terms of the total or partial destruction of physical assets and infrastructure and changes in economic flows arising from the disaster. Both primary and secondary data sources were used during the PDNA. The assessment also acknowledged some limitations, such as the lack of data on the informal and private sectors and the potential underestimation of some impacts. Equally important, during the assessment of the 16 local authorities, some parts of the country, especially the lakeshore areas, were still experiencing floods and dry spells (Karonga, Nkhata Bay, and Salima) or water backflows from rising water levels in Lake Malawi (Nkhotakota and Mangochi) and in lakes Chilwa and Chiuta (Chisi Island in Zomba District).

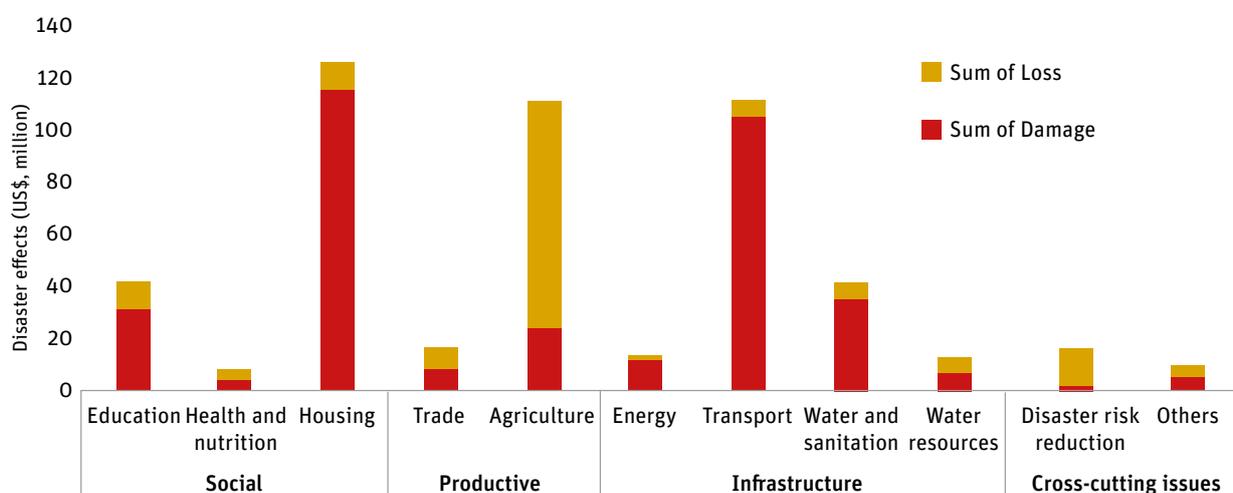
## Disaster effects

**The total effects of Tropical Cyclone Freddy across social, productive, and infrastructure sectors are estimated at \$506.7 million, with physical damages valued at \$347.2 million**

**and economic losses assessed at \$159.5 million** (table 1). The most affected sector is the infrastructure sector (\$178.0 million), with the transport subsector sustaining the highest damages and losses (\$110.8 million), followed by water and sanitation (\$41.1 million), energy (\$13.4 million), and water resources (\$12.8 million). Housing is the most affected social subsector, with damages and losses amounting to \$124.5 million. The productive sector accounts for total effects of \$127.1 million, with the effects in the agriculture subsector (crop production fisheries, livestock, and irrigation) summing \$110.4 million (See Figure 1).

**Within the social sector, the housing subsector suffered the most damage.** A total of 260,681 houses have been damaged, of which 120,394 are destroyed. Most of the houses in the affected districts have been affected by the debris flows (mudslides), by boulders carried by the flooding rivers, and by the collapse of walls as the heavy rains and flooding weakened the structure.

**FIGURE 1. Disaster Effects of Tropical Cyclone Freddy across Sectors and Subsectors in Malawi (US\$, million)**



Source: [PDNA 2023 Team]

**TABLE 1. Summary of Disaster Effects for Tropical Cyclone Freddy in Malawi (US\$, million)**

Sector	Subsector	Total effects				
		Damage	Loss	Public	Private	Total
Social	Housing	113.45	11.02	-	124.47	124.47
	Health and nutrition	4.14	3.99	7.93	0.19	8.13
	Education	30.25	11.83	42.09	-	42.08
	<b>Subtotal</b>	<b>147.84</b>	<b>26.84</b>	<b>50.02</b>	<b>124.66</b>	<b>174.68</b>
Productive	Crops	0.33	55.01	-	55.34	55.34
	Livestock	3.50	3.04	1.44	5.10	6.54
	Irrigation	20.05	25.41	42.56	2.90	45.46
	Fisheries	0.50	2.54	0.02	3.01	3.03
	Trade	8.41	8.26	-	16.68	16.68
	<b>Subtotal</b>	<b>32.79</b>	<b>94.26</b>	<b>44.03</b>	<b>83.03</b>	<b>127.05</b>
Infrastructure	Transport	104.39	6.44	108.80	2.02	110.83
	Energy	11.43	1.93	3.01	10.35	13.37
	Water and sanitation	34.85	6.24	41.08	-	41.08
	Water resources	7.79	4.97	12.76	-	12.76
	<b>Subtotal</b>	<b>158.46</b>	<b>19.58</b>	<b>165.67</b>	<b>12.37</b>	<b>178.04</b>
Cross-cutting	Disaster risk reduction	2.59	14.25	14.94	1.90	16.84
	Other cross-cutting issues	5.56	4.54	10.09	0.01	10.10
	<b>Subtotal</b>	<b>8.15</b>	<b>18.79</b>	<b>23.21</b>	<b>1.91</b>	<b>26.94</b>
<b>Gross total</b>		<b>347.24</b>	<b>159.47</b>	<b>282.92</b>	<b>221.96</b>	<b>506.71</b>

Source: [PDNA 2023 Team]

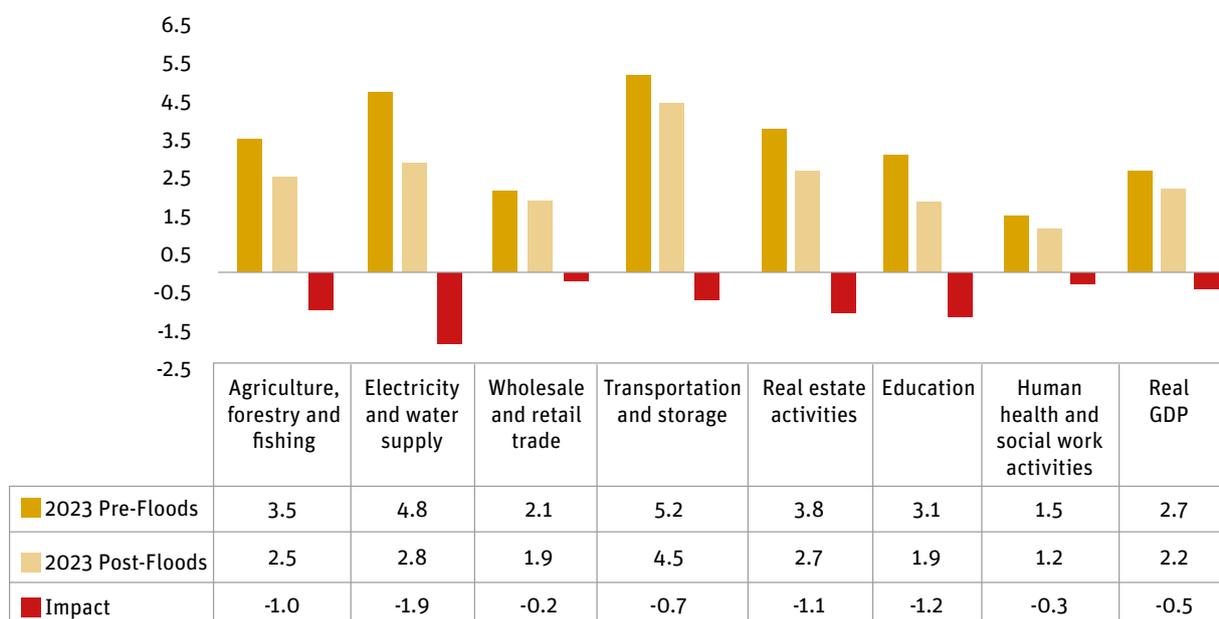
**The most affected council areas—as measured by the proportion of the total effects of the disaster for which they account—are Phalombe, Mulanje, Nsanje, Chikwawa, and Mangochi districts and Blantyre City.** Phalombe is the most devastated council area, with damages and losses of US\$ 96.39 million, followed by Mulanje (US\$ 67.63 million), Blantyre City (US\$ 47.94 million), Mangochi (US\$ 47.11 million), Nsanje (US\$ 45.52 million), and Chikwawa (US\$ 39.30 million), (Figure 2).

## Impacts of the disaster

### Macroeconomic impact

**Tropical Cyclone Freddy is estimated to have caused to Malawi's economy widespread production losses equivalent to \$36.4 million.** This translates as a real GDP loss of 0.5 percent, consequently slowing projected growth in 2023 to 2.2 percent (figure 2). About 47.0 percent of these production losses were in the agriculture, forestry, and fishing sector. Production losses in

**FIGURE 2. Gross domestic product (GDP) Loss (%), by Sector**



Source: [PDNA 2023 Team]

the electricity and water supply sector account for 11.1 percent of the total GDP loss, while the wholesale and retail sector experienced revenue losses equivalent to 5.9 percent of the total GDP loss. The floods also led to damage in the transport network resulting in revenue losses to the transportation and storage sector that account for 6.8 percent of the total GDP loss. Production losses emanating from the education sector account for 10.4 percent of the total GDP loss. The projected decline in growth is also being contributed by production losses from housing, wholesale and retail trade, transport and storage, electricity and water, education, and human health.

**Loss of crops and the expected subsequent reduction in agricultural output will worsen food insecurity in Malawi beyond the 20 percent expected to experience food insecurity prior to the disaster (IPCC 2022).** In alignment with the *Malawi Country Climate and Development Report* (World Bank Group 2022), this finding demonstrates that agriculture is a sector that is highly susceptible to climate shocks in Malawi. The crops subsector was the most affected, accounting for 44.8 percent of total GDP losses.

This comprised losses from staples, specifically maize, rice and tuber crops, as well as other food crops for smallholder farmers, tea, and sugar plantations for the estates. A total of 54,949 hectares, equivalent to 26.8 percent of total hectares planted during the 2023/24 agriculture season, has been affected by the floods. The livestock sub sector accounted for 2.8 percent of the total GDP losses, affecting 285,569 livestock owned by 104,565 households. In fishing and aquaculture, a total of 1483 fish farmers were affected, accounting for 2.4 percent of total GDP losses. The additional upward pressure on domestic food prices will consequently push additional people into poverty, especially those that rely on the food purchases to supplement their consumption.

**Additional spending needs to cover expenses related to disaster response may further weaken the country’s fiscal position.** Reduced economic activity will weigh down on revenue mobilization, and consequently reduce the domestic resource envelope. The increased donor inflows anticipated to support disaster response may boost disbursement of grants and partially contain the pressure. Additional spending needs

may contribute to expenditure overruns. Given the reduced fiscal space, the government may struggle to meet planned expenditure, which may contribute to further deterioration of the fiscal position. Financing the gap may exert additional pressure on public debt and push it beyond 60 percent of GDP.

### Human and social development impact

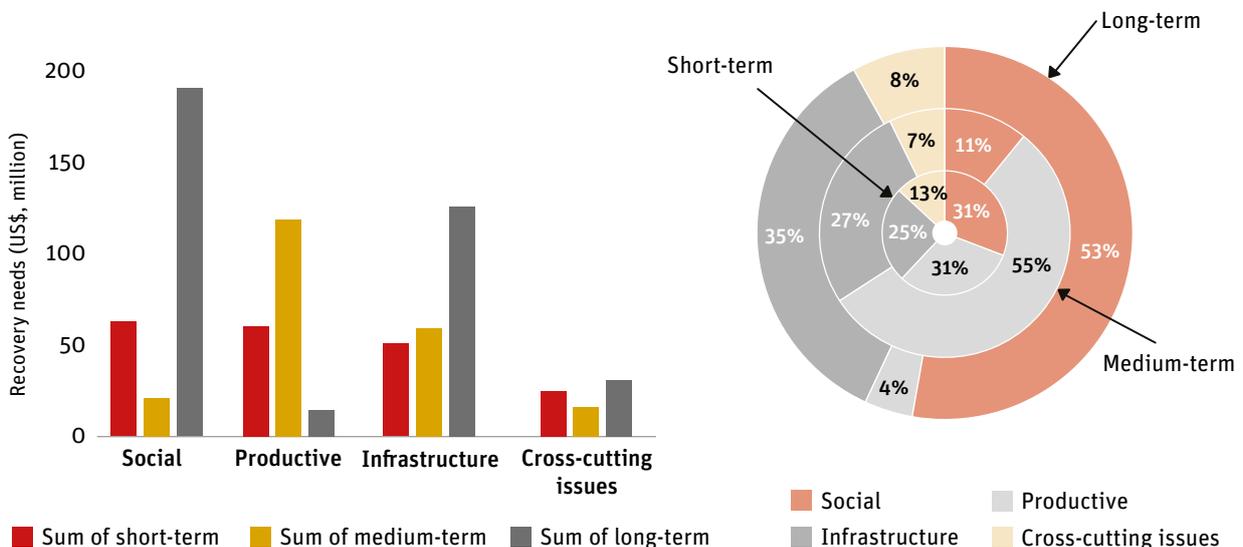
**Tropical Cyclone Freddy has singularly had significant human and social development effects on Malawi’s population through job losses, displacement of residents from their homes, disruption of access to education and health services, and diminishment of livelihoods.** This is of particular concern for the Southern Region, which has historically registered poverty incidence rates above the national average. Moreover, the damage to crops, livestock, and infrastructure has led to most farming households—which rely on their production for their own needs—experiencing food shortages as well as loss of livelihoods, with most farming households failing to access food from the market as an alternative. Furthermore, the cyclone will also have a bearing on the net enrollment rate considering that at least 633 education institutions (550 primary schools, 74

secondary schools, 3 colleges, and 6 universities) experienced some level of damage and loss. Seventy-two classrooms, 87 teacher houses, and 986 toilets were fully destroyed, along with key school infrastructure.

### Needs for recovery and reconstruction

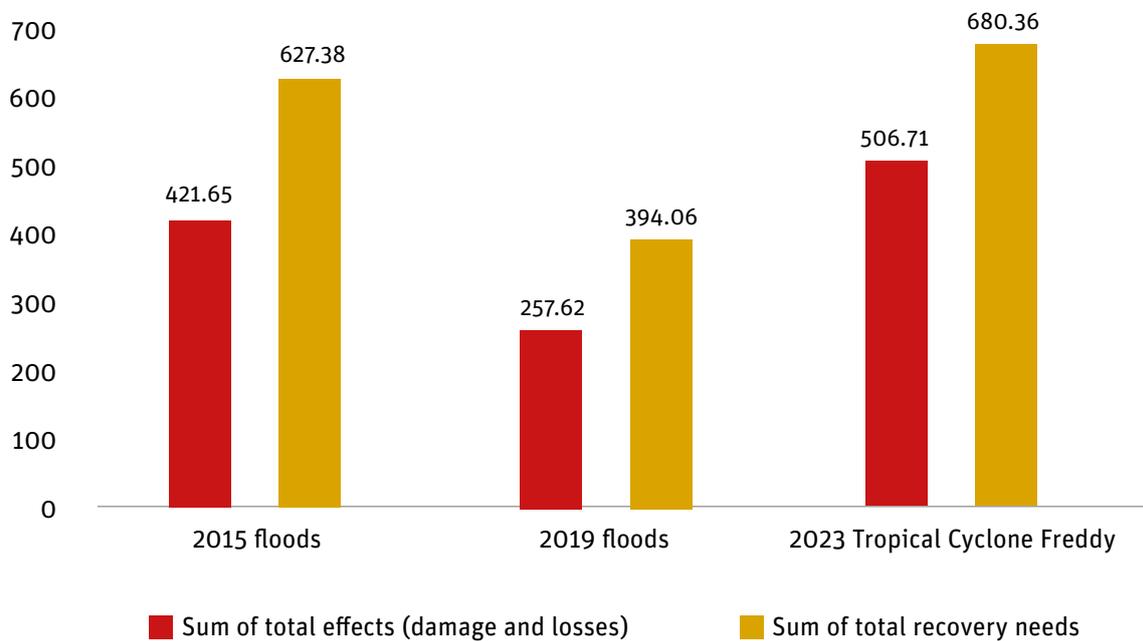
The PDNA considered needs for recovery and reconstruction of the sectors affected by Tropical Cyclone Freddy across all 16 affected local authorities (figure 3). Total recovery needs for the physical damages and economic losses are estimated at \$680.4 million, and recovery interventions will be implemented over a period of one to five years, where under one year is considered short term, one to two years is medium term, and three to five years is long term. Specifically, the social sector requires about \$274.8 million, while \$233.5 million is needed by the infrastructure sector to recover. The needs for the productive sector and cross-cutting issues amount to about \$100.6 million and \$71.5 million respectively. The needs for recovery and reconstruction account for implementing the principles of ‘building back better’, which are subsequently presented for each sector.

**FIGURE 3. Short-, Medium-, and Long-Term Recovery Needs across Sectors**



Source: [PDNA 2023 Team]

**FIGURE 4. Disaster Effects and Recovery Needs of the 2015, 2019, and 2023 Events (US\$, 2023 million)<sup>1</sup>**



Source: [PDNA 2023 Team]

## Cumulative impacts

**The frequent disasters experienced by Malawi represent a constant erosion of the country’s resources and hinder development efforts.** The need for emergency response and rehabilitation efforts in the aftermath of a disaster can divert resources from long-term recovery and development efforts. Additionally, frequent disasters lead to the depletion of resources, both natural and financial, and can hinder progress toward development goals. Tropical Cyclone Chedza in 2015, Tropical Cyclone Idai in 2019, Tropical Storm Ana and Tropical Cyclone Gombe in 2022, and Tropical Cyclone Freddy in 2023 have led to significant loss of life, loss of livelihoods, and damage to infrastructure, with the frequency of these disasters exceeding the country’s capacity to conduct recovery efforts. Figure 4 shows the disaster effects and recovery needs of the 2015, 2019, and 2023 events, for each of which a PDNA was conducted.

## Recommendations

- **Strengthen the organizational, technical, institutional, and financing arrangements for disaster risk management (DRM) in the country.** There is a need for the Government of Malawi to operationalize the implementation of existing institutional arrangements and to further clarify the roles and responsibilities of the various ministries, departments, or agencies involved in DRM at all levels. Disaster risk financing agendas need to be advanced to offset risk within the built environment and safeguard critical infrastructure, as well as to support preparedness and contingency planning efforts.
- **Enhance disaster risk knowledge to allow for effective disaster preparedness and disaster risk reduction activities, across sectors.** The impacts of Tropical Cyclone Freddy have raised concerns about the limited attention given to landslide hazard

<sup>1</sup> 2015 and 2019 damage effect values, as reflected, are adjusted to 2023 dollars to facilitate the comparison

in Malawi and the adoption and utilization of flood hazard information across sectoral decision-making. Improved disaster risk knowledge is essential to identify and execute appropriate risk mitigation measures and to ensure effective disaster preparedness and response. Updating of flood models is key, to ensure infrastructure being repaired/replaced and new infrastructure is designed appropriately and adequately to cater for future flood events.

- **Risk information should also guide land use and development planning processes as well informing design standards and approaches to infrastructure resilience across sectors.**

This information is also critical in decision support around resettlement planning and incentives for relocation outside of risky areas. In complement, stronger and more effective enforcement of regulations and development controls is necessary to protect sensitive areas e.g., steep hills, watersheds, mountains, natural forests, protected areas. This includes capacity development, stricter punitive and enforcement measures, greater fiduciary management, and re-investment of resources into supporting protection of these areas

- **Develop and strengthen the early warning systems for multiple hazards to inform effective decision-making and early actions.**

Early warning systems in Malawi need to consider the country’s multi-hazard context and ensure service delivery to those at risk. Discussions on a mandate for landslide alerts, as part of efforts to enhance Malawi’s early warning systems, have been inconclusive as specific responsibilities have not yet been assigned to agencies. This is a gap that needs to be addressed urgently to enhance preparedness for similar hazards. Furthermore, strengthening coordination among stakeholders in early warning systems to inform effective decision-making and early actions is fundamental to facilitate resilience building in the country. Government and other stakeholders, including communities,

should develop a smooth information flow that will enhance national capacity to manage and monitor flood control systems, as well as forecast and communicate alerts about extreme weather events.

- **Establish building regulations for resilience and construct new infrastructure that can withstand climate shocks and stressors.**

Malawi needs to review, adopt, and implement infrastructure design standards, processes, and parameters for roads, bridges, irrigation, water control systems, housing, and other structures to ensure climate-resilient construction and to streamline climate-sensitive public investment management. There is a need to disseminate and enforce the safer construction guidelines for housing and schools at all levels while paying attention to the most vulnerable groups. This priority has also been identified in the *Malawi Country Climate and Development Report*, as “Studies have shown that building infrastructure to be climate-resilient does not add significantly to the upfront costs and brings substantial savings in maintenance and repair and reduced disruptions to the economy, over the lifetime of the infrastructure” (World Bank Group 2022, 14).

- **Integrate respect for the environment in resilience building.**

All recovery and reconstruction activities must aim to minimize harm to the natural environment; to avoid rebound effects; to provide green and blue infrastructure that works with grey infrastructure; to support decision-making using ecosystem information; and to reduce threats posed by the natural environment, such as trees falling on power lines. Land degradation is exacerbating disaster risk in Malawi, contributing to increased landslide and flood hazard. According to the *Malawi Country Climate and Development Report*, continued land degradation would significantly increase the damage to infrastructure from inland flooding—by as much as 25 percent by 2050 (World Bank Group 2022). Integrated catchment management activities are critical

to prioritize runoff management and sediment trapping within the landscape, especially along roads, foot paths, around houses, schools, and trading centers, and infield.

- **Strengthening Stakeholder Coordination and Collaboration.** Facilitate engagement, involvement, and participation across all levels of society. Raise awareness to enable everyone to understand disaster impacts across the various sectors of the economy and how individual contributions can ensure the achievement of resilience building. Build the capacity of different actors to understand their roles in resilient recovery. Engage with people and communities so that they have a better understanding of how they can help prevent and respond to disasters. This will facilitate shared prosperity and responsibility, thereby facilitating transparency and accountability in recovery processes.
- **Ensure resilient lifeline infrastructure and critical service provision.** Certain transport, water and sanitation, and electricity infrastructure systems are critical for life safety and emergency response operations and essential for economic activity, and continuity of service delivery must be ensured during and after disasters. Tropical Cyclone Freddy demonstrated the high vulnerability of critical infrastructure systems, leaving

many communities isolated and without access to emergency and health services and humanitarian assistance. Critical lifelines need to be identified and resilience measures implemented.

- **Be dynamic and continuously adapt.** The manifestation of disaster has increasingly become unpredictable therefore recovery systems and processes should actively adapt and transform to suit the ever-changing operating environment. This principle enhances disaster preparedness; contributes to reduce system and process failures; facilitates response to the unexpected; and facilitates quicker recovery.
- **Integrate recovery and development planning.** The PDNA is a crucial first step in understanding the extent of the disaster effects and impacts and identifying critical recovery needs. The recovery strategy should establish clear objectives and appropriate interventions that meet the prioritized recovery needs and integrate with development goals. A disaster recovery framework can guide and enable the strategy's effective implementation by establishing appropriate policy principles, governance arrangements, financing mechanisms, and implementation processes.





# 1. National Pre-Disaster Context

## 1.1 Country Overview

**Malawi is a landlocked country in southeast Africa, bordered by Mozambique to the east, south, and southwest, Tanzania to the north and northeast, and Zambia to the west.** The country expands over 900 kilometers (km) from north to south, with a surface area of 118,484 km<sup>2</sup>, a quarter of which is made up of lakes, including the 580 m long Lake Malawi, the third-largest lake in Africa (Terrier, Garcin, and Thiery 2022).

**Malawi is one of the least developed and poorest countries in the world, with a gross domestic product (GDP) per capita of \$634.8 in 2021.<sup>2</sup>** The already dense population of 19.89 million in 2023 is expected to reach 33.6 million in 2050 (population growth rate of 2.7 percent) posing challenges for poverty reduction and environmental sustainability. The rapid population growth, combined with high unemployment rates, is already putting pressure on environmental resources, including land for both settlement and agriculture in rural areas, resulting in rapid deforestation.

**Most of the population (over 80 percent) still resides in rural areas.** Urbanization has been relatively slow in Malawi (World Bank Group 2018), and two-thirds of the urban population are concentrated in the two major cities, the capital Lilongwe and Blantyre. More than 70 percent of this urbanization involves informal settlements and unplanned traditional housing in marginal areas that are susceptible to weather and geological hazards (World Bank Group 2022). Of the rural population, 51 percent reside in permanent houses, 23 percent in semipermanent houses, and the remaining 26 percent in traditional houses. Given high poverty rates, construction of most of these structures, especially semi-permanent and traditional housing, does not comply with guidelines, rendering the houses vulnerable to natural disasters.

**The country's high dependence on rain-fed agriculture contributes to volatile agricultural performance and rural poverty.** Malawi's economy is highly dependent on the country's natural resources and is dominated by the agriculture sector, which drives livelihoods for two-thirds of the population and accounts for one-third of the national GDP (World Bank Group). Agricultural production in Malawi is predominantly rain-fed, hence the sector is particularly vulnerable to unreliable rainfall and weather shocks such as floods and droughts (World Bank Group).

<sup>2</sup> For more information about Malawi's GDP per capita, see the World Bank Data website at <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=MW>.

**Exogenous shocks resulting from the combined effects of adverse weather events and acute foreign exchange shortages, high inflation, disruptions to electricity services, and persistent macro-fiscal imbalances have led to an economic slowdown in Malawi** (World Bank 2023a, 2023b). GDP growth slowed to 1.2 percent in 2022, from 4.6 percent in 2021, increasing to 2.2 percent in 2023, still below the levels seen prior to the COVID-19 pandemic (5.2 percent in 2017, 4.0 percent in 2018, and 5.7 percent in 2019).<sup>3</sup>

**The Malawian kwacha devaluated against the US dollar by 25 percent in May 2022.**<sup>4</sup> Official reserves continue to be very low, and an acute lack of foreign currency is impeding business and is increasingly reflected in the shortage of imported goods, including essential medicines and petroleum products. Headline inflation (year on year) reached 24.6 percent in July 2022, and food inflation was at 32.5 percent, largely due to an increase in maize prices, while nonfood inflation increased to 17.5 percent, with particularly large increases in the costs of transport and utilities. These inflation rates lead to a significant impact on the cost of living, particularly for low-income households, which spend a higher proportion of their income on food.

**According to the 2022 Fragile States Index, Malawi is at a state of high warning for becoming fragile.** The Fragile States Index comprises 12 fragility risk indicators to assess the various pressures facing countries that affect their level of fragility.<sup>5</sup> Malawi ranks in the top 10 countries on the Demographic Pressures Indicator (9.5 points on a scale of 0 to 10, with higher values indicating higher demographic pressures in the country). High values are also shown for the Public Services Indicator (8.5 index points on a scale of 0 to 10, with higher values indicating worse public services).<sup>6</sup>

**Limited access to and reliability of energy, water, and other infrastructure services have a high cost in terms of economic growth, health, and poverty reduction** (Hettinger et al. 2020). Insufficient investments in infrastructure and overreliance on public finance have resulted in limited energy and water service delivery. The already large supply and demand gaps are exacerbated by rapid population growth and inefficient energy and water systems.

**Poverty in Malawi is high and persistent, with significant disparities observed throughout the nation** (Caruso and Cardona Sosa 2022). Despite registering a modest improvement, dropping from 51.5 percent in 2016/17 to 50.7 percent in 2019/20, poverty remains stubbornly high. Income inequality also remains very high, with the Gini coefficient standing at 0.379 in 2019/20. The incidence of poverty is significantly higher in the rural parts of the country's central and southern regions which are also more densely inhabited (figure 1.1). As a result, a vast 86 percent of all indigent households in Malawi are concentrated in the central and southern areas of the country. Frequent climate shocks with large effects on the agriculture sector, housing, and living conditions have contributed to the persistence of poverty (Caruso and Cardona Sosa 2022).

**Malawi is making significant economic and structural reforms toward development.** In 2021, Malawi launched a new long-term development vision, Malawi 2063 (MW2063), as a successor to Malawi Vision 2020. The long-term MW2063 strategy highlights three pillars to guide the development agenda, namely: (1) Agricultural Productivity and Commercialization; (2) Industrialization; and (3) Urbanization. Learning from the successes, failures, and inadequacies of the strategies deployed to pursue the realization of the Malawi Vision 2020 ambitions, MW2063 seeks to drive Malawi's new development trajectory with the aim of creating an inclusively

<sup>3</sup> For more information about GDP growth in Malawi, see the Reserve Bank of Malawi Data website

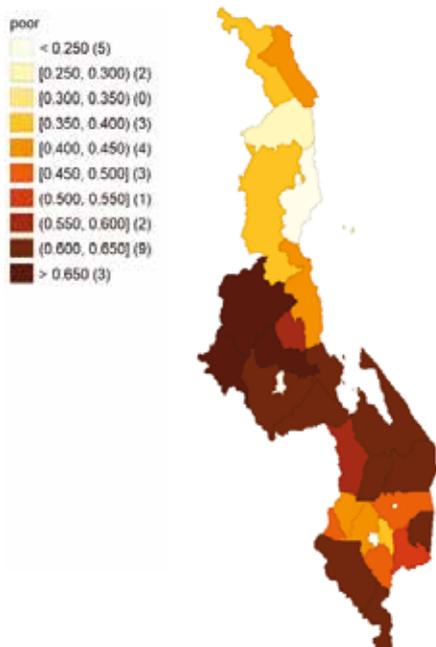
<sup>4</sup> For an economic overview of Malawi, see the World Bank website at <https://www.worldbank.org/en/country/malawi/overview>.

<sup>5</sup> For more detail about the index, see the Fragile States Index website at <https://fragilestatesindex.org>.

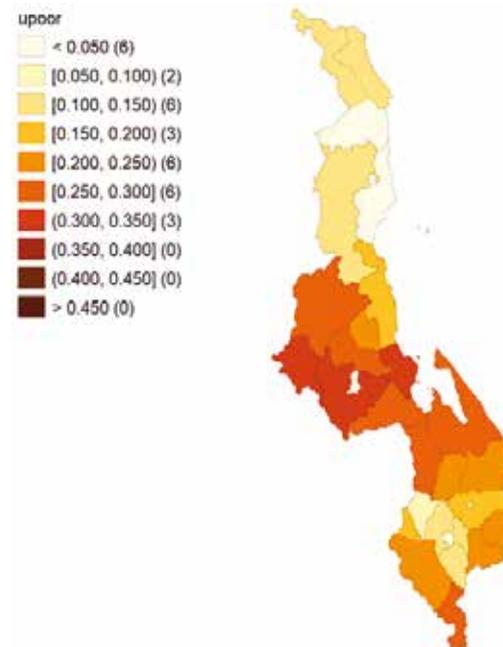
<sup>6</sup> For Fragile States Index data on Malawi, see the Country Dashboard page on the Fragile States Index website at <https://fragilestatesindex.org/country-data>.

**FIGURE 1.1. Poverty Rate per District, 2019**

**a. Poverty rate**



**b. Extreme poverty rate**



Source: Caruso and Cardona Sosa (2022).

wealthy and self-reliant industrialized upper-middle-income country by 2063.

**As a time-bound operationalization strategy, the Malawi 2063 First 10-Year Implementation Plan aims to achieve two key milestones by 2030: (1) to transition Malawi into a lower-middle-income economy; and (2) to meet most of the Sustainable Development Goals by their 2030 deadline.** In the *Malawi 2063 First 10-Year Implementation Plan*, the achievement of the former is pegged to achieving a gross national income per capita of \$1,064. This is coupled with other, complementary high-level targets required for inclusive wealth creation and self-reliance: a GDP growth rate of 6 percent, a Gini coefficient of 0.39, a poverty headcount ratio of 26 percent, an unemployment rate of 17.2 percent, and domestic revenue as a percentage of national expenditure at 82 percent.

**Climate shocks are exacerbating the country’s macroeconomic instability and making it harder for Malawi to break the cycle of vulnerability.** The number of weather-related disasters in Malawi has been increasing (USAID

2019), and major floods and droughts in Malawi have a significant impact on national economic performance, with severe implications for the most vulnerable in society, such as resource-poor, small-scale farmers, and poorer urban households (World Bank Group 2018). It has been observed that the likelihood of a household plunging into poverty surges by 14 percentage points following a climate shock. The income generated by households from agricultural activities tends to decline by up to 17 percentage points after a flood and by up to 14 percentage points in the aftermath of a drought (Caruso and Cardona Sosa 2022).

**MW2063 explicitly recognizes the need for adaptation measures to cushion the economy from the effects of shocks.** The long-term development vision acknowledges that implementation of the country’s development aspirations is susceptible to various challenges and risks. The occurrence of Tropical Cyclone Freddy has been hard felt in Malawi considering that the country is yet to fully recover from the historic 2015 and 2019 floods, and the lingering effects of the COVID-19 pandemic, the war in Ukraine, and

a cholera outbreak, which have caused serious disruptions to the stability of Malawi’s economy. Damage to the Kapichira hydroelectric plant by Tropical Storm Ana in 2022 exacerbated electricity supply challenges in the country. Compounded with macro-fiscal imbalances and persistent shortages of foreign exchange for import of raw materials, this disruption to the energy sector further weakened growth in other productive sectors.

## 1.2 Disaster Risk Profile

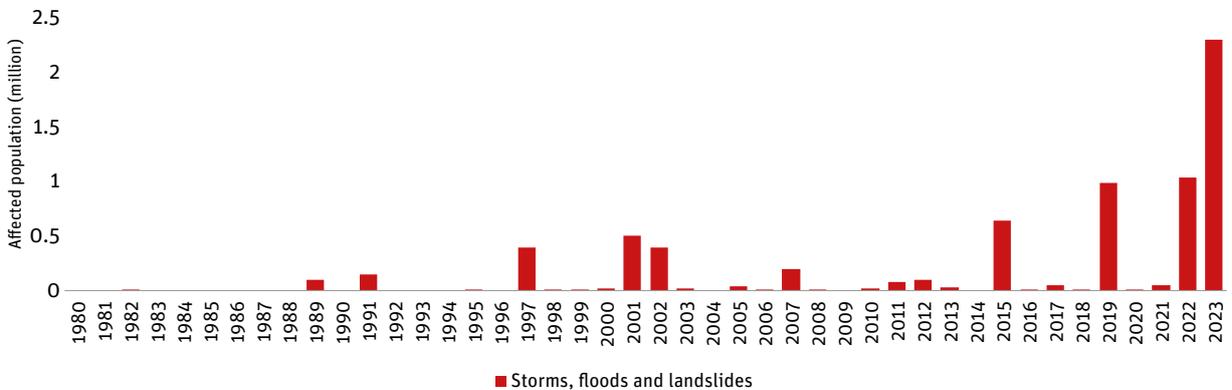
**Floods and droughts pose the most significant and recurring risk to Malawi, with the highest impacts occurring in the Central and Southern regions.** On average, 100,000 people in the country are affected by floods and 1.5 million people by droughts every year (World Bank Group 2019). The combined effects of droughts and floods reduce Malawi’s total GDP by about 1.7 percent per year on average (GFDRR 2009).

**Since 1980, more than 50 disasters associated with hydrometeorological events, including storms, floods, landslides, and droughts, have**

**been reported in Malawi, affecting millions of people** (figure 1.2). Seventeen disasters associated with severe rainfall events (floods, landslides, and storms) have occurred in the last decade alone and have exhibited an incremental upward tendency in terms of the number of people affected.

**These frequent disasters impose on the country large costs for repairs and rebuilding, diverting scarce resources from other development needs.** The 2015 floods resulted in 278 deaths, 638,000 people affected, and physical damages and economic losses of \$335 million (\$422 million when adjusted to 2023 dollars), while the 2019 floods resulted in 60 deaths, 975,000 people affected, and damages and losses of \$220 million (\$257 million in 2023 dollars) (CRED n.d.; Government of Malawi 2015, 2019). The effects of Tropical Cyclone Idai, in 2019, placed Malawi in the top five countries worldwide most affected by extreme weather events, according to the Global Climate Risk Index (Eckstein, Künzel, and Schäfer 2021). More recently, Tropical Storm Ana (2022) resulted in 64 fatalities and 945,934 people affected. Damages, excluding infrastructure, were estimated at \$126 million to \$192 million, equivalent to 1.5 to 2.7 percent of Malawi’s national GDP in 2020. Infrastructure damages were estimated at \$57 million to \$136 million.<sup>7</sup>

**FIGURE 1.2. Disaster Events Associated with Severe Rainfall Events (Storms, Floods, and Landslides) in Malawi**



Source: Original figure for this publication with data for disaster events 1980–2023 (CRED n.d.) and preliminary information on Tropical Cyclone Freddy from WFP (2023b).

<sup>7</sup> Data are from an unpublished January 2022 Global Rapid Damage Estimation (GRADE) report by the World Bank and the Global Facility for Disaster Reduction and Recovery.

**Flood hazard in the Lower Shire Basin has been well documented.** Historical data and field observations, however, demonstrate the highly variable types of flooding in Malawi, ranging from flash floods and vigorous floods in the steep creeks of mountainous areas (for example, the Blantyre, Mulanje, and Zomba mountains) to extensive and long-duration floods in the lower basins of large rivers (for example, the Lower Shire Valley). Depending on the flood type, various parameters can be used to assess the flood hazard, such as flow velocity, water level, flood duration, and solid discharge (Terrier, Garcin, and Thiery 2022).

**In Malawi, some rivers are highly mobile over a short duration, owing to meander migration or meander cutoffs.** Local river channel networks can experience rapid changes in the trajectory of the main flow channel, which can lead to significant infrastructure damage. These changes can occur over a few years or during a single flood (Terrier, Garcin, and Thiery 2022).

**The high drainage density areas in Malawi, which lie alongside the mountainous areas, where streams are very frequent and dense, are particularly prone to high-energy flash floods and debris flows (mudslides), triggered primarily by periods of intense rainfall** (Terrier, Garcin, and Thiery 2022). High annual rainfall and weathering rates, low shear resistance, and slope material with a high clay content are preconditions for mass movements (Terrier, Garcin, and Thiery 2022). Hazard is exacerbated by human-induced contributory factors such as deforestation and land degradation, poor land use planning, and construction (mostly informal settlements) on steep slopes that often exceed a 45-degree angle.

**Several debris flows (mudslides) have been recorded in Malawi, causing significant loss**

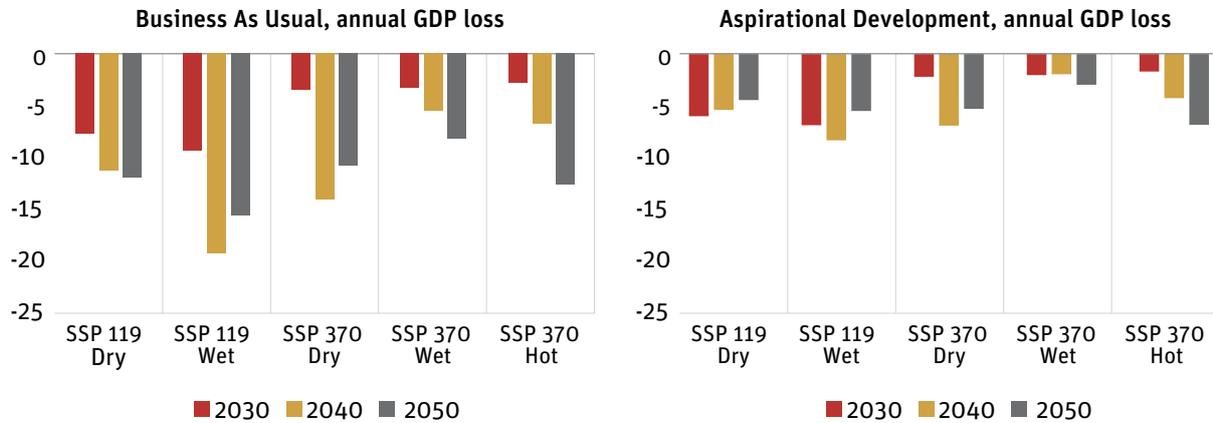
**of life, livelihoods, and property.** Significant historical events include the 1946 Zomba Mountain flow, which led to 21 deaths, and the 1991 Phalombe debris flow, which caused 500 deaths and extensive damage to housing, infrastructure, and crops (Terrier, Garcin, and Thiery 2022). After the Phalombe disaster, the housing stock was rebuilt in the same location.

## Climate change

**Malawi is highly vulnerable to climate change, ranking 163rd out of 182 countries in 2020 on the Notre Dame Global Adaptation Initiative Country Index.** Extreme weather events are projected to increase in frequency and severity in Malawi in future, making the country even more vulnerable to climate-related disasters. Climate change is likely to exacerbate existing social and economic inequalities in Malawi, particularly for vulnerable groups such as women, children, and the poor. The poorest households are disproportionately affected by climate change, and climate shocks will further reduce their incomes and may also push other affected people into poverty (World Bank Group 2022).

**The Malawi Country Climate and Development Report shows that climate change impacts could result in very large annual GDP losses of up to 20 percent by 2040 under ‘business as usual’.** According to the report, “results for the ASP [aspirational development] scenario show how much damages would be reduced by the policies and investments envisioned in Malawi 2063, as the economy shifts away from the vulnerable agriculture sector, and infrastructure is built to higher standards” (World Bank Group 2022, 48).

**FIGURE 1.3. Annual Gross Domestic Product (GDP) Loss from Climate Change Damage with No Adaptation (% deviation from the baseline)**



Source: World Bank Group (2022).  
 Note: SSP: Shared Socioeconomic Pathway

### Deforestation and land degradation

**Malawi’s natural capital, the main asset underlying its economic activity, is eroding due to widespread deforestation and land degradation.** Malawi possesses diverse and valuable forests, but the country is losing them at an alarming rate. In 1975, about 47 percent of the national territory was forested, but over half of the country’s natural forests were lost between 1972 and 1992, at a rate of 2.5 percent per year. Deforestation is currently estimated at 0.63 percent annually. Unsustainable forest loss threatens ecosystem services and carries economic costs.

**The loss or degradation of forests in Malawi has also resulted in increased soil erosion and loss.** A soil loss assessment conducted in 2014 found an average annual soil loss rate of 29 tons per hectare, with variation in the rate of loss based on factors such as soil type, topography, and land use. Topsoil loss negatively affects crop productivity, and a 10 percent increase in topsoil loss could reduce Malawi’s GDP by 1 percent owing to the resulting reduction in maize yields.

**Natural resource degradation increases susceptibility and exposure to climate shocks and further strains the adaptive capacity of resource-dependent communities.** Deforestation

and watershed degradation result in higher disaster risk and challenge sustainable natural resource management. Deforestation and land degradation have reduced the availability and quality of land and water resources in Malawi. Additionally, the country’s reliance on low-productivity smallholder agriculture has led to food insecurity and migration of farmers to steep slopes or forest reserves to find new farmland. Soil erosion and nutrient depletion are severe forms of land degradation that affect more than 60 percent of the entire land area of Malawi.

**Recurrent floods worsen this issue by increasing sediment levels.** Watershed degradation has also affected water resources by increasing the quantity of sediments transported from the land to rivers, streams, and reservoirs, resulting in polluted water resources and blocked waterways. High loads of sediment are deposited in riverbeds, reservoirs, and floodplain wetlands. Hydroelectric facilities, the main source of electricity in Malawi, are often disrupted by sediment inflows, leading to insufficient power supply due to diminished electricity generation capacity. These impacts are exacerbated by climate change, which increases the strain on land and forests because of the increased incidence of natural disasters and extreme weather events.



## Food insecurity

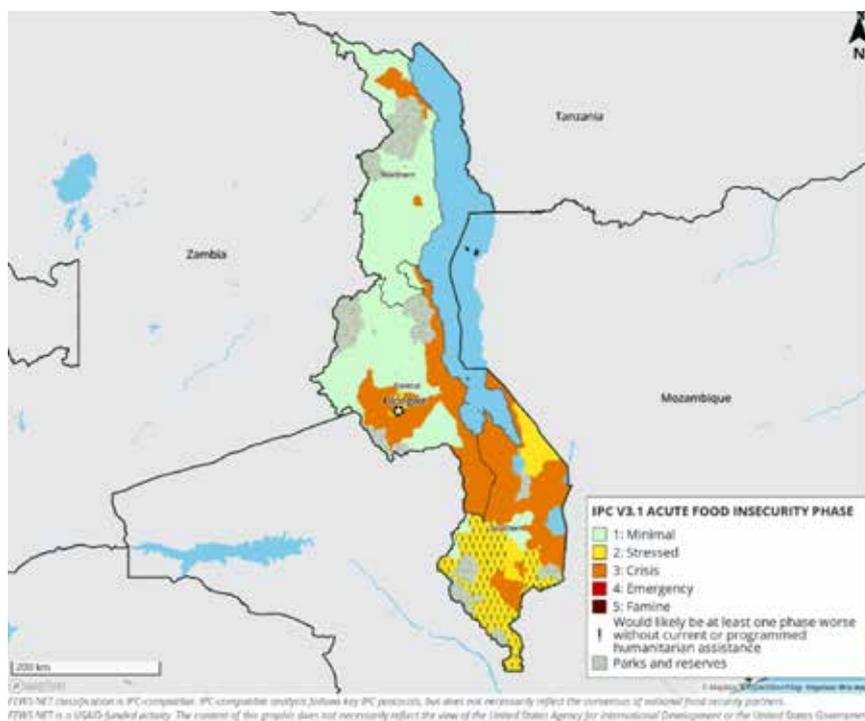
**Malawi has one of the highest prevalence rates of food insecurity in Africa and the world, with the prevalence of moderate or severe food insecurity in the population standing at 81.3 percent in 2020.** The world average in 2019 was 27.6 percent.<sup>8</sup>

**Food insecurity at the Integrated Food Security Phase Classification (IPC) Acute Food Insecurity (AFI) Phase 2: Stressed and Phase 3: Crisis levels has been experienced in most of the southern districts of Malawi.** Crop production deficits in southern and central Malawi in 2022, coupled with high prices for food and basic nonfood commodities due to global and domestic economic factors, remain key drivers of acute food insecurity.<sup>9</sup> According to the World Food Programme, 3.8 million people were facing acute food insecurity (IPC Phase 3: Crisis) at the peak

of the hunger season. Tropical Cyclone Freddy has worsened the situation. In the southern Nsanje District, cut off by floods, maize prices are up 400 percent year on year (WFP 2023a).

**An estimated 20 percent of the population (across 16 local authorities) face acute food insecurity during the 2022/23 lean period.** Low agricultural output has worsened the availability of food, specifically for the farming households that rely on their own food production to meet their household needs. Rising domestic prices, which have remained high throughout 2022, largely driven by the impact of high commodity prices and the 25 percent devaluation of the Malawian kwacha in May 2022, are exerting additional pressure on the food situation. This is pushing additional people into poverty, especially the portion of the population that relies on food purchases to supplement consumption.

**FIGURE 1.5. Projected Food Insecurity in Malawi (February–May 2023)**



Source: FEWS NET (2023).

<sup>8</sup> For more information on the prevalence of food insecurity in the population in Malawi, and indeed worldwide, see the World Bank Data website at <https://data.worldbank.org/indicator/SN.ITK.MSFI.ZS?locations=MW-1W>.

<sup>9</sup> For more details about acute food insecurity in Malawi, see the FEWS NET (Famine Early Warning Systems Network) website at <https://fews.net/southern-africa/malawi>.

### 1.3 Disaster Risk Management Legal and Policy Framework

**Malawi's disaster risk management (DRM) policy landscape has been shaped by international frameworks including the Sendai Framework for Disaster Risk Reduction 2015–2030 and the African Strategies for Disaster Risk Reduction 2004.** These frameworks have informed the formulation of Malawi 2063 (MW2063), which expresses the vision and aspirations of Malawi's citizens toward attaining a youth-centric, inclusive, wealth-creating, and self-reliant nation by 2063. DRM is included in MW2063 as a cross-cutting theme, aiming to reduce vulnerability and enhance the resilience of Malawi's population to disasters and socioeconomic shocks. MW2063 is anchored on three pillars, namely: (1) Agricultural Productivity and Commercialization; (2) Industrialization; and (3) Urbanization. The National Resilience Strategy has also informed the implementation of DRM activities in the country. Building on lessons learned from the implementation of Malawi Vision 2020 and other past experiences, MW2063 adopts environmental sustainability as one of seven enablers for the attainment of the country's vision and aspirations. Malawi continues to suffer from climate- and disaster-related shocks, however, despite being a net emitter of greenhouse gases.

**Additionally, the National Disaster Risk Management Policy (2015), which is currently under review, provides strategic guidance for the effective mainstreaming, implementation, and coordination of DRM programming at all levels of sustainable development policy and planning.** The policy provides a set of key priority areas and strategies to increase Malawi's resilience to disasters. It also provides guidelines to all government entities, nongovernmental organizations, private sector organizations, media, and development partners at the national and local authority levels for the effective implementation of DRM programs and activities. In addition, Malawi has formulated a progressive National Gender Policy and legal framework that includes the Gender Equality Statute. The National Gender Policy provides guidance to integrate and

mainstream gender issues into all development plans, including DRM.

**The National Resilience Strategy aims to facilitate a paradigm shift, placing greater emphasis on a multisectoral perspective to build resilience to break the cycle of food insecurity and to facilitate the provision of other humanitarian support in the event of disasters.** The National Resilience Strategy was formulated based on an understanding that building resilience requires the comprehensive involvement of multiple sectors. It was also formulated on an understanding that resilience must be increased at the household level as well as through the systems and structures that govern and affect people's lives and livelihoods. The National Resilience Strategy is centered around four pillars: (1) Resilient Agricultural Growth; (2) Risk Reduction, Flood Control, and Early Warning and Response Systems; (3) Human Capacity, Livelihoods, and Social Protection; and (4) Catchment Protection and Management.

**The new Disaster Risk Management Act was approved by Parliament on April 12, 2023. The National Disaster Preparedness and Relief Act of 1991, which established the Department of Disaster Management Affairs, still provides the main legal framework for DRM, however, until the new Act is operationalized.** The Disaster Preparedness and Relief Act (1991) was promulgated to guide the coordination and implementation of disaster reduction initiatives in Malawi. It also established the National Disaster Preparedness and Relief Committee (at both the technical and steering levels) and the National Disaster Preparedness and Relief Fund and the local-level civil protection committees. The Disaster Preparedness and Relief Act also provides a legal basis for the President of Malawi to declare a state of disaster, which defines the extent of the geographic area affected by the disaster and may remain in effect for up to three months. The new Disaster Risk Management Act (2023) provides improved guidelines for DRM, placing greater emphasis on resilience building and sustainable financing.





## 2. Tropical Cyclone Freddy

**In March 2023, Malawi was severely affected by Tropical Cyclone Freddy, which developed in the Western Indian Ocean and moved eastwards, influencing torrential rains over the southern part of Malawi** (Figure 2.1).

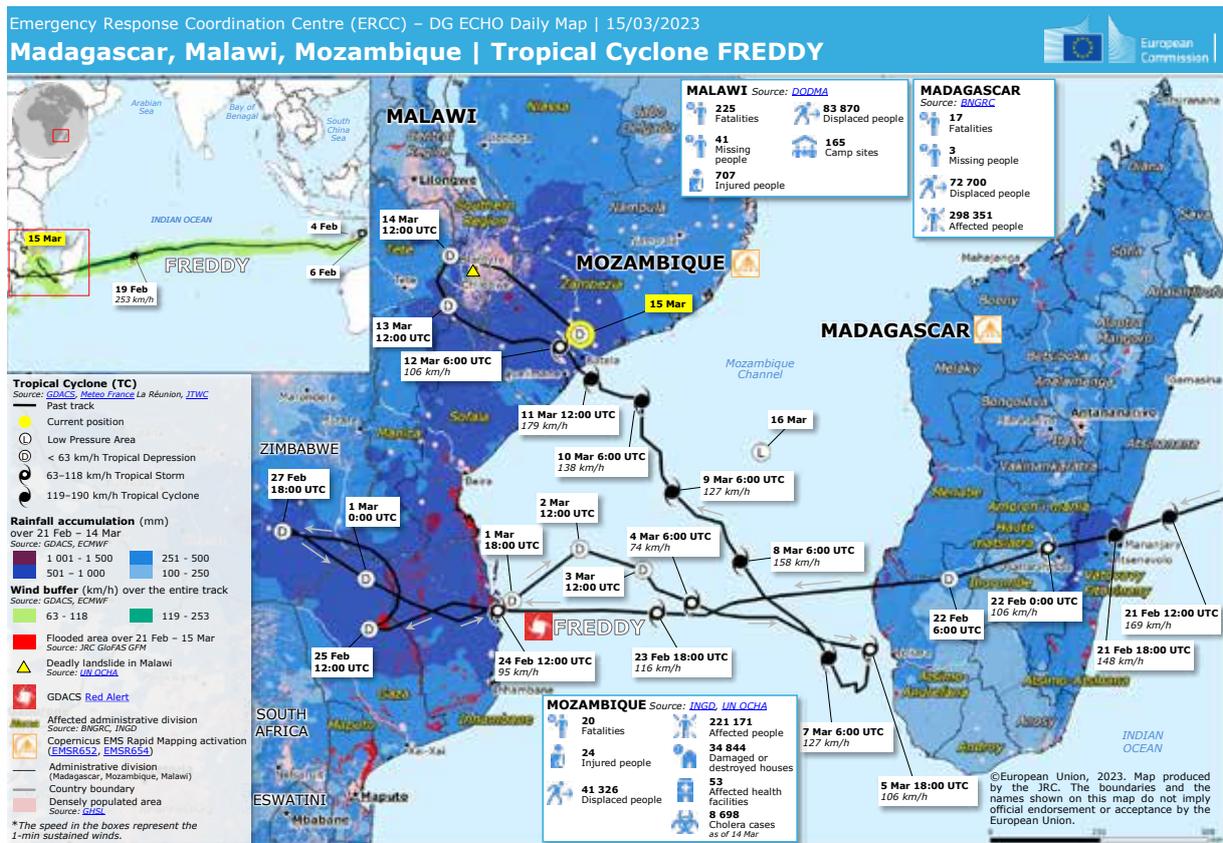
Following the heavy rains, multiple flood events were reported in Balaka, Blantyre, Chikwawa, Chiradzulu, Machinga, Mangochi, Mulanje, Mwanza, Neno, Nsanje, Ntcheu, Phalombe, Thyolo, and Zomba districts, including in Blantyre City and Zomba City. More than 2,267,458 people were affected, including more than 659,278 displaced, with 679 deaths, 530 missing, and 2,186 injured. Among the total affected population, 1,308,064 are women and girls of reproductive age and about 100,297 of these are pregnant women.

**The record-breaking Tropical Cyclone Freddy formed in early February 2023 near the coast of Australia and began its path toward Madagascar and Southern Africa following seven separate rapid intensification cycles and three landfalls.**<sup>10</sup> Freddy first developed as a disturbance and the storm quickly intensified as it moved into the Southwest Indian Ocean Basin. It tracked across the entire Indian Ocean from east to west, affecting Mauritius and Réunion en route to Madagascar. A super zonal track of this nature is rare. Freddy became the longest-lived tropical cyclone on record, with the highest accumulated cyclone energy of all time—equivalent to that of an average North Atlantic hurricane season in its entirety. Freddy was a named tropical cyclone for 34 days, crossed the entire Southern Indian Ocean, and traveled more than 8,000 kilometers (WMO 2023).

**Freddy made its first landfall in Madagascar, weakening over land and restrengthening in the Mozambique Channel to continue its path to a second landfall south of Mozambique** (Figure 2.1). The remnant low of Tropical Cyclone Freddy restrengthened again as it reemerged into the Mozambique Channel, and then looped back toward northern Mozambique, hitting the country for a second time on March 11. Tropical Cyclone Freddy reached Malawi's border in the early evening of March 12. Freddy led to destructive winds and extreme rainfall in Malawi, Mozambique, southeast Zambia, and northeast Zimbabwe (WMO 2023).

<sup>10</sup> For more detail about the path of Tropical Storm Freddy, see the NASA Earth Observatory website at <https://earthobservatory.nasa.gov/images/151111/freddy-delivers-another-blow>.

**FIGURE 2.1. Storm Tracks of Tropical Cyclone Freddy**



Source: Directorate General for European Civil Protection and Humanitarian Aid Operations (DG ECHO).

**Storm and flood damage was particularly severe in the southern districts of Malawi.**

Tropical Cyclone Freddy led to torrential rains of 200 millimeters (mm) to 670 mm over 48 hours across wide areas of Malawi and Mozambique.<sup>11</sup> Southeastern Malawi—particularly Blantyre, Chiradzulu, Mulanje, and Phalombe districts—was hard hit by incessant and intense rains. For most cyclones, the most intense rainfall usually occurs in the eyewall, which is the ring of thunderstorms around the center of the storm, and in the storm’s outer bands. Rainfall in the southeastern areas of Malawi was exacerbated by lifting due to the mountainous landscape, in addition to the local convergence of the Congo airmass and moist southeasterly winds (channel air).

**Rains induced by the cyclone were experienced from March 10 in the southeastern districts of Mulanje and Thyolo, spreading to all**

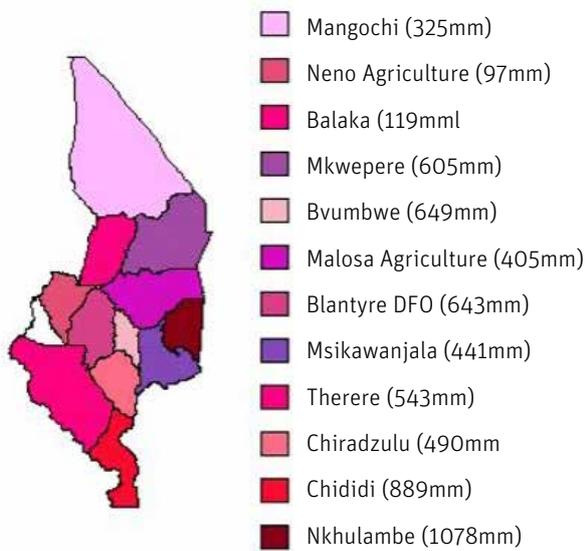
**other southern districts by the morning of March 12.** Strong winds and persistent rainfall were experienced from March 12 to March 14. Although the path of Tropical Cyclone Freddy was in the lower altitudes and its base position generally away from the Southern Highlands of Malawi, the region received the highest impact of the cyclone. Already prevailing moist conditions in the region implied an increased risk of flooding and related extreme events such as landslides.

**Extreme rainfall was recorded on the night of March 13 and early hours of March 14, 2023** (figure 2.2). Extreme 24-hour rainfall amounts were recorded at some stations, with many stations in Blantyre, Chiradzulu, Mulanje, Phalombe, Thyolo, and Zomba reporting over 100 mm per day. The highest rainfall amounts were reported in Nkhulambe, a village in Phalombe: 241 mm (March 12), 458.6 mm (March 13), and

<sup>11</sup> For more detail about the path of Tropical Storm Freddy, see the NASA Earth Observatory website at <https://earthobservatory.nasa.gov/images/151111/freddy-delivers-another-blow>.

363.2 mm (March 14). Maximum rainfall rates exceeded 39 mm per hour over the Nkhulambe area, which consecutively received 241.0 mm, 458.6 mm, and 363.2 mm on March 12, 13, and 14 respectively. The cumulative four-day total of 1,078 mm was higher than the average annual amount for the station.

**FIGURE 2.2. Three-day Reported Rainfall across Southern Districts (March 12–14, 2023)**



Source: Department of Climate Change and Meteorological Services of Malawi (2023).

**Intense rainfalls triggered flash floods and numerous debris flows (mudslides) in the South. Urban floods caused by the failure of drainage systems were also reported across Blantyre.** The mountainous areas of southeastern Malawi, where high drainage density can be found, are particularly prone to high-energy flash floods and debris flows (mudslides) following high-intensity rainfall in upper catchments. Debris flows are characterized by high energy, a solid load, coarse grain size (boulders, pebbles), a very short lag time (a few minutes to hours), and a current of very high velocity (several meters per second) (Terrier, Garcin, and Thiery 2022). Heavy rainfall caused by Tropical Cyclone Freddy led to debris-slides, debris-flows, and mudflows, flowing downhill as a mixture of mud, rocks, and debris,

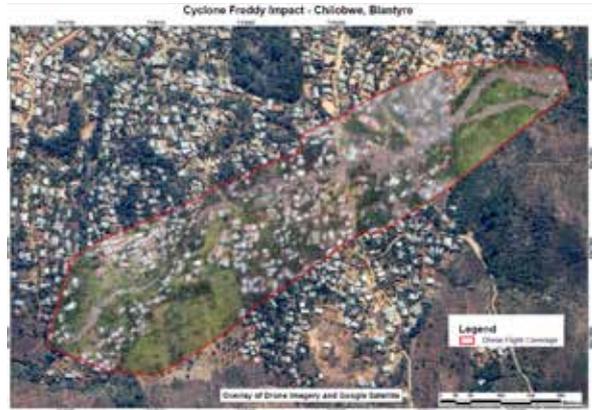
causing damage to homes and infrastructure in their path. Densely populated areas and informal settlements located in high-risk areas on or near steep slopes were significantly affected, leading to many fatalities.

**Most fatalities were attributed to landslides, including debris flows (mudslides), in the Southern Highlands.** Tropical Cyclone Freddy made a huge impact in the high-lying districts of Blantyre, Chiradzulu, Mulanje, Phalombe, Thyolo, and Zomba. Blantyre, Chiradzulu, and Phalombe experienced landslides, which in some cases wiped away entire communities, including infrastructure (figure 2.3). Prior to the cyclone, parts of the Southern Highlands, including Blantyre, had been receiving rains of high intensity that caused flash floods that weakened the slopes.

**The Lower Shire Basin was affected by widespread long-duration floods.** In this area, the local river channel network experienced rapid changes in the trajectory of the main flow channel, leading to significant damage to transport infrastructure (roads and bridges). Rivers in the basin are highly mobile over short periods, owing to meander migration or meander cutoff (Terrier, Garcin, and Thiery 2022). Inundation also resulted in extensive damage to (informal) housing, infrastructure, and agricultural fields across the southern districts (figure 2.4).

**Tropical Cyclone Freddy was preceded by an above-normal rainfall season.** From October 2022 to March 10, 2023, almost all areas in Malawi had cumulatively received normal to above-normal total rainfall amounts. In the 10 days preceding the occurrence of Tropical Cyclone Freddy, normal to below-normal 10-day rainfall accumulation was observed in most areas of the country. Normal and above-normal rainfall amounts were, however, recorded in the Lower Shire districts of Chikwawa and Nsanje, and in the high-lying areas of Blantyre, Chiradzulu, Mulanje, Phalombe, and Thyolo.

**FIGURE 2.3. Images of Debris Flows (Mudslides) Experienced during Tropical Cyclone Freddy, March 2023**



Soche Mountain (L) and Chilobwe (R)



Chiradzulu (World Bank Mission team, March 2023)



Phalombe (World Bank Mission team, March 2023)

**FIGURE 2.4. Images of Flood Impacts in the Lower Shire Basin after Tropical Cyclone Freddy, March 2023**



Collapse of bridge on M1 road, Chikwawa. (World Bank mission team; WFP Drone Imagery)



Flooding of housing, infrastructure, and crops. (WFP Drone Imagery)





### 3. Government Response and Humanitarian Assistance

**In response to the impact of the heavy rains, floods, and strong winds associated with Tropical Cyclone Freddy, the President of Malawi declared a state of disaster with effect from March 13, 2023.** The president made an appeal for humanitarian relief assistance from the international donor community, the United Nations, nongovernmental organizations, and the private sector, toward alleviating the suffering of people affected by the event.

**Immediately after the disaster, the Government of Malawi activated its cluster system to coordinate flood response and conducted a rapid needs assessment to determine immediate lifesaving response needs.** An interagency assessment followed, the findings of which were published and informed the development of the Tropical Cyclone Freddy Emergency Response Plan, to be implemented for a period of three months, with immediate humanitarian response needs estimated at \$143.6 million. The Emergency Response Plan acknowledges that the government faced a financial gap of \$107.3 million for its short-term response. The Emergency Response Plan recognizes several categories of response interventions, including food security; agriculture; nutrition; protection; water, sanitation, and hygiene; education; health; shelter and camp management; and coordination clusters.





## 4. Post-Disaster Needs Assessment

**On March 14, 2023, the Government of Malawi, through the Ministry of Finance and Economic Affairs, submitted a formal request for World Bank assistance to conduct a systematic impact and needs assessment to understand the economic impact of the floods.** On March 20, 2023, the Department of Disaster Management Affairs submitted a request to the World Bank for a PDNA to fully understand the impacts of the present disaster, determine and quantify the corresponding multi-sectoral needs and develop long-term solutions and resilience to similar disasters in the country.

**Leveraging the 2008 tripartite agreement signed by the World Bank, the United Nations, and the European Union, the World Bank coordinated the partners to provide technical and financial support to the Government of Malawi for the PDNA.** The design of the PDNA mirrored that of a rapid impact assessment of the recent floods: as well as use of existing data from similar assessments that were ongoing, the PDNA relied on existing data from the various local authority offices.

**The primary goal of the PDNA was to estimate the physical damages, economic losses, and impacts of Tropical Cyclone Freddy, and identify recovery needs.** The PDNA evaluates the effects of the disaster using information related to the damage to physical assets and infrastructure and the resulting production losses. It further analyzes the overall impact of the disaster on macroeconomic and human development indicators. It presents a comprehensive picture of pre- and post-disaster contexts to identify the distinct recovery needs and priorities of different sectors and cross-cutting issues to build back better in the short, medium, and long term.

### 4.1 Methodology

**The PDNA methodology was used to assess the disaster effects and impacts, and to identify the immediate and long-term recovery needs.** The methodology involves a multisectoral and multistakeholder approach to the assessment process, with a high level of coordination to generate a participatory and comprehensive product.

**For each priority sector, the main steps of the PDNA process (UN, EU, and GFDRR 2013) were conducted, as follows:**

- *Collection of pre-disaster context and baseline information.* This step involves examining the pre-disaster conditions for comparison with the post-disaster conditions to evaluate the magnitude and scale of the disaster. Contextual information can also help identify both potential risk drivers and resilience measures.

- *Assessment of disaster effects.* Disaster effects are assessed across four main elements: (1) damage to physical assets and infrastructure; (2) disruption of access to goods and services; (3) changes in governance and decision-making processes; and (4) increased risks and vulnerabilities due to changes in financial flows. Damages (1) and losses (2–4) are expressed in monetary terms and, where possible, disaggregated by geographical divisions and sociological characteristics of the population (for example, gender, age, ethnicity, disability).
- *Evaluation of disaster impacts.* The impacts of the disaster are determined through the assessment of two main elements: (1) economic impact at macro and micro levels, including the disaster's likely effects on economic performance and the temporary macroeconomic imbalances that may arise from it, as well as its varied impacts on personal/household income and employment in all sectors; and (2) human development impact, which considers the impact of the disaster on the quality of human life.
- *Identification and prioritization of recovery needs.* The recovery needs are identified based on the disaster effects and impacts, accounting for specific needs and considerations for resilience building. The recovery needs are disaggregated into short-, medium-, and long-term recovery and reconstruction interventions.

## 4.2 PDNA Approach

**The Government of Malawi, in collaboration with key partners, reflected on past experiences and agreed to conduct a focused and strategic assessment and ensure its timely completion.**

The PDNA was conducted in all the affected local authority areas, spanning 16 local authorities (Balaka, Blantyre, Chikwawa, Chiradzulu, Machinga, Mangochi, Mulanje, Mwanza, Neno, Nsanje, Ntcheu, Phalombe, Thyolo, and Zomba, Blantyre City and Zomba City). Priority sectors/subsectors comprised: (1) social: housing, health and nutrition, education; (2) productive: agriculture (crops, livestock, irrigation, and fisheries), trade (commerce and industry); (3)



infrastructure: transport, energy, water supply and sanitation, and water resources; and (4) cross-cutting issues including disaster risk reduction and early warning systems, environment, social protection, people with disabilities, gender and social inclusion, and governance. In addition, the PDNA used both macroeconomic and human development impact analyses.

**The PDNA process involved the participation of more than 60 sector experts from the government, the World Bank, the United Nations, and other development agencies and from selected civil society organizations over the period April 2–14, 2023.** A comprehensive PDNA data collection framework was adapted to determine, classify, collate, quantify, and validate the effects of Tropical Cyclone Freddy on various sectors of the Malawi economy. Each sector team collected the respective pre-disaster baseline data for comparison with post-disaster conditions and evaluated the disaster effects and impacts. The PDNA process combined bottom-up and top-down approaches by involving the participation of both local- and national-level administrators.

**Sector experts valued the damage to assets and infrastructure and the losses due to changes in financial flows resulting from Tropical Cyclone Freddy.** The effects were valued in terms of: (1) total and partial destruction of assets and infrastructure; (2) changes to production, delivery, and access to goods and services; (3) changes to governance processes; and (4) activities to reduce immediate risk or vulnerability, manifested by the changes to financial flows due to Tropical Cyclone Freddy. Cross-sectoral linkages were pursued to prevent double or multiple counting in estimating the value of the cyclone’s effects. In addition, the PDNA included an assessment of cross-cutting issues like disaster risk reduction, environment, social protection, people with disabilities, gender and social inclusion, and governance, where qualitative methods were applied. Accordingly, recovery needs for each sector were examined considering the principles of ‘building back better’.

The recovery plan identifies and prioritizes needs into short-, medium-, and long-term needs.

**Sectoral data were triangulated and assessed by the coordinating team and sectoral experts to minimize the risk of damages and losses being overstated or understated.** Experts adopted a mixed methods approach to triangulate data captured for the assessment. The process consisted of: (1) desk review of pre-disaster information; (2) disaggregated data collection and analysis of damages and loss information; and (3) follow-up on key sectors with council officials. In addition, on April 11, 2023, the directors of planning and development from all 16 affected councils participated in the validation of the total damages and losses resulting from Tropical Cyclone Freddy across all sectors.

### 4.3 Limitations

**The Government of Malawi’s urgent need to initiate recovery efforts implied an important time constraint for the PDNA, and the need to initiate the assessment process in parallel to ongoing response efforts.** The assessment team was constrained by the limited time frame for the assessment, which was carried out in the period April 2–14, 2023, with training conducted on March 30 and 31, 2023. Additionally, at the time of the assessment, some specific areas in the most affected districts remained inaccessible at the point of data collection.

**The assessment of the disaster effects and impacts is based on the data that the sector teams were able to collect during the preestablished assessment period.** Even though various data validation methods were applied, limitations of the data may have led to some damages, losses, and needs being underestimated or overestimated and some specific effects or impacts being overlooked. More detailed subsector assessments may therefore be required to define a more comprehensive recovery strategy.





## 5. Disaster Effects

### 5.1 Summary of Disaster Effects

The total effects of Tropical Cyclone Freddy across social, productive, and infrastructure sectors are estimated at \$506.71 million, with physical damages valued at \$347.23 million and economic losses assessed at \$159.4 million (table 5.1). The most affected sector is the infrastructure sector (\$178.04 million), with the transport subsector sustaining the highest physical damages and economic losses (\$110.83 million), followed by water and sanitation (\$41.08 million), energy (\$13.37 million), and water resources (\$12.76 million). Housing is the most affected social subsector, with damages amounting to \$113.45 million and losses of \$11.02 million. The productive sector accounts for total effects of \$127.06 million, with damages evaluated at \$32.78 million and losses estimated at \$94.27 million.

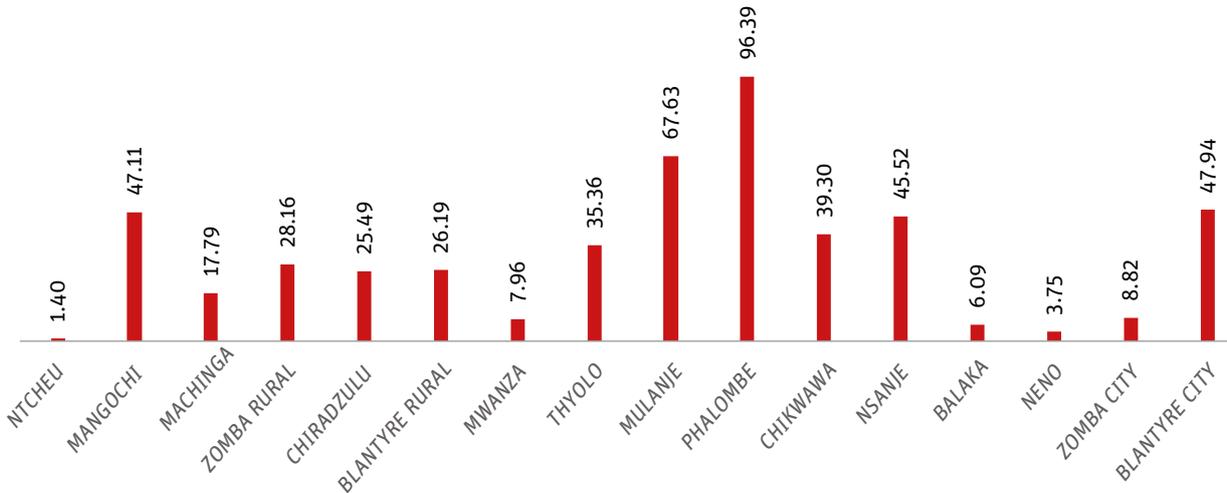
Addressing each sector in turn, this section outlines for each subsector the detailed pre-disaster context, followed by the damages and losses, social impact, and factors contributing to the impacts.

**TABLE 5.1. Summary of Disaster Effects for Tropical Cyclone Freddy (US\$, million)**

Sector	Subsector	Damage	Loss	Public	Private	Total Effects
<i>Social</i>	Housing	113.45	11.02	-	124.47	124.47
	Health and nutrition	4.14	3.99	7.93	0.19	8.13
	Education	30.25	11.83	42.09	-	42.08
	<b>Subtotal</b>	<b>147.84</b>	<b>26.84</b>	<b>50.02</b>	<b>124.66</b>	<b>174.68</b>
<i>Productive</i>	Crops	0.33	55.01	-	55.34	55.34
	Livestock	3.50	3.04	1.44	5.10	6.54
	Irrigation	20.05	25.41	42.56	2.90	45.46
	Fisheries	0.50	2.54	0.02	3.01	3.03
	Trade	8.41	8.26	-	16.68	16.68
	<b>Subtotal</b>	<b>32.79</b>	<b>94.26</b>	<b>44.03</b>	<b>83.02</b>	<b>127.05</b>
<i>Infrastructure</i>	Transport	104.39	6.44	108.80	2.02	110.83
	Energy	11.43	1.93	3.01	10.35	13.37
	Water and sanitation	34.85	6.24	41.08	-	41.08
	Water resources	7.79	4.97	12.76	-	12.76
	<b>Subtotal</b>	<b>158.46</b>	<b>19.58</b>	<b>165.67</b>	<b>12.37</b>	<b>178.04</b>
<i>Cross-cutting</i>	Disaster risk reduction	2.59	14.25	14.94	1.90	16.84
	Other cross-cutting issues	5.56	4.54	10.09	0.01	10.10
	<b>Subtotal</b>	<b>8.15</b>	<b>18.79</b>	<b>23.21</b>	<b>1.91</b>	<b>26.94</b>
<b>Gross total</b>		<b>347.24</b>	<b>159.47</b>	<b>282.92</b>	<b>221.96</b>	<b>506.71</b>

Source: [PDNA 2023 Team]

**FIGURE 5.1. Percentage Distribution Share of the Districts Effects**



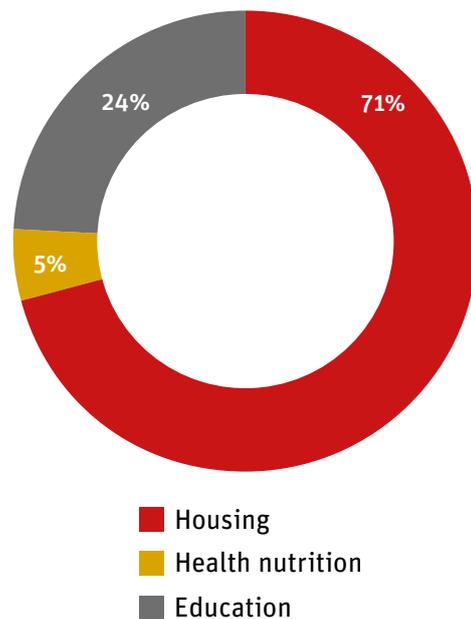
Source: [PDNA 2023 Team]

In terms of districts, Phalombe is the most affected district, with total effects of \$96.3 million, followed by Mulanje (\$67.6 million), Blantyre City (47.9 million), Mangochi (\$47.1 million), Nsanje (\$45.5 million), Chikwawa (\$39.3 million), and Thyolo (\$35.4 million).

## 5.2 Summary of Disaster Effects: Social Sector

**The assessment of the social sector looked at the effects of the disaster on three subsectors, namely housing, health and nutrition, and education.** The total effects (physical damages and economic losses) of Tropical Cyclone Freddy on the social sector are estimated at \$174.68 million, with the highest effects experienced in the housing subsector (\$124.47 million), followed by education (\$42.09 million) and health and nutrition (\$8.13 million) (table 5.1 and Figure 5.2). The social sector has been largely affected by the landslides and floods causing damages to housing stock, education infrastructure and other assets. The losses are mainly from the additional costs to ensure the provision of goods and services (for example, in the health subsector, airlifting of medical supplies to hard-to-reach areas; and removal of debris in the education subsector) and the foregone income from public and private sector activities (for example, rentals in the housing subsector).

**FIGURE 5.2. Percentage Distribution Share of Tropical Cyclone Freddy Effects by Social Subsectors (%)**



Source: [PDNA 2023 Team]

### Housing subsector

**Pre-disaster context: There are about 2.3 million houses in the 16 affected local authorities.** Approximately 51 percent of the houses are categorized as permanent, 23 percent are semipermanent, and 26 percent are recorded as temporary houses. Construction of houses in rural districts like Balaka, Blantyre, Chikwawa,

Chiradzulu, Machinga, Mangochi, Mulanje, Mwanza, Neno, Nsanje, Ntcheu, Phalombe, Thyolo, and Zomba is regulated by the Department of Housing in the Ministry of Lands, Housing, and Urban Development. In Blantyre and Zomba cities, construction of houses is controlled by the city councils. Housing construction in rural areas does not, however, follow the safer housing construction guidelines, owing to high poverty levels among the private house developers. Moreover, houses are constructed using unskilled artisans, resulting in poor workmanship. Furthermore, the low standard of houses in the rural areas is exacerbated by the lack of resources employed by the Department of Housing to educate and enforce regulations for climate- or disaster-resilient houses.

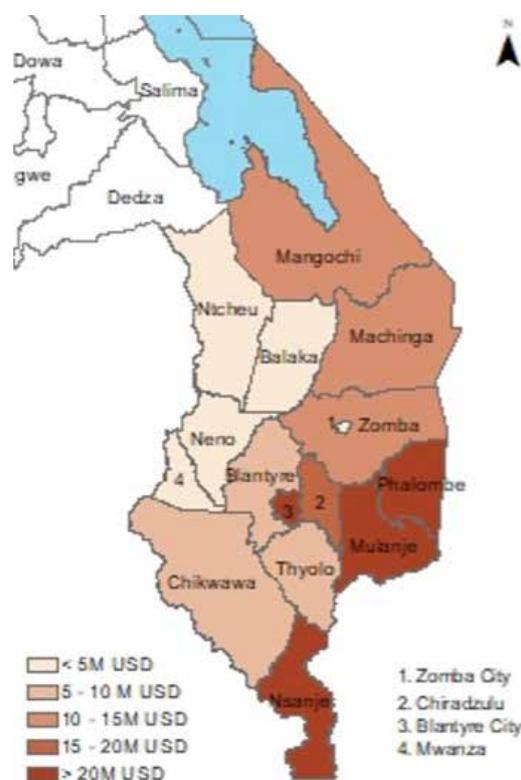
**TABLE 5.2. Damages due to Tropical Cyclone Freddy by Type of House (number of affected housing units)**

	No. of housing units
<b>Fully destroyed</b>	
Permanent	6,748
Semipermanent	23,028
Temporary	90,661
Kitchen	6,748
<b>Partially destroyed</b>	
Permanent	8,783
Semipermanent	27,000
Temporary	104,461
Kitchen	8,783
<b>Total</b>	<b>276,212</b>

Source: [PDNA 2023 Team]

**Disaster damages: The total damages caused by Tropical Cyclone Freddy in the housing subsector amount to \$113.45 million.** A total of 276,212 houses have been damaged, of which 127,185 are fully destroyed and 149,027 have been partially destroyed (table 5.2). Most of the houses in the affected districts have been affected by the debris flows (mudslides), by boulders carried by the flooding rivers, and by the collapse of walls as the heavy rains and flooding weakened

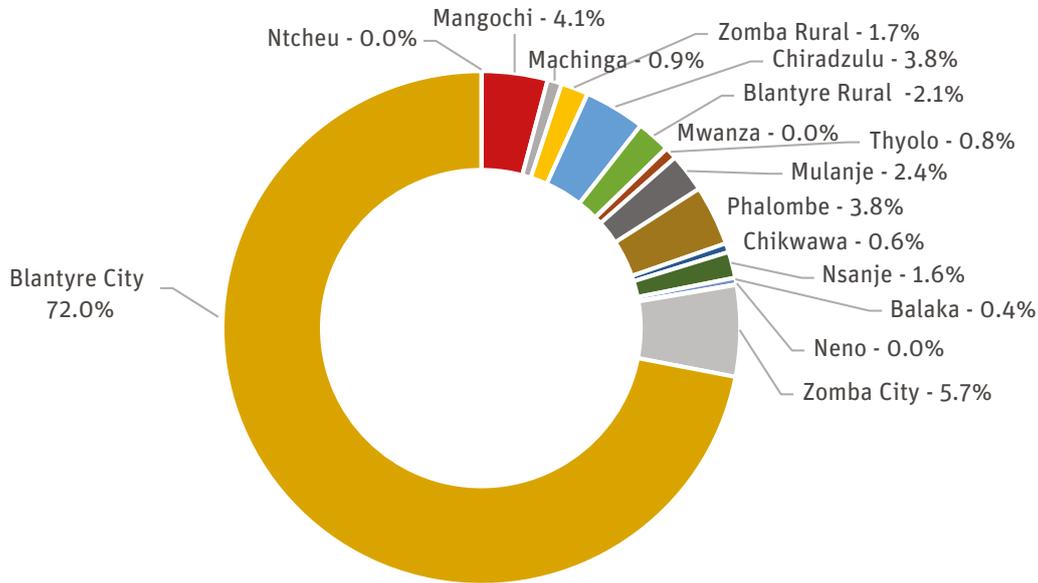
**MAP 5.1. Total effect of Freddy on the Social sector across the affected councils**



the structure. The most affected districts by percentage of housing stock affected are Mulanje, Blantyre City, Mangochi, Phalombe, and Chiradzulu. The damages have been calculated according to the partial or complete destruction of the dwelling unit, kitchen, and standard/basic household items for permanent, semipermanent, and traditional houses. A replacement cost was used to calculate either the partial or full damage for the affected households.

**Disaster losses: The total losses caused to the housing subsector by the cyclone are estimated at \$11.02 million.** Losses incurred include the cost of emergency shelter, foregone income from rentals, and the cost of clearing debris. Losses are highest in Blantyre City, followed by Zomba City, where the number of affected houses is high and as Tropical Cyclone Freddy affected high-density areas—like Chilobwe, Ndirande, and Zingwangwa in Blantyre City. Chiradzulu, Mangochi, and Phalombe have also experienced high losses in the housing subsector.

**FIGURE 5.3. Percentage Distribution of Losses in Housing Subsector due to Tropical Cyclone Freddy, by District**



Source: [PDNA 2023 Team]

**Social impact of disaster damages and losses:**

About 48.7 percent of the damaged houses are owned by female heads of household and 29.2 percent by male, 8.1 percent by elder, and 5 percent by widowed heads of household. The majority of the houses were damaged owing to the nature of their construction and the materials used, causing issues such as poor foundations; absence of dampproof courses to the base of superstructure walls; lack of external plaster or waterproofing to superstructure walls; use of mud bricks and grass roof thatch; lack of adequate roof overhangs and verandas to keep rain off the walls; ineffective local drainage networks; and the predominant use of unskilled labor for housing construction. Furthermore, debris flows (mudslides) contributed to the damage to houses built in hilly areas of Chilobwe, Ndirande, and Zingwangwa in Blantyre. The assessment reveals that of the 260,681 houses affected by Tropical Cyclone Freddy, 75 percent were temporary structures and 19 percent were semipermanent structures.

**Health and nutrition subsector**

**Pre-disaster context: The affected districts have a total of 313 health and nutrition facilities, of which 290 are at the primary level, 21 are secondary level, and 2 are tertiary level.**

Health indicators have remained poor in the affected districts, with stunting at 49 percent, minimum dietary diversity at 21 percent, minimum meal frequency at 33 percent, and minimum acceptable diet at 8.3 percent. These health indicators can be easily worsened by any disaster. In January and February 2022 alone, during which time Tropical Storm Ana hit Malawi, 6,945 children with severe acute malnutrition were admitted to health facilities. Moreover, the districts affected by Tropical Cyclone Freddy had registered high cases of cholera in February 2023, with 5,191 of the country’s 8,162 cases (almost 64 percent) recorded across the 16 affected local authorities.

Additionally, the prevalence of human immunodeficiency virus (HIV), at 8.1 percent,

remains relatively high in the country, with more women than men affected, although the vast majority (91 percent) of people living with HIV in Malawi are on antiretroviral therapy. The maternal mortality ratio is high, at 349 maternal deaths per 100,000 live births, with 276 maternal deaths occurring across the 16 local authorities in focus in 2022. The doctor–patient ratio is 0.05 to 1,000, in comparison to the recommended ratio of 1 to 1,000. The country has 364 medical doctors, 6,535 nurse midwives (with a vacancy rate of 60 percent), 1,217 clinical technicians, and 1,039 medical assistants, who cover both rural and urban settings and are critical in providing health services. In general, service availability and readiness stands at 60 percent in the health and nutrition subsector, with most health facilities in a dilapidated state and subject to a poor maintenance schedule. Moreover, construction of health facilities, especially community health facilities, does not follow minimum construction guidelines and no site supervisions are made by the Ministry of Health during construction.

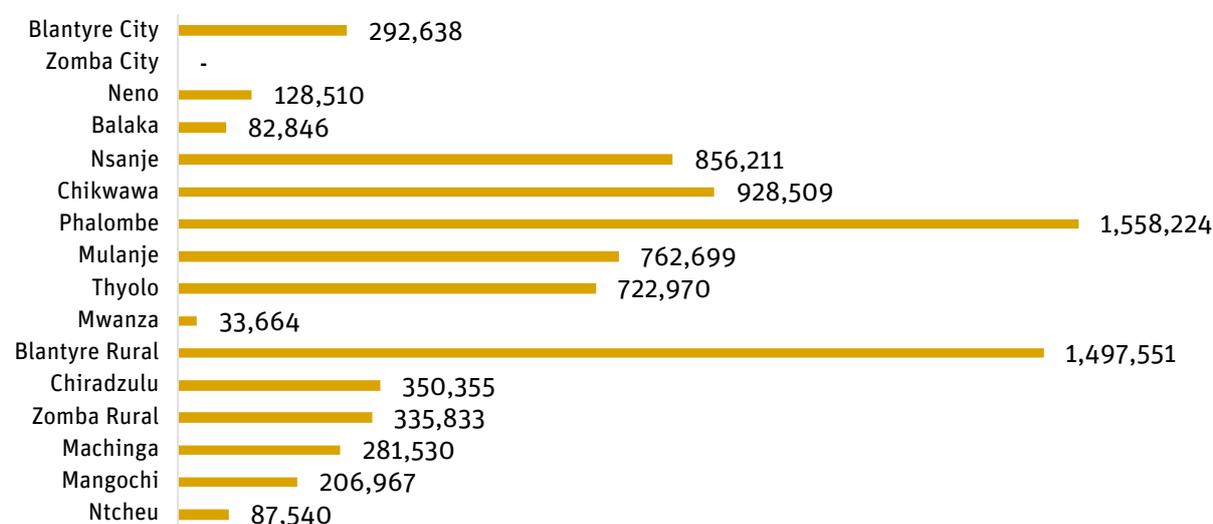
**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the health and nutrition subsector across the 16 affected local authorities are estimated at \$4.14 million.**

The damage is calculated from the destruction of health infrastructure, equipment, and medical supplies. Some 340,267 of the affected population are children under five years of age, 174,594 are people living with HIV, and 90,399 are pregnant and lactating women. Furthermore, 92 health workers were displaced, creating staff shortages. In addition, Tropical Cyclone Freddy severely damaged health infrastructure, equipment, and medical supplies in all 16 affected districts, and some health facilities were rendered inaccessible because of damaged and impassable roads.

**Disaster losses: The total losses in the health and nutrition subsector across all 16 affected local authorities amount to \$3.99 million.**

Losses in the health and nutrition subsector are due to disruption of health services, additional costs to access health services in other areas (whether nearby or far away), and costs to remove mud or debris from health centers affected by Tropical Cyclone Freddy. Furthermore, the health and nutrition subsector has incurred or will incur additional costs to restore health service delivery, engage additional staff, set up mobile clinics, and pay for airlift services to reach otherwise inaccessible areas.

**FIGURE 5.4. Total Effects of Tropical Cyclone Freddy on Health and Nutrition Sub Sector across the 16 affected local authorities (US\$)**



Source: [PDNA 2023 Team]

### **Social impact of disaster damages and losses:**

All 16 affected local authorities have a high disease burden, which is attributed to the prevalence of HIV or acquired immune deficiency syndrome (AIDS), diarrhea, cholera, and malnutrition. Tropical Cyclone Freddy will likely perpetuate the disease burden. An increase in new HIV infections is anticipated owing to limited access to HIV preventive services, such as provision of condoms. Moreover, low condom use (55 percent) among youth ages 15–24 years in the Southern Region who have multiple partners compounds risky behaviors, especially among women, who may resort to transactional sex in the event of loss of income. Further such behavior would predispose women and girls to unwanted and early pregnancies, with the Southern Region recording 139 pregnancies per 1,000 adolescents, and heighten the risk of gender-based violence, contributing in the long term to maternal complications and a high maternal mortality ratio. Psychosocial effects of the disaster may exacerbate the impact of noncommunicable diseases such as mental illness and cardiovascular disease, contributing to the already low life expectancy in Malawi. The disease burden disproportionately affects girls and women as social norms dictate that females typically take up the role of primary caregiver for family members in ill health, which affects the caregiver's socioeconomic productivity.

### **Education subsector**

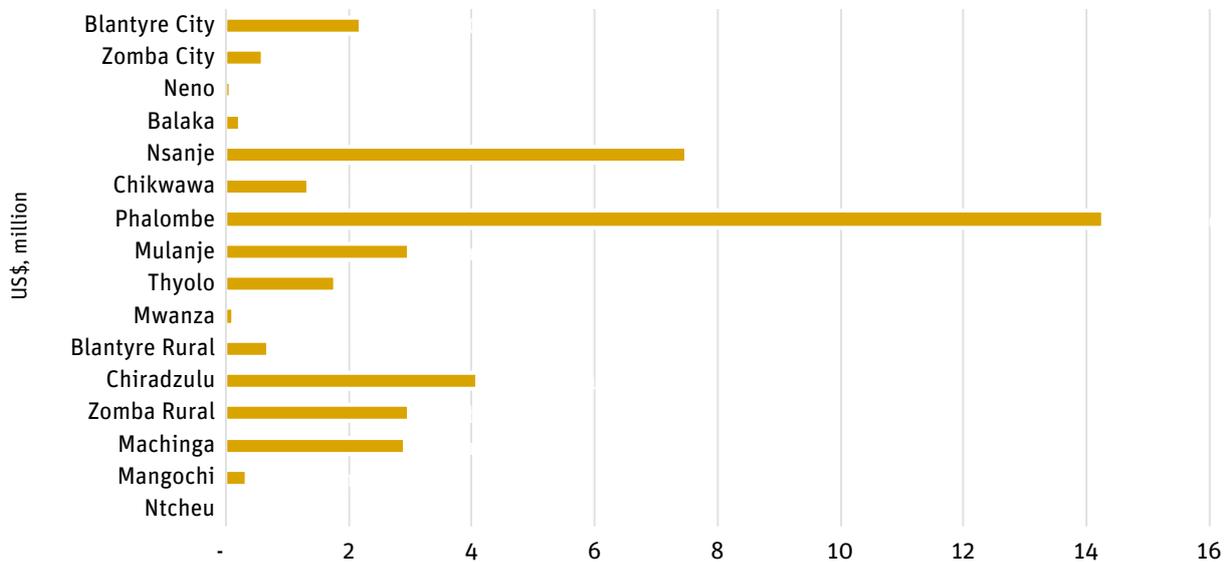
**Pre-disaster context: Across the 16 affected local authorities, 10 percent of the school-age population does not attend school at all, while over 21 percent of the school-age population repeats grades.** The net enrollment rate is 87 percent in primary education and 15 percent in secondary education. In primary education, the completion rate is 56 per cent, while the repetition rate is 24 per cent. The rate of transition to secondary education is 42.5 percent. Furthermore, in secondary education, the gross enrollment rate is very low, and over 61 percent of students across the affected districts fail to proceed to the next grade. The qualified teacher–student ratio at primary level is 1 to 62,

and at secondary level, it is 1 to 32. The average number of children in a permanent classroom at primary level is 98, the highest average amount of any country in Southern Africa. The quality of education is severely affected by the lack of qualified teachers and by a lack of motivation to teach in remote areas without social amenities such as quality housing and access to safe water, electricity, and banking and health facilities. Additionally, there are critical shortages of classrooms, desks, and toilets as well as teaching and learning materials. Most school facilities in the affected districts were built using community resources, with low compliance with safer school construction guidelines.

**Disaster damages: The total damages to the education subsector resulting from Tropical Cyclone Freddy amount to \$42.09 million across all 16 affected local authorities.** In the affected districts, the entire span of education services—from primary to tertiary level—suffered diverse damages. A total of 72 classrooms, 87 teacher houses, 986 toilets, and key school infrastructure were fully destroyed. Additionally, 460 classrooms, 423 teacher houses, 542 toilets, and key school infrastructure were partially destroyed. Tropical Cyclone Freddy caused most classrooms to be inundated and filled with debris flows (mudslides) and water as well as boulders, or their walls to collapse as water weakened the structure. School boreholes were also submerged by sand or floodwater during the cyclone. Most school records, first aid supplies for injured or ill students, and stocks of maize or flour for school feeding programs were also soaked with water and rendered unusable. About 62 learners (29 female) and 2 teachers lost their lives during Tropical Cyclone Freddy.

**Disaster losses: The total losses caused by Tropical Cyclone Freddy to the education subsector amount to \$11.83 million across all 16 affected local authorities.** The cyclone led the Ministry of Education to suspend classes for almost 25 days in fear of heavy rains and flooding, further disrupting teaching and the learning calendar. About 62 learners (29 girls; 33 boys) and 2 teachers lost their lives during Tropical Cyclone

**FIGURE 5.5. Total Effects of Tropical Cyclone Freddy in the Education Subsector across affected Districts (US\$, million)**



Source: [PDNA 2023 Team]

Freddy. In addition, 408 schools were used as camps for internally displaced people, with about 1,481 classrooms occupied. As a result, some 724,709 learners (368,313 girls; 356,396 boys) stopped attending classes because of the cyclone. Of this number, 44,256 were adolescents, and 3,656 were learners with disabilities. A total of 978 teachers (302 females) were equally affected and faced challenges continuing their duties. The Ministry of Education has employed auxiliary teachers and provided them with accelerated training to make up for lost or disrupted teaching and learning time. There are fears that schools may not restock maize or flour for school feeding programs as agricultural crops have also been destroyed by the cyclone. Moreover, if maize or flour can be located, schools will likely pay a higher cost to procure and transport the stock from further away than usual.

**Social impact of disaster damages and losses: Disruption of education services and destruction of education goods is likely to increase how many students drop out of school.**

Most of the affected learners will not have access to safe learning spaces since so many classrooms have been destroyed. Some classrooms are still being used as shelter for internally displaced

people, forcing some primary students to have their classes outside, beneath trees. The presence of internally displaced people in primary schools has also put additional pressure on school toilet facilities, which were already inadequate prior to the disaster, thereby facilitating the spread of communicable diseases like scabies and cholera. Moreover, the presence of internally displaced people in schools has exposed students to the risk of gender-based violence and violence against children, as some internally displaced people may perpetrate violence. Gender-based violence or violence against children may involve rape, which can result in adolescent pregnancy, the spread of sexually transmitted infections, early or child marriage, and subsequent school dropout.

Furthermore, the damage to teacher housing will increase the teacher attrition rate owing to the absence of social amenities such as quality housing, and access to banking and health facilities. Submergence of school boreholes has affected or will affect the water, sanitation, and hygiene (WASH) conditions in most schools. Among the main factors intensifying the effects of Tropical Cyclone Freddy on the education subsector are the weaker education infrastructure across the 16 affected districts, which does

not comply with the safer school construction guidelines; construction of education facilities using artisans with low technical know-how; and lack of a minimum recommended construction package for community education facilities.

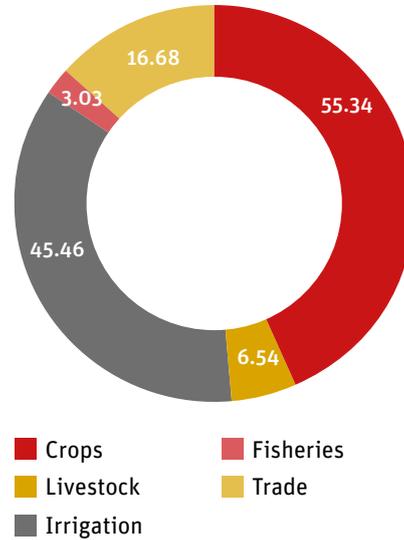
### 5.3 Summary of Disaster Effects: Productive Sector

The productive sector is composed of the agriculture subsector (that is, crops, irrigation, fisheries, and livestock) and trade subsector (that is, micro, small, medium, and large enterprises). As Malawi is an agrarian economy, Tropical Cyclone Freddy has heavily affected the productive sector, with total effects of **\$127.06 million**, the vast majority of which relate to the agriculture subsector (Figure 5.6). Crops (\$55.34 million) are the most affected aspect of the agriculture subsector, followed by irrigation (\$45.46 million), livestock (\$6.54 million), and fisheries (\$3.03 million). About \$16.68 million in total effects are attributed to the trade subsector. Damages in the productive sector include the cyclone’s effects on agricultural land; stocks of agricultural inputs; farm structures, machines, and implements; irrigation systems and equipment; plantations; Mikolongwe Training Institute for Livestock; sheds; animal deaths; and fishing vessels, engines, and gear. Losses consist of loss of standing crops; reduced yields for standing annual and perennial crops; additional costs of replanting and acquiring new inputs; loss of milk, meat, eggs, honey, and wool from livestock; higher inputs for fish farming; and decreases in fish farming and capture harvests.

#### Agriculture subsector (crops, livestock, irrigation, and fisheries)

**Agriculture remains the backbone of the economy and is vital to the livelihoods of most of Malawi’s citizens, as well as national food self-sufficiency and household food and nutrition security.** The agriculture subsector contributes about 22.6 percent of the country’s gross domestic product (GDP) and provides livelihoods for about 85 percent of Malawi’s population. Women make

**FIGURE 5.6. Total Effects of Tropical Cyclone Freddy on Productive Sector (US\$, million)**



Source: [PDNA 2023 Team]

up the majority of the labor force (70 percent) in the agriculture subsector. Malawi is endowed with land suitable for rain-fed and irrigated agriculture, and it relies upon both. Climate change-induced extreme weather events such as droughts and floods are increasingly affecting agricultural production and rural livelihoods. Almost every year, natural disasters such as floods and dry spells adversely affect agricultural production because agriculture relies greatly on optimal conditions in terms of weather, water availability, and climate to flourish.

#### Crops subsector

**Pre-disaster context: The crops subsector is responsible for an estimated 13.6 percent of the agriculture subsector’s contribution to Malawi’s GDP.** Maize is the dominant crop, grown in all districts of the country. Other important crops include cassava (mainly grown in the lakeshore districts, as well as around Lilongwe, Mulanje, Phalombe, Thyolo, and Zomba districts); groundnuts (grown in the rich soils of the Mzimba-Lilongwe Plain, and Mchinji, Ntchisi, and Rumphu districts, among others); rice (found in flooded fields along the lakeshore and other low-lying

areas); sorghum, millet, and cotton (mostly grown in Chikwawa and Nsanje districts); tobacco; and legumes. Crop production is typically rain-fed, and as many farmers are smallholder farmers, crop production is left vulnerable to climate variations and the incessant hazards. Of the districts affected by Tropical Cyclone Freddy, Blantyre, Chikwawa, Chiradzulu, Mulanje, Mwanza, Neno, Phalombe, and Thyolo also grow pigeon peas as a cash crop. Malawi's agricultural labor force is divided into two: the smallholder sector and estates, with the biggest estates located in Mulanje, Nsanje, and Thyolo districts in the south.

**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the Crop's subsector amount to \$330,000.** For crops, the only data available on damages across the affected districts relate to banana crops. About 245.57 hectares of land under banana production were damaged. Thyolo had the highest damage value for bananas, amounting to \$144,690. In total, Tropical Cyclone Freddy affected about 54,029 hectares of smallholder land belonging to 509,244 farm households and devoted to the production of various crops, with some hectares submerged with sand, and the topsoil of some other land washed downstream. By landholding size, the crops that sustained most damage were maize (28,164 hectares), followed by pigeon peas (8,227 hectares), rice (6,158 hectares), sorghum (4,430 hectares), and groundnuts (1,951 hectares). Seasonal crops like maize, rice, sorghum, millet, and leguminous crops were completely buried, or in some cases, submerged or completely washed away. Soon after the cyclone, prolonged waterlogged conditions resulted in mature maize cobs experiencing ear germination and wilting. Crop plantations were also affected by Tropical Cyclone Freddy, for instance, plantations of 100 hectares of land growing tea and sugar in Thyolo and Chikwawa districts respectively.

**Disaster losses: The total losses caused by Tropical Cyclone Freddy to the Crop's subsector are estimated at \$55.01 million.** Economic losses due to Tropical Cyclone Freddy were

calculated based on the reduced yields from standing annual and perennial crops. Overall, across all three sectors, the crops subsector is the subsector most affected by the cyclone in terms of production losses incurred. Of the total affected 204,833 hectares of land planted to various crops, 51,578 hectares were considered a total loss. Phalombe is the most affected district in terms of the value of crop production losses sustained, with total crop losses amounting to about \$8.6 million. Such large-scale losses were experienced by the crops subsector because the cyclone occurred during the peak rainy season, when the main crops had been planted and the main harvest was imminent. Production loss estimates were calculated based on the following crops: maize, rice, beans, cowpeas, cassava, sweet potatoes, potatoes, groundnuts, pigeon peas, sorghum, cotton, bananas, sesame, chili, millet, tobacco, and tomatoes. In addition, Tropical Cyclone Freddy reduced the income that some households make from being engaged as casual labor in crop production. Moreover, 9,477 hectares of land under irrigation will not be cultivated in the upcoming season, further increasing the crop losses due to the cyclone.

**TABLE 5.3. Number of Units Affected by Tropical Cyclone Freddy for Each Subsector of Agriculture**

	Number of units
<b>Fully destroyed</b>	
<b>Crops (hectares)</b>	54,029
<b>Irrigation (hectares)</b>	7,582
<b>Fisheries</b>	
Ponds	370
Fishing boats	854
<b>Livestock</b>	
Cattle	859
Goats	7,892
Sheep	1,505
Pigs	3,687
Chickens	37,933

Source: [PDNA 2023 Team]

**FIGURE 5.7. Image of a Crop Field Washed Away by Tropical Cyclone Freddy**



**FIGURE 5.8. Image of a Goat Killed by Tropical Cyclone Freddy**



**Social impact of disaster damages and losses: Damage to the crops subsector in Malawi has significant social impacts on the country since agriculture is the backbone of the economy and a major source of livelihoods, particularly for people in rural areas.** The current damages to the crops subsector caused by Tropical Cyclone Freddy will likely lead to food insecurity, loss of income, and increased poverty. Damages to the crops subsector will also lead to social tensions and conflict, particularly in communities where agriculture is a key source of wealth and status. In some cases, households may resort to selling off their remaining crops to cope with the effects of the disaster, which can lead to a decrease in the overall value of crops in the market and a loss of income for those who rely on the sale of crops. Furthermore, the loss of crops owing to disaster will have long-term effects on the health and nutrition of the population. Crops provide an important source of nutrients, and the loss of crops can lead to malnutrition and other health problems, particularly among children and vulnerable populations. Specifically, at the household level, the damages and losses caused by the cyclone will reduce the income-generating decisions for farm households; restrict food consumption and dietary diversification initiatives; disrupt farm work; facilitate stress-induced ill health and human fatalities; increase migration from stricken areas; and reduce investment because of the perceived risk of asset loss.

### *Livestock subsector*

**Pre-disaster context: The livestock subsector contributes an estimated 7 percent to the**

**agricultural GDP** (Ministry of Finance and Economic Affairs 2023). At the household level, it is estimated that the livestock subsector contributes 16 to 50 percent of annual household income (Ministry of Agriculture 2021). Livestock plays a vital role in food security during typical years when the crop production has been inadequate for the whole consumption period, with animals sold to raise cash for food and to meet other household needs (Svesve 2015).

Seventy percent of the livestock population are found in rural areas (Ministry of Agriculture 2021), with species comprising cattle, goats, sheep, pigs, and chickens. The Lower Shire districts of Chikwawa and Nsanje host most of the country's cattle, with goats and sheep abundant across all 16 affected local authorities (Malawi PDNA 2015). Through Heifer International initiatives and the Government of Malawi's One Cow, One Household program, the Southern Highlands districts of Mulanje and Thyolo have become home to most of the country's dairy cattle. Production systems are mostly low input and low output, with over 80 percent of livestock either indigenous or local breeds (Ministry of Agriculture 2021). The livestock subsector faces several challenges including livestock diseases and inadequate pastures.

**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the livestock subsector amount to \$3.50 million across all 16 affected districts, with more damages mainly reported in Chiradzulu, Phalombe, and Mulanje districts.** In these three districts alone, about 47,899 livestock of various classes died following

the disaster and 5,530 livestock of various classes were injured, while some infrastructure was washed away. Across all affected districts, a total of 285,569 livestock owned by 104,565 households were either killed or injured. Some of the livestock were seen being washed away by heavy floodwater. Small ruminants were the most common livestock washed away by Tropical Cyclone Freddy. Some households lost pastureland, while others lost livestock sheds, feed, and fodders. The recorded damage was also due to the partial or complete destruction of livestock housing, dip tanks, markets, kraals, abattoirs, and other equipment. In addition, one of the public training centers for livestock husbandry was also affected by the cyclone.

**Disaster losses: The total losses related to Tropical Cyclone Freddy in the livestock subsector are estimated at \$3.04 million across all 16 affected districts.** The losses in the livestock subsector were attributed to animal deaths and the wash away of livestock; failure to access livestock products (meat, milk, hides, and skins); extra costs incurred in treating injured animals; and the partial or full destruction of livestock infrastructure, such as dip tanks and kraals. Households keep livestock for several reasons, including prestige and wealth creation. Households will likely experience production losses, such as milk, meat, eggs, and wool, because of the death of livestock. In addition, households will also encounter losses because they incur additional costs for adequate community animal care and veterinary services. Currently, the country's remaining 2,994,900 livestock are predisposed to increased disease risk. This will result in transient food shortages, and disrupted incomes for households dependent on livestock. Furthermore, the debris flows (mudslides) buried parts of the grazing land that provides fodder for livestock, forcing households to seek alternative means to feed their livestock and hence increasing the burdens on households.

**Social impact of disaster damages and losses: Livestock is an important source of food and income for many people in Malawi, particularly those in rural areas, and the damages to the**

**subsector will have significant social impacts on the country.** The current damages experienced by the livestock subsector will lead to food insecurity, loss of income, and increased poverty. Damages to the livestock subsector may also lead to social tensions and conflict, particularly in communities where livestock is a key source of wealth and status. In some cases, households may resort to selling off their remaining livestock to cope with the disaster, which can lead to a decrease in the overall value of livestock in the market and a loss of income for those who rely on the sale of livestock. Furthermore, the loss of livestock due to disaster can have long-term effects on the health and nutrition of the population. Livestock provides an important source of protein and other nutrients, and the loss of livestock can lead to malnutrition and other health problems, particularly among children and vulnerable populations.

### *Irrigation subsector*

**Pre-disaster context: The Department of Irrigation, in the Ministry of Agriculture, Irrigation, and Water Development, is mandated—under the National Irrigation Policy (2016)—to facilitate the growth and stabilization of agricultural production through mobilization of small- and large-scale irrigation projects,** with human and financial resources provision from the beneficiaries, the private sector, nongovernmental organizations, and the public sector. Malawi has a potential irrigable land size of 407,862 hectares, according to the National Irrigation Master Plan and Investment Framework (2015–2035). According to the 2021/22 annual report, 146,966 hectares of irrigable land had been developed to date, cumulatively representing 66.8 percent of the 2025 target and 36 percent of the country potential.

**Disaster damages: The total damages to the irrigation subsector resulting from Tropical Cyclone Freddy amount to \$20.05 million across 14 of the 16 affected local authorities (the 2 cities are omitted as neither has irrigable land).** About 9,477 hectares of irrigable land belonging to 46,135 households were affected by Tropical Cyclone Freddy, some of which will be

unusable for upcoming winter cropping. Irrigation infrastructure damaged by the cyclone includes 129 headworks; 75 solar pump sets; 8,746 meters of soil and water conservation bunds; 139,643 meters of canals; 14 storage reservoirs; 3,352 water control structures; 166,836 drains; and 34,229 meters of access roads. In addition, the cyclone damaged already mature crops that were receiving supplementary irrigable water. Most of the damage occurred in Chikwawa, with total damages of \$5.8 million, followed by Phalombe, with about \$3.4 million in damages. Furthermore, Chikwawa registered damages worth \$2.9 million to a single private entity, Illovo Sugar Company.

**Disaster losses: Tropical Cyclone Freddy affected about \$25.41 million in the economic value of irrigation returns across 14 of the 16 affected districts.** The economic losses in the irrigation subsector are due to the loss or reduced yield of crops that had already been planted and were affected by the cyclone. Had the disaster not occurred, households would have derived income from these crops through sales, helping households to move out of poverty. Furthermore, households must now rehabilitate drains, canals, and other infrastructure affected by the cyclone for the irrigation scheme or irrigable land to become usable once more. Solar-driven pumps will need to be procured for irrigation schemes. In addition, households will have to pay more money to transport their irrigable produce to market as the existing roads are damaged and impassable.

**Social impact of disaster damages and losses: The disaster effects have had an impact on the delivery of extension and technical services to farmers.** Some of the affected irrigation infrastructure remains inaccessible. Where farmers can access damaged infrastructure, its replacement is high risk, as wet and collapsing banks are likely to cause injuries. Given the disaster impacts, an increase in demand for irrigable areas and for irrigation water is expected, with the cost of accessing these services likely to rise, which is likely to most affect vulnerable groups such as the elderly, women, and the sick, for whom accessing income is challenging.

Catchment degradation is one of the major factors that increased the risk and vulnerability of irrigation schemes to Tropical Cyclone Freddy. Essentially, any runoff from rainfall causes most rivers to swell and overtop their banks. Subsequently, the weirs and other structures fail in terms of their stability and resistance against the water and silt pressures. For riverbank cultivation, short-term needs for recovery include distribution of irrigation equipment, preparation of climate-resilient designs, awareness of the requirement to adhere to the irrigation standards/code of practice, and capacity building of farmers and staff. In the medium term, the irrigation subsector will require rehabilitation of damaged schemes, with an emphasis on building back better and resilience. In the long term, there is a need to promote catchment management activities to protect or secure irrigation infrastructure, as well as promote the empowerment of farmer organizations.

The irrigation subsector in Malawi is critical to ensure food security and reduce poverty in the country. When disasters such as floods or droughts damage the irrigation subsector, significant social impacts can result. Disaster damage to the irrigation subsector can lead to reduced crop yields and food insecurity, particularly for those who rely on irrigation for their livelihoods. This can result in increased poverty and social tensions, particularly in rural areas, where agriculture is the main source of income. Furthermore, the loss of irrigation infrastructure can have long-term effects on the ability of communities to recover from disasters. In some cases, the high cost of repairing or rebuilding irrigation infrastructure may be unaffordable for affected communities, leading to long-term food insecurity and poverty.

### *Fisheries subsector*

**Pre-disaster context: The fisheries subsector (including aquaculture) accounts for about 4 percent of the agriculture sector's contribution to the national GDP** (Ministry of Finance and Economic Affairs 2023). Lake Malawi and major rivers such as the Shire River provide fishing opportunities throughout the year (Svesve 2015).

In certain areas, fish is regarded as another staple, and it is an important source of protein in these areas (Svesve 2015). In addition, while the fishing industry provides direct income from fish sales, it also provides employment opportunities, especially along the shore of Lake Malawi. According to the National Aquaculture Strategic Plan (2021–2031), some of the major problems identified with commercial aquaculture are technical and institutional in nature. Technical challenges include inadequate technologies (unable to deliver high yielding strains, quality feeds, best management practices); poor linkages between research, fish farmers, and extension services; and a poorly developed value chain and financial ecosystem.

**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the fisheries subsector are estimated at \$500,000,** with Mangochi District suffering the highest fisheries damage at \$200,000. The damages in the fisheries subsector include the destruction or wash away of 7,520 fishing boats, 392 dugout canoes, 26,543 items of fishing gear, 68 seine nets, 2,300 hooks and lines, 395 fishponds, and 58 smoking kilns.

**Disaster losses: The economic value of losses due to Tropical Cyclone Freddy stands at \$2.54 million.** Fishing households lost income from fish that were stocked in fishponds. In addition, households engaged in capture fishery could not catch fish during or immediately after the cyclone as doing so would have put their lives at risk. Moreover, households will have to pay additional costs to recommence operation of their fishing gear, as some components were partially or fully destroyed by Tropical Cyclone Freddy. Ultimately, this will affect household livelihoods and the uptake of fish-related proteins.

**Social impact of disaster damages and losses: The fisheries subsector in Malawi is an important source of food and income for many people, particularly those living near lakes and rivers.** Floods also negatively affected income due to lower volumes of fish sales resulting from reduced harvests. Disaster damage to the fisheries subsector can lead to reduced fish

stocks and income loss, particularly for those who rely on fishing for their livelihoods. This can result in increased poverty and social tensions. Furthermore, the loss of fisheries infrastructure can have long-term effects on the ability of communities to recover from disasters. In some cases, the high cost of repairing or rebuilding fisheries infrastructure may be unaffordable for affected communities, leading to long-term income loss and poverty. The subsector contributes more than 70 percent of Malawi’s dietary animal protein intake and 40 percent of the total protein supply. The subsector directly employs more than 60,000 fishers and 15,465 fish farmers (38.5 percent female). This suggests that in addition to the effects of floods on animal protein uptake, household livelihoods will also be affected by the disaster.

### **Trade subsector (commerce and industry)**

**Pre-disaster context: The trade subsector (commerce and industry) plays a very pivotal role in the economy of every country and Malawi is no exception.** The trade subsector in Malawi comprises micro, small, and medium enterprises (MSMEs) as well as large enterprises or industries, spread across various sectors of the economy, namely agriculture, manufacturing, mining, and wholesale and retail trade. The trade subsector (commerce and industry) is the largest employer and contributes over 30 percent of the national GDP. In 2019, MSMEs contributed about \$8.2 billion to Malawi’s economy. More than 80 percent of micro enterprises—which are considered the most vulnerable enterprises during times of disaster—are owned by women. The country’s large enterprises or industries, which employ about 756 people on average, are more resilient to natural disasters.

**Disaster damages: The total damages due to Tropical Cyclone Freddy in the trade subsector are estimated at \$8.41 million, with MSMEs highly devastated across all 16 affected districts.** About 17,704 business premises for MSMEs were partially destroyed and another 6,741 premises for MSMEs fully destroyed, while just 93

large industries were only partially affected by the cyclone. A small number of enterprises affected by Tropical Cyclone Freddy were reported to Ntcheu District Council. Damage to the subsector includes the destruction of shops, equipment, and stock. Several MSMEs were affected by the cyclone because most of their business operations occur within a home that is either a semipermanent or temporary house. Most of the affected large enterprises had their equipment damaged by Tropical Cyclone Freddy and some of these were pushed out of business during the disaster period. Most of the affected stock was soaked with water and washed away by heavy flooding.

**Disaster losses: The trade subsector also incurred some losses, both to MSMEs and large industries.** The total losses in the trade subsector are estimated at \$8.26 million. The losses to the subsector took the form of losses in revenue owing to businesses being nonoperational, and the additional costs that resulted from the increased costs of providing goods and services following the disaster.

**Social impact of disaster damages and losses: Disaster damage to the trade subsector in Malawi can have significant social impacts.** The subsector is a critical part of the country's economy, providing jobs and income for many people. Disaster damage can disrupt commerce and industry, leading to reduced economic activity and income loss. This can result in increased poverty and social tensions, particularly in communities where commerce and industry are the main sources of income. Furthermore, loss of infrastructure, such as roads, bridges, and markets, can have long-term effects on the ability of communities to recover from disasters. In some cases, the high cost of repairing or rebuilding infrastructure may be unaffordable for affected communities, leading to long-term income loss and poverty. Tropical Cyclone Freddy will likely push some households out of their engagement in MSMEs, with women the most affected group since they own the majority of micro enterprises—most vulnerable during times of disaster—which were heavily devastated by the cyclone.

## 5.4 Summary of Disaster Effects: Infrastructure Sector

**The Post-Disaster Needs Assessment (PDNA) assessed the effects of Tropical Cyclone Freddy on four subsectors of the infrastructure sector, namely transport, energy, water and sanitation, and water resources** (table 5.4). The transport subsector has the largest total effects (physical damages and economic losses), amounting to about \$110.83 million, followed by water and sanitation (\$41.08 million), energy (\$13.37 million), and water resources (\$12.76 million). In the transport subsector, Tropical Cyclone Freddy destroyed road networks, bridges, and culverts, thereby disrupting access and the delivery of goods and services in the affected districts. In the water and sanitation, and water resources subsectors, Tropical Cyclone Freddy destroyed dams, boreholes, and water distribution networks. Damages in the water and sanitation subsector likely increase the risk of the spread of waterborne diseases.

### *Transport subsector*

**Pre-disaster context: The Malawi transport sector is composed of four main modes of transport: road, air, water, and rail transport. Road transport** is the dominant mode, accounting for 99 percent of passenger services, 90 percent of domestic freight, and 90 percent of international freight. Air transport and water transport are minor modes, each accounting for less than 5 percent of passenger and freight movements. Rail transport is the least used mode, accounting for less than 1 percent of passenger and freight movements.

Malawi's road network comprises approximately 15,451 kilometers (km) of designated roads, of which 28 percent is paved (see map 5.2). Some 9,500 km of undesignated roads serve rural communities. Malawi's Southern Region, which was heavily affected by Tropical Cyclone Freddy, accounts for 3,618.3 km of the total road network, of which 1,312.5 km is paved and 2,305.8 km is unpaved. The paved road network is in better condition than the unpaved road network.

**TABLE 5.4. Total Effects of Tropical Cyclone Freddy on Infrastructure Subsectors, by District (US\$, million)**

	Transport	Energy	Water and sanitation	Water resources	Total
Ntcheu	—	—	0.05	0.96	1.01
Mangochi	27.40	0.11	0.93	0.83	29.27
Machinga	2.44	0.07	1.35	0.97	4.83
Zomba Rural	5.29	0.06	2.64	1.06	9.05
Chiradzulu	2.34	0.08	1.90	0.52	4.84
Blantyre Rural	5.43	0.05	1.98	1.94	9.40
Mwanza	0.21	0.01	0.15	1.01	1.38
Thyolo	11.27	0.16	1.35	1.17	13.95
Mulanje	13.67	0.11	4.77	0.82	19.37
Phalombe	13.53	10.53	8.04	0.13	32.23
Chikwawa	13.28	0.07	4.20	1.21	18.76
Nsanje	13.02	0.06	2.07	1.07	16.22
Balaka	—	0.02	0.54	0.55	1.11
Neno	0.51	0.07	0.19	0.25	1.02
Zomba City	—	0.02	4.54	0.13	4.69
Blantyre City	2.44	1.95	6.40	0.13	10.92
<b>Total</b>	<b>110.83</b>	<b>13.37</b>	<b>41.08</b>	<b>12.76</b>	<b>178.04</b>

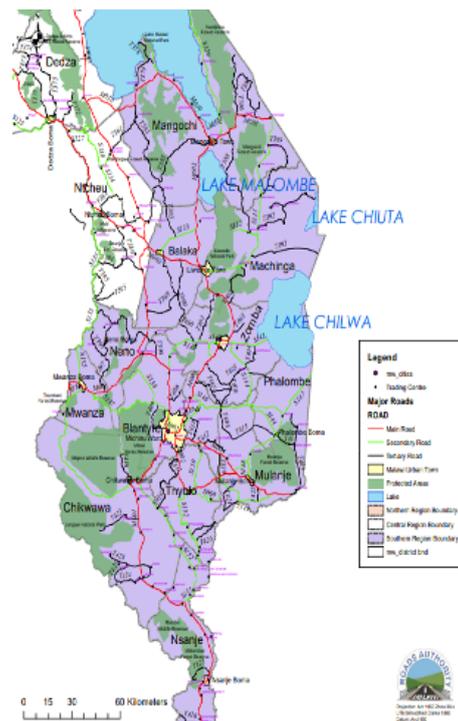
Source: [PDNA 2023 Team]

Unpaved roads are susceptible to flooding, instances of which have become severe in recent years owing to climate change.

Air transport is facilitated by three international and several domestic airports. The country’s railway line runs from Blantyre to the Port of Nacala in Mozambique and is primarily used to transport goods, particularly for the mining industry. The country’s limited water transport infrastructure includes small ports at Chilumba and Chipoka on Lake Malawi.

**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the transport subsector are estimated at \$104.39 million.** The damages vary geographically, depending on the degree of flooding experienced and the occurrence of landslides. Tropical Cyclone Freddy partially or fully destroyed approximately 1,820 km of road network: 524.2 km of primary roads, 775.4 km of secondary roads, and 520.4 km of tertiary roads. In addition, about 58 bridges were

**MAP 5.2. Southern Region Map Showing Road Networks**



Source: [PDNA 2023 Team]

destroyed and 117 culverts washed away by the cyclone. This led to several diversions being put in place as an immediate solution to some of the access issues created by the damaged bridges and sections of road.

In terms of damages to the transport subsector, the most significantly affected districts are Mangochi (\$26.6 million), Mulanje (\$13.3 million), Phalombe (\$13.2 million), Chikwawa (\$11.9 million), Nsanje (\$10.8 million), and Thyolo (\$10.5 million). The effect of the floods on the road network resulted in increased transport and operational costs and compromised access to social services and amenities. Furthermore, where damage to the road network made some roads impassable, this constrained the operationalization of relief and recovery activities. Consequently, the government was required to use more expensive modes of transport, such as airlifting, to supply relief items to the affected population, including internally displaced people.

**FIGURE 5.9. Image of Road and Bailey Bridge Damaged by Tropical Cyclone Freddy**



Source: [PDNA 2023 Team]

**Disaster losses: The total losses caused by Tropical Cyclone Freddy to road transport—the dominant mode in the transport subsector—are estimated at \$6.44 million.** The key indicators considered include the condition of the roads, the safety of road users, travel charges, operating costs, and road users' travel time. Tropical Cyclone Freddy resulted in increased travel time especially on sections of the road network where traffic was diverted to alternative routes following the destruction of bridges. Transport operators tend to charge additional costs because fewer vehicles are using the damaged roads, with some people unwilling to travel for fear of damaging their vehicles.

In addition, the damage caused to the road network by the disaster has negatively affected service delivery in other sectors, for example: (1) transport of medical supplies in the health sector; (2) transport of farm inputs and harvests; and (3) transport of relief items to the affected population. Furthermore, to restore the road network system, the road transport subsector spent unplanned resources on activities like the ferrying of bailey parts (for the construction of bailey bridges) from the Northern Region to districts in the Southern Region affected by the cyclone. In addition, the road transport subsector set up temporary diversions and removed landslides and rubble from select sections of road to ensure continued access to various services in the 16 affected districts.

**Social impact of disaster damages and losses: Destruction of road networks in the 16 affected local authorities has had several social impacts, including the payment of additional money and increased travel time to access services.** This has reduced the amount of income available for competing needs of equal importance. Tropical Cyclone Freddy has also reduced the profits made by enterprises as the cost of delivering products and services has risen because of the increased transport costs. Road transport subsector vulnerability to climate and disaster shocks is due to the following: (1) continued deforestation leading to increased soil erosion, resulting in siltation of drainage structures

and the wash away of road embankments and drainage structures; (2) encroachment into the road reserve, resulting in siltation of side drains and blockage of miter drains and culverts; (3) construction by local communities of other flood risk protection structures, such as dikes; and (4) sand mining leading to the wash away of drainage structures. The PDNA suggests strengthening the holistic assessment of landscape and flood risk and the enforcement of legislation and policies for integrated landscape and flood risk management.

### *Energy subsector*

**Pre-disaster context: The Malawi energy sector comprises four main sources of energy: hydropower, biomass, fossil fuels, and solar power.** Hydropower is the primary source of electricity in the country, accounting for over 90 percent of total electricity generation. Malawi has several hydropower stations located along the Shire River, including the Nkula, Tedzani, and Kapichira power stations. Power is generated and sold by the Electricity Generation Company Limited (EGENCO), the national electricity generating company. Five independent power producers also exist, and these mainly focus on solar power production and hydropower production, which contribute to power in the main grid. The Electricity Supply Corporation of Malawi (ESCOM) is responsible for transmitting and distributing electricity in Malawi.

EGENCO has an installed capacity of 441.55 megawatts (MW). Of this total, 390.55 MW is generated by hydropower, while 51.4 MW is from thermal diesel generators. The available capacity currently stands at 262.35 MW, however, against an estimated demand of 529 MW. Weekly power production is 290 MW, with an average gap of 29 MW due to production losses. Malawi's rate of electrification is considered one of the lowest among countries in the Southern African Development Community. In rural areas of Malawi, the electrification rate is worse—it is estimated at just 3.9 percent.

Biomass, including wood fuel and charcoal, is the primary source of energy for cooking and heating

in Malawi, particularly in rural areas. Biomass accounts for over 80 percent of the country's total energy consumption. Fossil fuels, including diesel and heavy fuel oil, are used as a backup power source when hydropower production is limited due to low water levels. Fossil fuels are primarily used in diesel generators, which are used to supplement the country's electricity supply during times of peak demand or when hydropower production is insufficient. Solar energy is an emerging source of renewable energy in Malawi, with several solar photovoltaic power plants installed in recent years. The country has abundant sunshine, making it well suited to solar energy production. Solar energy accounts for only a small proportion of the country's total electricity generation, however.

The energy subsector faces a few challenges, chiefly the pronounced effects of climate change, which has caused less rainfall over the years. This has affected the generation of electricity because of the reduced availability of water to hydropower plants. On the other hand, heavy rainfalls and cyclones lead to damage to the power generation infrastructure. Indeed, the energy subsector has not yet recovered from the previous tropical cyclones/storms Idai, Ana, and Gombe. Environmental degradation has also affected power generation. Moreover, lack of sustainable energy sources has made most communities dependent on illegal charcoal and firewood for energy use.

**Disaster damages: The total damages caused by Tropical Cyclone Freddy to the energy subsector are estimated at \$11.43 million, with Phalombe (\$10.34 million) the most heavily affected district, followed by Blantyre City (just over \$200,000).** Damage reported in the energy subsector largely relates to the impairment of transmission and distribution lines and related infrastructure, with most of the 16 local authorities affected by the cyclone suffering both physical and operational damages. The majority of the damages identified by EGENCO and ESCOM relate to the 11 kilovolt (kV) and 66 kV high tension lines, 132 kV low tension lines, and distribution transformers used for distribution to consumers.



Poles, structures, conductors, cables, and other hardware associated with the distribution lines have been damaged.

In Neno and Blantyre districts, the major Nkula and Tedzani hydropower stations suffered damage due to flooding caused by Tropical Cyclone Freddy. Independent power producers were badly hit, losing almost an entire power plant to the cyclone. EGENCO reported intake screens damaged by debris, spillways overtopped by floodwater, and intake channels eroded by sediment accumulating in the channels. At the Tedzani hydropower plant, the guide chain collapsed due to intense pressure from the raging waters. Partial damage has been reported to about 63 solar photovoltaic installations in some basic health centers in the Southern Region.

Due to these damages, power losses and blackouts were experienced in most of the affected districts in the Southern Region. Revenue losses were

primarily due to the production losses, which affected energy consumption.

**Disaster losses: Loss estimates of \$1.93 million due to Tropical Cyclone Freddy were gathered from representatives of EGENCO and ESCOM, where loss of sales was the main variable.** The values were adjudged for coherence and compared with the latest available pricing data. Losses represent a decline in revenue because of lost output or diminished economic activity. Losses pertain to the loss of revenue to EGENCO, ESCOM, and independent power producers. Losses on other sources of energy such as charcoal, which is widely used in Malawi, are also included. Immediate needs for the energy subsector are aimed at reconstruction, rehabilitation, and repair of the damaged infrastructure in the Southern Region used by EGENCO, ESCOM, and independent power producers. In the short term, this will involve fast-tracking the restoration of

damaged infrastructure such as poles, lines, and transformers, and the provision of renewable energy systems to affected communities. Medium-term needs include building back better steel towers and concrete structures, while long-term needs will involve reviewing the distribution network design to make it more resilient to natural and climatic hazards, while also exploring alternative sources of energy.

**Social impact of disaster damages and losses: Energy is a universal requirement, hence the social impacts of damages and losses to the energy subsector cut across the productive, social, and infrastructure sectors.** This is envisaged in Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all. As such, the effects of the disaster on energy requirements not only affected the power generators and distributors themselves, but also had an impact on the livelihoods of the affected population. In rural Malawi, the absence of clean and accessible energy sources and technologies affects many people, especially women, who rely on energy for their day-to-day activities. The temporary losses in power supply affected many businesses that rely on electricity, such as barbershops, salons, and maize mills. Households also lost perishable items of food stored in refrigerators.

Service delivery in hospitals was affected as hospitals rely on electricity to run many of their operations, including cold storage of drugs and other essentials. Some health centers also had their solar photovoltaic systems destroyed by the strong winds affecting their operation. Schools were affected owing to lack of lighting caused by loss of power supply. Businesses recorded revenue losses due to prolonged periods of power outages. The vulnerability of the energy subsector is mainly due to an overreliance on hydropower, which is weather- or climate-dependent. Moreover, the distribution lines for electricity are made of wooden poles, which were easily snapped by heavy winds due to Tropical Cyclone Freddy.

### *Water and sanitation, and water resources subsectors*

**Pre-disaster context: According to the Malawi Investment Plan (2014–2020), the country has over 31,983 boreholes and 2,392 protected shallow wells.** In addition, there are few solar powered piped schemes fitted with submersible pumps spanning a radius of 5 km and often connecting villages, market centers, health centers and schools. There are about 83 gravity-fed systems located in 13 districts of the Southern Region. About 22 percent of the schemes were not functioning at any one time. These gravity-fed systems provide water to about 2 million people through a total of 14,192 taps. About 40 percent of the taps are nonfunctional due to a combination of factors such as old age, catchment deterioration, neglect, inadequate local capacity to manage the water points, and vandalism. A total of 168 protected springs existed in rural areas with a functionality rate of 82.1 percent. Overall, the 2015-2016 Sector Performance report indicates that 77 percent of the water points are functional at national level. The country has a long-term vision to provide safely managed drinking water services for all, at all times, by 2030 (Sustainable Development Goal Target 6.1); with strategies that seek to address demand, supply, and the enabling environment for water supply to facilitate sustained functionality of water points. The Tropical Cyclone Freddy disaster affected all 13 districts in the Southern Region of Malawi plus a single district in the Central Region, thus affecting 50 percent of the country's 28 administrative districts. This severely set back the gains that had already been achieved in this part of the country.

**Disaster damages: The total damages resulting from Tropical Cyclone Freddy in the water and sanitation, and water resources subsectors combined are estimated at \$42.64 million (\$34.85 million of which relates to the water and sanitation subsector). WASH facilities for slightly above 1.3 million people have been damaged, with 900,000 people requiring urgent services.** Damage to the water and sanitation subsector includes destroyed water



sources and infrastructure such as boreholes and piped water supply systems, several which were washed away leading to a shortage of safe drinking water. For instance, a total of 1,847 boreholes and over 100 protected shallow wells were reported as damaged to varying degrees. In addition, hand pumps have been inundated with silt and clay. Several piped water supply schemes also experienced significant damage, including 39 intake structures and over 534 km of pipeline, with most damages occurring to the pipeline at river crossings, where underbed and overhead pipe crossings were washed away. The floods and landslides also contaminated water sources with debris, sewage, and other pollutants, increasing the risk of the spread of waterborne diseases. In addition, the cyclone destroyed pit latrines, toilets, and other sanitation facilities, leading to a lack of proper sanitation and increased risk of diseases such as cholera.

In the water resources subsector, Tropical Cyclone Freddy resulted in increased sedimentation that reduced the effectiveness of flood protection structures; hence, the structures could not hold back water and protect communities from flooding. Furthermore, heavy rainfall caused damage to dikes and dams, resulting in structural damage, erosion of the embankments, and

breaches, which in turn caused severe flooding and the destruction of nearby villages. The cyclone also damaged hydrological stations (groundwater and surface water monitoring stations), leading to a disruption in the data collection process, thereby affecting the accuracy of water resource management decisions. A total of 61 monitoring stations (groundwater and surface water), 38 water harvesting structures (dams and excavated tanks), and 21 flood protection structures have been damaged across all 16 affected districts.

**Disaster losses: The total losses caused by Tropical Cyclone Freddy to the water and sanitation, and water resources subsectors combined are estimated at \$11.21 million.** The disruption of access to soap, safe water, and other hygiene items also made it difficult for people to maintain proper hygiene practices, increasing the risk of the spread of infectious diseases. Losses to the water and sanitation subsector derived from increased operational costs associated with supplying potable and other water in the heavily affected areas as well as the evacuation camps. Moreover, the water user associations and water point committees also lost revenues from water users and had unplanned expenditure on the treatment of contaminated water. For example, about 2,695 boreholes are at high

risk of contamination as they were submerged under flooded water. In addition, the government incurred costs related to providing water and sanitation services, including latrines, to the displaced population in camps. Losses were also incurred in the subsector owing to costs associated with the removal of silt from water reservoirs or intake points; from reduced revenue from water supply; and from the cost of constructing temporary sanitation facilities and transporting water using water tankers. The prolonged unavailability of water resulted in many people, mainly women and girls, being required to spend more time fetching water, thereby reducing the time available for other, economic activities.

**Social impact of disaster damages and losses: Losses to the water and sanitation subsector are mainly due to the drop in production of potable water due to interruption of the water supply, and inundated boreholes.** Water boards and water user associations also experienced reduced revenues from water sales. In addition, Tropical Cyclone Freddy increased the walking distance to alternative water sources. In restoring water supply services, companies incurred additional costs for treating waterborne diseases, like cholera; for collection and disposal of solid waste; and for the rollout of awareness campaigns for improved water use and improved sanitation practices. Furthermore, the installation of temporary connections and provision of emergency WASH supplies was a burden to the water and sanitation subsector. With open defecation on the rise following the cyclone, owing to the collapse of toilets and some pit latrines, households will likely spend money on treating water as well as paying to treat waterborne diseases. Factors contributing to the excessive damages and losses in the water and sanitation subsector include poorly constructed water facilities and low enforcement of standards and principles by local authorities.

## 5.5 Cross-Cutting Issues

The PDNA has qualitatively highlighted the physical damages and economic losses incurred in the sectors that affect the delivery of goods and

services to Malawi's population. The total effects of Tropical Cyclone Freddy on cross-cutting issues total \$26.94 million, where damages account for \$5.56 million and losses for \$4.54 million. The recovery phase presents an opportunity to strengthen and integrate cross-cutting issues like gender and social inclusion, social protection, environment, disability, food security, and governance across the social, productive, and infrastructure sectors, as discussed below.

**Environment: Environmental degradation has increased the intensity of disasters—including Tropical Cyclone Freddy—causing multiple damages and losses to the environment and natural resources in the affected districts.** Deforestation, forest degradation, and a growing built environment in marginal lands have significantly increased the risk of landslides, soil erosion, and flooding. Moreover, unsustainable urbanization and poor land use planning, coupled with a lack of enforcement of environmental legislation, have intensified the effects of Tropical Cyclone Freddy in affected districts like Blantyre City.

The effects of Climate Change, especially more intense rain events, are exacerbated by no or poor runoff management. Runoff occurs when the rainfall intensity exceeds the infiltration (absorption) capacity of the soil. Changes in land use (including deforestation, encroachment, illegal structures in watercourses, and farming and development on steep slopes), loss of vegetation cover, and increased area of impervious surfaces/compact ground contribute significantly to increased runoff. The damage, loss and devastation experienced from even slight rain events can be quite significant. The impact from significant rain events such as cyclone Freddy are disastrous, as witnessed.

Excessive runoff results in increased volume of water draining across land into channels, wetlands, watercourses and rivers. In the process this runoff, especially on slopes, increases in velocity (and energy) causing significant erosion and force, resulting in extensive physical damage to assets, infrastructure (Especially

inappropriately/inadequately designed), crops, etc. The water collects soil and other pollutants (including pathogens) as it moves to lower areas. This results in the detrimental damage to water resources as a result of decreased water quality. Poor water quality from flood water reduce access to drinking water; the sedimentation blocks reticulation systems (both drinking water and irrigation schemes); the turbidity and increased suspended solids and pathogens significantly decreased water quality for drinking purposes resulting in an array of health impacts such as diarrhea, *cholera*, *giardia*, dehydration, as well as vector diseases such as malaria and bilharzia, amongst others. The sediment results in smothering of aquatic habitats and reduced oxygen levels in water resources, this leads to extensive fish kills through suffocation, and reduced breeding habitat in next breeding cycles resulting in reduce fish stocks for food and livelihood activities; the sediment deposition also results in aggradation (raising) of floodplains, which will result in wider flood affected areas and more people affected by subsequent rain events. Sedimentation of impoundments results in reduced storage capacity of the impoundment resulting in less water available for use e.g. drinking water supply for drier months, and reduced volume for hydropower generation as well as increased cost of operation maintenance to remove the sediment from the impoundment and maintain equipment scoured by the sediment load. The force of the water and erosion result in loss of productive soils, loss of physical land, loss of trees including natural forests, which in turn impacts on food security and soil health. The loss of trees not only results in loss of biodiversity, habitat and food for fauna, but also the loss of productive use such as fruit for food/income, medicinal use, timber for construction/income, and energy source (97–98 percent of households of Malawi rely on solid biomass—mainly firewood and charcoal— for cooking (CCDR, 2022)<sup>12</sup>). The full extent of damage to forests, biodiversity, land, loss of ecosystem services, pollution clean-up, and associated health impacts from pollution, are yet to be fully accounted and requires more detailed investigations and there will be delayed

impacts from decreased seasonal productive function of ecosystem services as a result of the sediment deposition in key water resources such as Elephant Marsh and Lake Chilwa which are critical fishing areas. Some fragile ecosystems have been destroyed by the cyclone in the districts of Zomba, Chikwawa and Nsanje which include Lake Chirwa, Elephant Marsh, Matandwe, Mwabvi wildlife reserve and Khuluvu Cultural Heritage sites.

The resilient recovery and restoration of degraded landscapes urgently requires runoff management. Runoff management is not about moving water out of the landscape as quick as possible, rather to slow the movement of water safely and sustainably through the landscape to enable improved infiltration for groundwater recharge for drier months, to reduce flood peaks and flash flooding. Efforts to address land degradation are anchored in the 2016 Malawi National Forest Landscape Restoration Strategy. An integrated catchment management approach is required for landscape restoration combining sustainable land use practice, improved and adequate runoff management, in order to rehabilitate damage from TS Ana and Cyclone Freddy.

There is significant amount of baseline data available from previous studies, including the CCDR and initial Natural Capital Accounts, Malawi Country Environmental Analysis, and various studies in Elephant Marsh, Lake Chilwa, and the Shire River Basin Management Program. This data can be used to identify extent of damage to the physical environmental, as well as for baseline data for quantifying impact to these critical ecosystems and impacts to ecosystem services.

**Gender and social inclusion: Tropical Cyclone Freddy has pushed more people into poverty, especially in 14 of the 16 affected districts, where over half of the population is poor and one-fifth is ultra-poor.** Women are the most affected population as over two-thirds of them depend on the sectors that have been affected by the cyclone. For example, in the agriculture subsector, women provide 70 percent of the

<sup>12</sup> World Bank Group (2022). *Malawi Country Climate Development Report* (CCDR).

labor force and depend on agriculture as their main source of livelihoods. In addition, women own most of the micro enterprises in the country, which have been damaged by Tropical Cyclone Freddy, hence they have suffered loss of income due to sales of goods and services being disrupted. Furthermore, most women live in temporary housing structures, many of which the cyclone fully destroyed, pushing them further into poverty. Most women in the districts affected by Tropical Cyclone Freddy are stripped of their dignity during menstruation as the camps hosting internally displaced people do not provide gender-sensitive WASH services.



**Social protection: Over 143,563 Social Cash Transfer Programme beneficiary households are in the affected districts.** About 5,368 (44 percent) of the country’s 12,220 early childhood development centers are in the 16 districts. Tropical Cyclone Freddy fully destroyed about 356 early childhood development centers and partially destroyed another 323 of these centers. With access to these services standing at only 49 percent prior to the disaster, the cyclone’s occurrence has further worsened the already challenging task of reaching vulnerable communities with social protection services. For instance, over 125 early childhood development centers or community-based children’s centers are being used as temporary shelters for

internally displaced people following the disaster. In other words, Tropical Cyclone Freddy may worsen the social protection and early childhood development center indicators in the affected districts.

**Food security: Tropical Cyclone Freddy has pushed most of the population in the affected districts into food insecurity.** Not only has the cyclone affected households’ food production but it has also severely disrupted access to food through markets. For instance, Tropical Cyclone Freddy washed away crops that were already mature, and in some places submerged agricultural land, making it unsuitable for agricultural purposes in the short to medium term. Moreover, owing to disruption in the transport subsector caused by the cyclone, the cost of food commodities at markets has risen. For example, in Chikwawa District, the price of grain has increased from 95 cents to \$1.10 per kilogram.

**Disability: Because of high poverty levels and low social inclusion among people with disabilities in Malawi, Tropical Cyclone Freddy has disproportionately affected this vulnerable population in the affected districts, which together host about 1.1 million people with disabilities.** About 10.3 percent of the people with disabilities in the affected districts have been affected by the cyclone—132,837 female and 127,628 males in total. Tropical Cyclone Freddy has increased the physical limitations of people with disabilities, through constrained access to public services, and the social limitations, through discrimination. It has also brought about secondary impairments and new barriers. For example, people with albinism who are dependent on relatives have been displaced to areas where they have no relatives. A total of 47,424 people with disabilities (24,186 female) have been displaced. In addition, for some people with disabilities, Tropical Cyclone Freddy has caused separation from or loss of relatives, assistive and mobility services, livelihoods, records such as personal national identification cards, and specialized health services. Furthermore, the cyclone washed away bottles of sunscreen, upon which people with disabilities rely heavily.

**Governance: Prior to the recently gazetted Disaster Risk Management Act (2023), the National Disaster Preparedness and Relief Act (1991) was the only legal instrument for disaster management in the country.** That previous instrument's focus was on response rather than disaster risk reduction. The new Disaster Risk Management Act aims to strengthen coherent and integrated working approaches among various actors and provides for the establishment of local government structures for disaster risk management (DRM), including in the agriculture, education, and health subsectors. Tropical Cyclone Freddy has exerted additional operational and administrative costs for managing response operations, coupled with losses in revenue streams, like market fees. In addition, Tropical Cyclone Freddy has damaged law enforcement infrastructure such as that of the police and prison services, threatening the upholding of the rule of law. For example, the cyclone forced the closure of the immigration office in Mulanje District, as the premises were flooded with water. In short, the disaster halted those decentralized operations of the local authorities that provide good governance and security to their residents.

**Cultural Heritage: Cyclone Freddy has greatly affected many cultural heritage resources of Southern Malawi, both movable and immovable cultural heritage, tangible and intangible heritage assets, i.e. UNESCO World Heritage sites, Mbona Sacred Rain Shrines, and Malawi Slave Routes.** Cyclone Freddy has affected several archaeological sites, cultural landscapes, and historical and monumental buildings. Exposure to flooding and inundation has damaged structural foundations, causing historical monumental structural instability. The total damage from the destruction of cultural sites amounts to \$1.8 million. The impact goes beyond direct Damage to heritage assets and considerable economic losses. The cyclone has disrupted tourism to heritage sites, leading to the loss of millions of Malawi Kwacha. There is also a loss of jobs from those who work at these sites. The sector's needs have totaled \$650,000.00 including developing a risk map of cultural assets, which will be the main reference tool to safeguard

Malawi cultural heritage against disasters. The sector will also conduct a multi-hazard risk and vulnerability assessment and multidisciplinary studies of key affected cultural heritage sites to better understand existing and ongoing risks and develop Disaster Risk Management Plans for all cultural heritage sites as part of their overall site-management plans. There is an urgent need to implement heritage recovery measures to rescue, safeguard, protect, preserve, and restore the affected cultural and natural heritage resources. The Department of Museums and Monuments will be responsible for developing and implementing a national emergency recovery action plan to build post-disaster resilience in the communities and rehabilitate the affected cultural heritage resources.

### *Disaster risk reduction and early warning system subsector*

**Pre-disaster context: Malawi is experiencing natural disasters at an increasing frequency.** The country was severely affected by floods from Tropical Storm Ana and Tropical Cyclone Gombe (2022), Tropical Cyclone Idai (2019), and Cyclone Chedza (2015). The country was also affected by El Niño-induced drought in 2016. Cholera and COVID-19 outbreaks have affected the country since 2019. As a result of the disasters' effects on social and economic development processes, the Government of Malawi has been providing food and relief services to 2 million people on average per year since 2015. Tropical Cyclone Freddy affected the disaster risk reduction and early warning system subsector by inducing damages to early warning systems and recovery equipment, and losses through the acquisition of extra services and resources and in the provision of these. Tropical Cyclone Freddy exposed gaps in search and rescue operations and knowledge on the occurrence and management of landslides, the cause of the highest number of fatalities.

**Disaster damages: The disaster risk reduction and early warning system subsector suffered damages totaling \$2.58 million as a result of Tropical Cyclone Freddy.** Owing to the severity of Tropical Cyclone Freddy, all dikes in Chikwawa,



Machinga, Nsanje, Phalombe, and Zomba were submerged and sustained damages. Many river gauges in the affected districts have been displaced or washed away. Tropical Cyclone Freddy induced record rainfall amounts, with 468 mm the highest daily amount. At many stations, actual amounts proved difficult to measure since the maximum collection capacity of rain gauges is 200 mm, resulting in loss of record when they overflowed. Partial damages were recorded for Stevenson screens (instrument shelters); the community-based flood early warning systems; and river gauges, with only two out of six fully functional in the affected districts. A boat for search and rescue also sustained damage during operations.

**Disaster losses: The disaster risk reduction and early warning system subsector suffered \$19.17 million in losses because of Tropical Cyclone Freddy.**<sup>13</sup> The losses emanate from inventory of evacuation centers (assessment, amenities, nonfood items, coordination); emergency operations center operating costs; stockpiling of additional emergency supplies; search and rescue operations, and airlifting of supplies and response personnel (personnel, boats, ropes, and protective gear); camp coordination and management (cost of commissioning and decommissioning camps, which includes tent installation, disinfection, transport, cleaning); provision of relief items to displaced households (cost of food and nonfood items); and disruption of governance and social processes, causing extra work for the local-level civil protection committees.

<sup>13</sup> This reflects a loss for purposes of the disaster event; however, the majority of these losses are in the form of partner and donor contributions to the disaster response and were not a public cost.





## 6. Disaster Impacts

### 6.1 Macroeconomic Impact

**Tropical Cyclone Freddy is estimated to have caused to Malawi's economy widespread production losses equivalent to \$36.4 million.** This translates as a real gross domestic product (GDP) loss of 0.5 percent, consequently slowing projected growth in 2023 to 2.2 percent. About 47 percent of these production losses were in the agriculture, forestry, and fishing sectors. This is in line with previous analyses that revealed that the agriculture sector is the sector in Malawi most susceptible to climate shocks. Also contributing to the projected decline in growth are the production losses from real estate activities, wholesale and retail trade, transportation and storage, electricity and water supply, education, and human health and social work activities.

**Resource requirements for disaster response and recovery will exert additional pressure on Malawi's public finances and debt levels.** With the fiscal position already weakened, and public debt levels elevated, external nondebt-creating flows will be necessary to ensure alignment with the government's fiscal consolidation process. Increased imports for disaster response and recovery needs, particularly those financed by the government, will not only worsen the foreign exchange shortage, but also exert additional pressure on the exchange rate. Moreover, with the slight decline expected in exports due to losses in output, the disaster is expected to further widen the current account deficit. The increased foreign financial inflows anticipated to support disaster response and recovery processes will have a positive impact on the financial account.

**Loss of crops and the expected subsequent reduction in agricultural output will worsen food insecurity in Malawi beyond the 20 percent experiencing food insecurity prior to the disaster** (IPC 2022). The additional upward pressure on domestic food prices will consequently push additional people into poverty, especially the portion of the population that relies on food purchases to supplement consumption. In the Southern Region, the poverty incidence rate had reduced to 56.7 percent in 2019/20, down from 65.2 percent in 2016/17. During the same period, however, inequality in the region worsened, with the Gini coefficient increasing from 0.342 in 2016/17 to 0.374 in 2019/20.

## Pre-disaster macroeconomic context

**TABLE 6.1. Key Macroeconomic Indicators, 2017–23**

Indicator	2017	2018	2019	2020	2021	2022	2023 (projected)
Gross domestic product (GDP) growth (%)	5.4	4.4	5.7	0.8	4.6	1.2	2.7
GDP per capita (Malawian kwacha)	375.9	411.9	457.6	478.1	527.9	612.3	799.42
Inflation (%) annual average	11.5	9.2	9.4	8.6	9.3	20.9	18.2
Exchange rate (average US\$/kwacha)	730.3	732.3	745.5	749.5	805.9	949.0	1034.7
Current account balance, incl. transfers (% of GDP)	-25.1	-14.7	-12.0	-12.9	-14.4	-2.8	-11.9
Fiscal balance (% of GDP)	-3.4	-6.1	-5.3	-6.6	-7.1	-7.4	-7.1
Primary balance (% of GDP)	1	-2.3	-1.7	-3.5	-3.3	-3.9	-2.3
External debt, public sector (% of GDP)	32.5	32.1	27.3	32.9	27.2	26.2	–
Domestic debt, central government (% of GDP)	22.6	22.2	21.1	27.2	31.2	33.4	–
Gross reserves in months of import cover	3.2	3.3	3.6	3.2	1.9	1.5	1.1
Lending rate	24.8	14.9	14.7	13.3	12.13	13.8	–

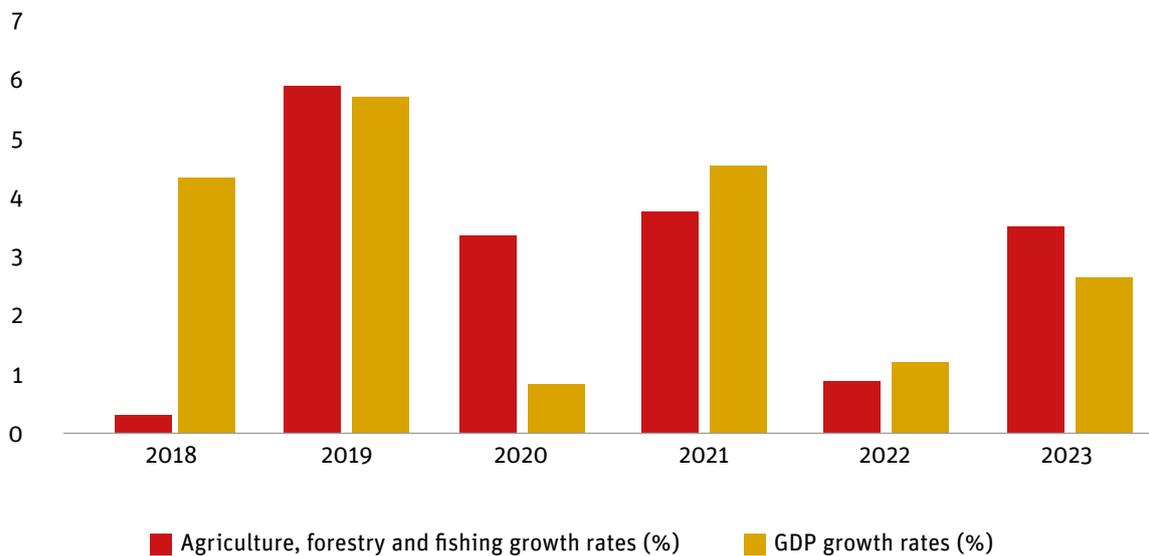
Source: [National Accounts and Balance of Payment (NABOP): Reserve Bank of Malawi, National Statistics Office, Dept of Economic Planning]

**Economic growth slowed to 1.2 percent in 2022 from the 4.6 percent registered in 2021** (table 6.1). This slowdown was driven by a combination of several factors: low agricultural production due to adverse weather conditions, which hindered economic activity in the agriculture, forestry, and fishing sector; devastating cyclones that damaged public infrastructure including power stations, roads, and bridges; the Ukraine war, which has disrupted the international supply of commodities and consequently increased commodity prices, and this effect has since passed over to domestic prices; and shortage of foreign exchange, which also exerted pressure on the exchange rate and consequently led to the 25 percent devaluation of the Malawian kwacha. High import costs, together with foreign exchange shortages, negatively affected

sectors that rely on importation of inputs for the production process. The subsequent rise in domestic inflation disrupted production and business operations in the country. Nevertheless, prior to Tropical Cyclone Freddy, the government projected growth to pick up to 2.7 percent in 2023, mainly driven by favorable weather conditions and anticipated improvements in the availability of foreign exchange.

**Malawi's current account balance has been in persistent deficit, with the gap widening to 14.4 percent in 2021.** A huge decline in external payments following the foreign exchange crisis, which impeded importation of goods and services, had contributed to the current account deficit, which improved to 2.8 percent of GDP in 2022. With the availability of foreign exchange

**FIGURE 6.1. Trends in Growth in the Agriculture, Forestry, and Fishing Sector and Real GDP (%)**



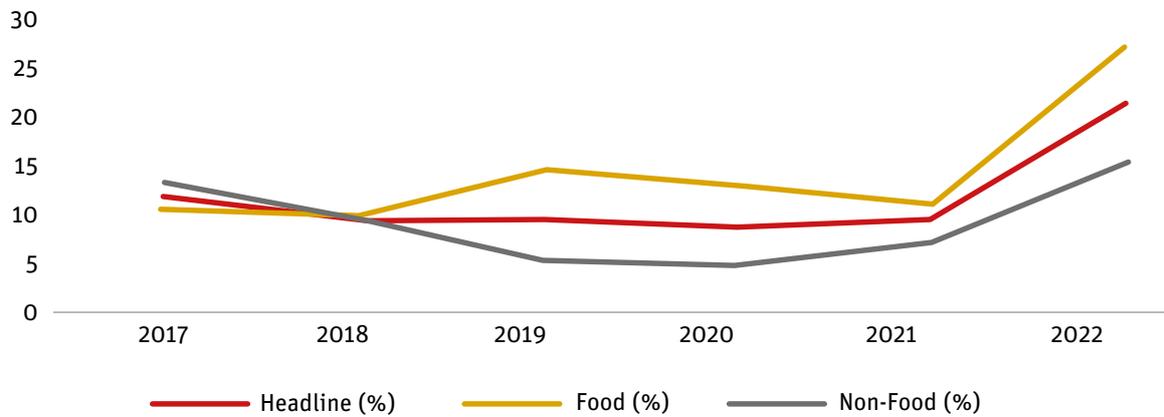
Source: [National Accounts and Balance of Payment (NABOP): Reserve Bank of Malawi, National Statistics Office, Dept of Economic Planning]

expected to improve and support imports, relative to 2022—on account of the expected balance of payment support through the International Monetary Fund’s Extended Credit Facility and via other development partners—against a moderate improvement in commodity exports, the current account deficit was projected to widen to 11.9 percent of GDP in 2023.

**Shortage of foreign exchange, amid an elevated demand for foreign currency to finance imports of goods and services, increased the vulnerability of the Malawian kwacha.** Consequently, the exchange rate premium widened beyond 40 percent and the government implemented a 25 percent devaluation of the Malawian kwacha in May 2022 as part of efforts to address the misalignment. This exerted upward pressure on inflation. The exchange rate is expected to remain stable, and market determined. Foreign exchange shortages have persisted, and demand for foreign currency to support imports has resulted in a dwindling reserve position. Gross official reserves were projected to cover 1.1 months of imports in 2023, down from 1.5 months of imports in 2022.

**Inflationary pressures mounted in 2022, pushing headline inflation into double digits.**

Already on an upward trajectory—mainly from the impact of supply-related challenges induced by the COVID-19 pandemic and the effects of Tropical Storm Ana—inflation was put under pressure from additional global and domestic factors. Supply-related constraints from the impact of the war in Ukraine pushed global commodity prices upwards. The passing on of higher prices to the domestic economy, compounded with low agricultural output, the devaluation of the kwacha, and increased money supply, resulted in average annual headline inflation reaching 20.9 percent in 2022, up from 9.3 percent in 2021 (figure 6.2). Food inflation was the primary driver, and maize prices have remained elevated, increasing to 696 kwacha per kilogram in March 2023. Nonetheless, annual headline inflation was projected to minimally subside in 2023, to an average of 18.2 percent. Favorable weather conditions were expected to result in increased crop yields, consequently lowering food inflation.

**FIGURE 6.2. Trends in Inflation: Headline, Food, and Nonfood Inflation, 2017–22 (%)**

Source: [National Accounts and Balance of Payment (NABOP): Reserve Bank of Malawi, National Statistics Office, Dept of Economic Planning]

**Recent macroeconomic developments have exerted pressure on Malawi’s already vulnerable fiscal stance, pushing average net lending above 6 percent of GDP since 2019.**

Slowdown of activity due to natural disasters and global conflicts has negatively affected revenue mobilization. The pace of revenue mobilization has failed to address the gap created by the reduction in donor budgetary support since the ‘cashgate’ scandal of 2013. Increased spending requirements for disaster response and recovery have exerted additional pressure on already high expenditure levels. Statutory expenditures consisting of wages and salaries, transfers to subverted organizations, interest, and pension payments have significantly increased in recent years, absorbing over 80 percent of domestic revenue on average. This is reducing the fiscal space for the delivery of public goods and services and infrastructure development necessary for economic recovery. This has consequently weakened the country’s fiscal position. Net lending is projected to decline to 8.0 percent of GDP in 2023/24, down from the 8.8 percent of GDP reported in 2022/23. Financing using high-cost borrowing has not only increased debt service costs but also exacerbated vulnerabilities in public debt and pushed it to unsustainable levels. Public debt reached 59.6 percent of GDP in 2022.

**Post-disaster macroeconomic impact**

*Impact on GDP*

**Production losses from the damage caused by Tropical Cyclone Freddy are estimated to result in a real GDP loss of 0.5 percent in 2023.** Economic growth in 2023 is projected to decline from the earlier estimate of 2.7 percent to 2.2 percent. These production losses were predominantly in the agriculture, forestry, and fishing sector, with an estimated 47 percent of the total GDP loss emanating from this sector (table 6.2). This is in line with previous analyses that revealed that the agriculture sector remains the sector in Malawi most susceptible to climate shocks. Other significant production losses emanated from the cyclone’s effects on real estate activities (15.2 percent of production losses); education (10.4 percent); and transportation and storage (6.8 percent). The loss in nominal GDP growth is estimated at 0.5 percent. This analysis used the production approach for the calculation of GDP based on the loss assessment by sectors.

**The crop production subsector was the subsector most affected by Tropical Cyclone Freddy, accounting for 41.8 percent of the total GDP loss.** The production losses affected

**TABLE 6.2. Real Gross Domestic Product (GDP) by Affected Sector Pre- and Post-Floods (Malawian kwacha, million)**

Sector	Pre-floods GDP (kwacha, million)	Post-floods GDP (kwacha, million)	GDP loss (kwacha, million)	Sector loss (% of total GDP loss)
Agriculture, forestry, and fishing	1,781,664.3	1,763,972.2	17,692.1	47.0
Crop and animal production	1,695,983.7	1,679,191.6	16,792.1	44.6
Crop production	1,085,124.8	1,069,388.0	15,736.8	41.8
Animal production	610,858.9	609,803.6	1,055.3	2.8
Fishing and aquaculture	76,719.7	75,819.7	900.0	2.4
Electricity and water supply	221,379.7	217,197.3	4,182.4	11.1
Wholesale and retail trade	944,669.1	942,447.8	2,221.4	5.9
Transportation and storage	352,835.7	350,271.3	2,564.4	6.8
Real estate activities	528,539.9	522,805.8	5,734.2	15.2
Education	325,640.0	321,738.2	3,901.9	10.4
Human health and social work activities	444,160.7	442,799.3	1,361.4	3.6
<b>Real GDP</b>	<b>7,891,256.5</b>	<b>7,853,598.8</b>	<b>37,657.7</b>	<b>100.0</b>

Source: [PDNA 2023 Team and NABOP]

food staples, specifically maize, rice, and tuber crops, as well as other food crops for smallholder farmers, and tea and sugar crops for plantation estates. A total of 54,949 hectares of agricultural land, equivalent to 26.8 percent of total hectares planted during the 2023/24 agricultural season, has been affected by the floods. The animal production subsector accounted for 5 percent of the total agriculture sector loss, affecting 285,569 livestock owned by 104,565 households. Total losses for the animal production subsector are estimated at 1.06 billion Malawian kwacha. In fishing and aquaculture, 1,483 fish farmers were affected, accounting for revenue losses totaling 900 million kwachas.

**Losses in the electricity and water supply sector are estimated at 4.18 billion Malawian kwacha, equivalent to 11.1 percent of the total GDP loss.** The electricity subsector experienced damage relating to the impairment of transmission and distribution lines and related infrastructure, as well as the accumulation of debris, which affected power generation at the main power stations. The power system was shut down for four days to mitigate further

damage. The water supply subsector registered a reduction in supply because of power outages and the destruction of water sources and related infrastructure such as boreholes and piped water supply systems, several of which were washed away. This led to a shortage of safe water in the affected districts.

**The wholesale and retail trade sector experienced revenue losses amounting to 2.2 billion Malawian kwacha, equivalent to 5.9 percent of the total GDP loss.** This was mainly due to loss in business and power supply disruption. Damages to the transport network disrupted supply chains, which negatively affected the wholesale and retail trade sector. In addition, loss in livelihoods for most people in the affected districts diminished disposable income, consequently affecting wholesale and retail trade. The sector has also benefited positively, however, owing to the increase in demand for relief items to support the affected population.

**Losses in the transportation and storage sector account for 6.8 percent of the total GDP loss.** The

floods led to damages to the transport network, contributing to the sector’s revenue losses of 2.56 billion Malawian kwacha. Slowdown in economic activities in other sectors such as wholesale and retail trade and agriculture, forestry, and fishing directly affected the performance of the transportation subsector.

**Real estate activities experienced significant revenue losses of about 5.7 billion Malawian kwacha, equivalent to 15.2 percent of the total GDP loss, owing to loss of property and damage to infrastructure.** In total, 260,681 houses were damaged or destroyed by the floods across the 16 affected districts, causing losses including the cost of emergency shelter, foregone income from rentals, and the cost of clearing debris. The need to vacate houses and offices owing to infrastructure damage has also negatively affected economic activities in the sector.

**An estimated 10.4 percent of the total GDP loss (in real terms) caused by Tropical Cyclone Freddy is on account of losses emanating from the education sector.** The losses arose from the disruption of access to goods and services, disruption of governance and social processes, and

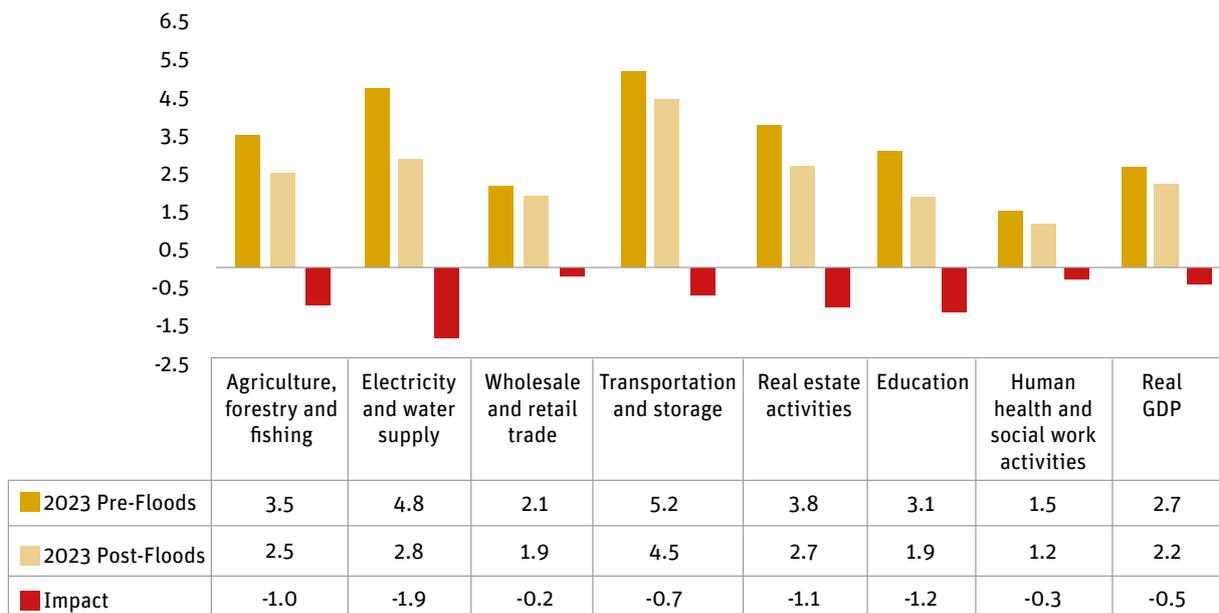
increased risks and vulnerabilities. Some school facilities were converted into shelters for internally displaced people. Students lost about 25 school days because Ministry of Education to suspend classes for almost 25 days in fear of heavy rains, flooding, and inaccessibility of schools further disrupting teaching and the learning calendar.

**Losses related to human health and social work activities amount to 1.36 billion Malawian kwacha, equivalent to 3.6 percent of the total GDP loss.** The losses to the sector are attributed to damage to infrastructure and equipment and disruption to service provision. The sector also experienced increased demand for health services to support the affected population and emergency response.

*Inflation*

**General increase in prices for goods and services:** Headline inflation, already on the rise since 2022, will face additional elevated pressures from the impact of Tropical Cyclone Freddy. These pressures will be most pronounced in the districts affected by the cyclone. Disruption to subsistence farming will increase upward

**FIGURE 6.3. GDP Loss by Sector (%)**



Source: [PDNA 2023 Team]

pressure on domestic food prices, but the impact will be slightly cushioned by crop yields in the Central Region, considering that the impact of the cyclone is mostly confined to the Southern Region. The cyclone will also affect nonfood inflation through two main transmission channels: foreign exchange pressures from the increased demand on imports for recovery and reconstruction, and additional transaction costs driving up prices because of disruptions to the transport network, housing, and infrastructure, among others. The extent of this nonfood inflationary effect will be minimized by the increased donor inflows anticipated given the declaration of a state of disaster in the hard-hit areas. This remains dependent on the dynamics of crude oil prices, however.

### *External Effects*

**Demand for goods and services during the recovery phase:** Increased imports for disaster response may worsen the current account deficit, but relative improvements in exports will partially contain the pressure. Most export commodities (tobacco, tea, and pulses) have not been highly affected by the floods. The floods have, however, caused supply chain disruptions by affecting the transport network, leading to an increase in export costs, with exporters having to use longer routes. Importation of goods and services is expected to increase to support recovery and reconstruction activities, thereby worsening the current account balance. This may consequently further worsen the foreign exchange reserve position. The expected increase in both donor inflows from development partners, in response to the disaster, and export proceeds will likely have a positive impact and contain some of the pressure caused by elevated imports.

### *Public Finances*

**Already weak fiscal position:** Additional spending needs to cover expenses related to disaster response may further weaken the country's fiscal position. Reduced economic activity will weigh down on revenue mobilization,

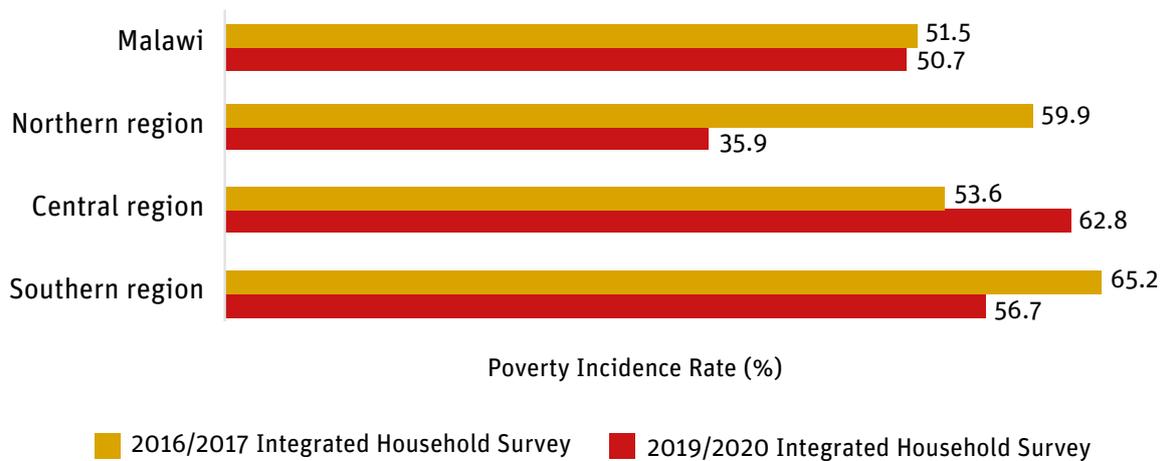
and consequently reduce the domestic resource envelope. The increased (nondebt-creating) donor inflows anticipated to support disaster response may boost disbursement of grants and partially contain the pressure. Additional spending needs may contribute to expenditure overruns. Given the reduced fiscal space, the government may struggle to meet planned expenditure, which may contribute to further deterioration of the fiscal position. Financing the gap may exert additional pressure on public debt and push it beyond 60 percent of GDP.

## 6.2 Human Impact

### Pre-disaster human development profile

**Malawi's poverty levels remain stubbornly high, but poverty incidence rates have improved slightly.** The national poverty incidence rate declined slightly from 51.5 percent in 2016/17 to 50.7 percent in 2019/20. In 2016/17, the Southern Region had the highest poverty incidence rate of all three regions, at 65.2 percent (figure 6.4), making the region historically more vulnerable to the impacts of natural disasters. Next came the Northern Region (59.9 percent), followed by the Central Region (53.6 percent). A reduction in the poverty incidence rate has since been observed in both the Southern and Northern regions, to 56.7 percent and 35.9 percent respectively in 2019/20. This translates as a reduction in susceptibility to the impacts of natural disasters for the population in the two regions. In contrast, the poverty incidence rate for the Central Region has increased, to 62.8 percent in 2019/20.

**Inequality has also improved nationally, with the Gini coefficient declining from 0.423 in 2016/17 to 0.379 in 2019/20.** This indicates that income distribution has slightly improved at the national level. At the regional level, however, income inequality worsened in the Southern Region, with the Gini coefficient for the region increasing from 0.342 in 2016/17 to 0.374 in 2019/20.

**FIGURE 6.4. Poverty Incidence Rate (%), 2016/17 and 2019/20**

Source: [National Statistics Office: Integrated Household Surveys 2016/2017 and 2019/2020]

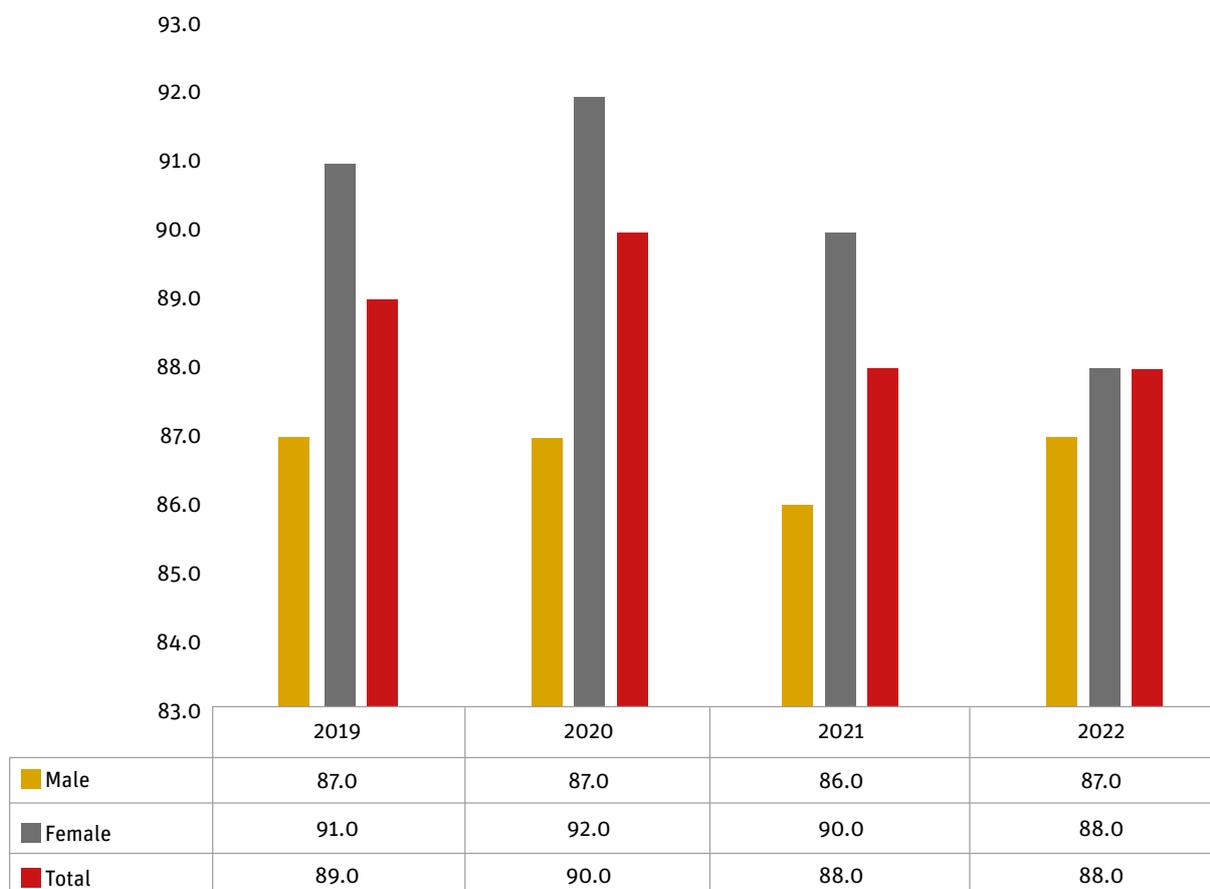
**Food insecurity has remained persistently high.** At the national level, the proportion of the population experiencing food insecurity has worsened, from 61.4 percent in 2016/2017 to 62.9 percent in 2019/2020, and it is higher in female-headed households (72.2 percent) than in male-headed households (58.7 percent). Food insecurity is more prevalent in rural areas (67.2 percent) than urban areas (40.7 percent), and it is more pronounced in the Southern Region, where 68.4 percent of households are classified as food insecure. This is further compounded by limited food production in the region. These figures reveal that any shocks such as floods will have a significant impact on the degree of food insecurity at both the household level and national level.

**Malawi has made significant strides in the last decade in improving nutrition indicators among mothers, infants, and young children.** The *Multi-Sectoral Maternal, Infant and Young Child Nutrition Strategy 2019–2023* reports that stunting among children of all ages declined from 47 percent to 37 percent. At 35.5 percent, however, the proportion of children under five years of age who are stunted remains higher than average for the Africa region (30.7 percent). Malawi is on course to reduce the prevalence of wasting and overweight among children. About 2.6 percent of children under five years are reportedly wasted, which is lower than

the average for the Africa region (6.0 percent). Similarly, the prevalence of overweight among children under five years has improved to 4.4 percent. About 59.4 percent of infants ages zero to five months are exclusively breastfed.

**Significant progress has been made in improving the health of the population over the last decade, even though some challenges remain.** Average life expectancy has increased by more than 10 years for both women and men, mainly because of improvements in child and adult health brought about by the robust implementation of human immunodeficiency virus (HIV) and lifesaving maternal and child health interventions. Maternal mortality has declined from 439 maternal deaths per 100,000 live births in 2015 to 349 maternal deaths per 100,000 live births in 2019. The under-five mortality rate has declined from 63 deaths per 1,000 live births in 2015 to 53 deaths per 1,000 live births in 2019. Likewise, infant mortality has fallen from 42 deaths per 1,000 live births in 2015 to 40 deaths per 1,000 live births in 2019, and neonatal mortality from 27 deaths per 1,000 live births in 2015 to 26 deaths per 1,000 live births in 2019. No progress has been made in reducing anemia among women of reproductive age, however, with 31.4 percent of girls and women ages 15 to 49 years affected today.

**FIGURE 6.5. Net Enrollment Rate (NER) for Primary Education in Malawi (2019–22)**



Source: [PDNA 2023 Team]

**Malawi’s net enrollment rate has remained largely unchanged over the last four years.** The net enrollment rate is a more refined indicator of school and enrollment coverage and explains the proportion of students enrolled in school in terms of official age group. Figure 6.5 shows that the total net enrollment rate for primary education in Malawi stood at 88 percent at the end of 2022. This means that 12 percent of the primary school-age population were not enrolled in primary schools in Malawi at the year-end. According to the 2018 Malawi Population and Housing Census, 19 percent of individuals ages five years and above had never attended school. Furthermore, only 34.9 percent of individuals ages five years and above were in schooling during the census period, of which 37.5 percent of those in schooling were in the Northern Region, 35.5 percent in the Southern Region, and 33.5 percent in the Central Region.

**The employment rate for Malawi stands at 81.5 percent, with many employees located in the Southern and Central regions (Malawi Population and Housing Census 2018).** Disaggregated by sex, the employment rate is 79.9 percent among females and 83.4 percent among males. The agriculture, forestry, and fishing sector remain the biggest contributor to employment in Malawi. Since most households depend on agriculture, any disaster shock to the sector significantly affects their livelihoods. Consequently, in such situations, most households turn to negative coping strategies such as prostitution, which eventually makes them more vulnerable.

**Malawi has made progress in the Human Development Index, with its score improving to 0.483 in 2019.** The country remains, however, within the low human development category, as



denoted by a score below the threshold of 0.550. Malawi's score on the index is also below the average score for Sub-Saharan Africa of 0.547.

### Post-disaster impact on human development

**The devastation to human development caused by the impact of Tropical Cyclone Freddy is multifaceted and far-reaching—more so than the impact of any other climatic shock that has befallen the country in the past 10 years.** Tropical Cyclone Freddy has singularly had significant human and social development effects on Malawi's population, massively deepening the effects on poverty in the country through job losses, displacement of residents from their homes, disruption of access to education and health services, and diminishment of livelihoods. This is worrisome, particularly for the Southern Region, which has historically registered poverty incidence rates above the national average. Even in 2019/20, irrespective of the overall improvement in the poverty situation, the Southern Region still

had a higher poverty incidence rate (56.7 percent) than the national average (50.7 percent).

**Weather-related shocks have rendered Malawi vulnerable to food and nutrition insecurity, and the cyclone's impact is aggravating the situation.** The food and nutrition situation in Malawi has generally been vulnerable despite increases in humanitarian assistance over the years. The situation has been aggravated by the continued unpredictable weather shocks caused by El Niño and by Tropical Cyclone Idai (2019), Tropical Storm Ana and Tropical Cyclone Gombe (2022), and Tropical Cyclone Freddy (2023).

**The floods caused by Tropical Cyclone Freddy have affected farming households in the Southern Region and have thus had a significant negative impact on the food security situation in the region.** The damage to crops, livestock, and infrastructure has led to most farming households—which rely on their production to meet their own needs—experiencing food shortages as well as loss of livelihoods, with most

farming households failing to access food from the market as an alternative. The cyclone has reduced food production in Balaka, Blantyre, Chikwawa, Chiradzulu, Machinga, Mangochi, Mulanje, Nsanje, Ntcheu, Phalombe, Thyolo, and Zomba districts, which has affected food expectations nationally, especially in the southern part of the country.

**Food insecurity exposes women to economic hardships, leading to the use of hazardous ways and means of soliciting financial resources, such as prostitution, thereby exposing women to greater risk of HIV infection.** Malawi's rate of HIV infection is very high, with poor healthy eating habits among most of the population leading to malnutrition in the low- and middle-income quintiles, especially among women and children. The disease also suppresses the appetite at times, hence an increase in the level of malnutrition among women living with HIV. Poor breastfeeding trends and an inadequate food intake among mothers in the low- and middle-income quintiles contributes to nutrition deficiencies for children ages zero to six months,



which is the prime growth period, leading to high numbers of malnourished and underweight infants (NSO and ICF 2011, 2017).

**Tropical Cyclone Freddy is likely to have a modest bearing on the net enrollment rate.** At least 633 education institutions (550 primary schools, 74 secondary schools, 3 colleges, and 6 universities) experienced some level of loss and damage. Seventy-two classrooms, 87 teacher houses, and 986 toilets were destroyed, along with key school infrastructure. The Post-Disaster Needs Assessment (PDNA) estimates that public education assets valued at about \$30.2 million were damaged. In addition, several schools were turned into camps for internally displaced people, accommodating most of the affected population. Teaching and learning were suspended during the disaster period. Over 724,700 learners were unable to access learning because of the cyclone, with an average of 25 school days lost across the affected districts. Total losses caused by the cyclone to the education subsector are estimated at \$11.83 million across the 16 affected districts.

**Tropical Cyclone Freddy will have varying impacts on employment, with some sectors or subsectors losing income activities and others gaining them.** Agriculture is the subsector most affected by the cyclone, and this will increase the vulnerability of the many households reliant upon agricultural production for their livelihoods since there are no crops to harvest or harvesting activities to be carried out for income. The losses to the agriculture subsector come from all its constituent parts, including crops, livestock, and fisheries. Other economic subsectors affected in terms of employment include water and sanitation, transport, energy, and trade, with a significant impact felt by micro, small, and medium enterprises (MSMEs). There has, however, been an increase in disaster-related employment to support distribution of relief items and the removal of debris across affected districts.



## 7. Recovery Needs

**After disaster has struck, it is necessary to address the needs of the affected population, and interventions are designed to address these needs over the short, medium, and long term.** This PDNA has considered the needs for recovery and reconstruction of the sectors and subsectors affected by Tropical Cyclone Freddy. Total recovery needs for the physical damages and economic losses are estimated at **\$680.36 million**, and recovery interventions will be implemented over a period of one to five years, where under one year is considered short term, one to two years is medium term, and three to five years is long term (appendixes D, E, and F). Specifically, the social sector requires about \$274.84 million, while \$233.51 million is required by the infrastructure sector. Needs for the productive sector and cross-cutting issues amount to about \$100.55 million and \$71.46 million respectively. The needs for disaster risk reduction alone amount to \$38.9 million.

The principles of ‘building back better’ subsequently informed the formulation of recovery and reconstruction needs. About \$169.16 million is budgeted for short-term recovery and reconstruction needs, \$156.89 million for medium-term needs, and \$354.31 million for long-term needs (table 7.1).

**TABLE 7.1. Recovery Needs for Social, Productive, and Infrastructure Sectors, by Subsector (US\$, million)**

Sector	Subsector	Short-term	Medium-term	Long-term	Total
Social	Housing	34.21	1.46	156.83	192.49
	Health and nutrition	2.26	5.00	1.45	8.70
	Education	26.05	15.88	31.72	73.65
	<b>Subtotal</b>	<b>62.51</b>	<b>22.34</b>	<b>190.00</b>	<b>274.84</b>
Productive	Crops	20.04	31.02	0.31	51.37
	Livestock	0.81	0.21	2.27	3.29
	Irrigation	8.00	24.64	2.50	35.14
	Fisheries	0.84	2.56	0.62	4.02
	Trade	1.34	2.35	3.02	6.72
	<b>Subtotal</b>	<b>31.04</b>	<b>60.79</b>	<b>8.72</b>	<b>100.55</b>
Infrastructure	Transport	24.35	42.90	93.96	161.22
	Energy	0.30	0.18	0.37	0.85
	Water and sanitation	16.48	10.05	20.07	46.61
	Water resources	8.78	5.36	10.70	24.84
	<b>Subtotal</b>	<b>49.92</b>	<b>58.49</b>	<b>125.10</b>	<b>233.51</b>
Cross-cutting issues	Disaster risk reduction	13.76	8.39	16.75	38.90
	Other cross-cutting issues	11.94	6.88	13.75	32.56
	<b>Subtotal</b>	<b>25.69</b>	<b>15.27</b>	<b>30.50</b>	<b>71.46</b>
<b>Gross total</b>		<b>169.16</b>	<b>156.89</b>	<b>354.31</b>	<b>680.36</b>

Source: [PDNA 2023 Team]

## 7.1 Social Sector

**Housing needs: The total costs for recovery and reconstruction in the housing subsector are valued at about \$192.49 million, representing 25 percent of the total recovery needs related to Tropical Cyclone Freddy** (appendix A). Eighteen percent of the needs are budgeted for the short term, while 81 percent are for long-term activities. Short-term needs include removal of debris flows (mudslides), while long-term needs consist of construction and the strengthening of housing legislation (appendix D). Phalombe, Mulanje, Blantyre City, Mangochi, and Chiradzulu are the districts with the most prioritized needs. About 57 percent of the subsector's total recovery needs are earmarked to address housing challenges in Phalombe, Mulanje, and Blantyre City. The prioritized interventions during the early recovery phase could include technical and detailed damage assessment, vulnerability mapping, and technical support to local governments for formulating and enforcing seismic resilience, urban planning, and development controls as well as promoting community- and area-based inclusive and sustainable recovery strategies. Local authorities should ensure that households planning their own reconstruction are guided



properly in regard to siting, design, materials, and labor requirements for safer and resilient reconstruction and rehabilitation.

**The total cost of recovery for the housing subsector amounts to \$192.49 million.** The recovery strategies and needs for the short-term total \$34.21 million (representing 17.77 percent of the total needs); for the medium term, \$1.46 million (0.76 percent); and for the long term, \$156.83 million (81.47 percent). The largest needs for the housing subsector are for Phalombe (\$39.0 million or 20.25 percent of the total needs for all local authorities), Mulanje (\$36.0 million or 18.71 percent), Blantyre City (\$34.6 million or 17.95 percent), Mangochi (\$20.4 million or 10.59 percent), and Chiradzulu (\$18.6 million or 9.64 percent).

**Health and nutrition needs: Recovery and reconstruction needs in the health and nutrition subsector amount to \$8.70 million, with 50 percent of the needs targeted in the medium term** (appendix A). In this subsector, the recovery phase aims to restore the primary health delivery system that integrates resilience building toward disasters. The near-term priority is to restore the continuity of essential health services in functional facilities, while continuing to provide services through mobile units to affected areas without functional health facilities. This includes ensuring vaccines and medicines for the care of pregnant women, and children, as well as providing mental health and psychosocial support services to the affected population, reequipping hospitals and laboratories with essential medical and diagnostic equipment, continuing to actively monitor children and pregnant women for malnutrition, and working closely with the water and sanitation subsector to prevent outbreaks of waterborne disease, including cholera. This recovery strategy advocates for the provision of health services that meet minimum standards for health care based on the principles of equity, access to essential health care, timeliness, achievement of results, and accountability.

**Education needs: Recovery and reconstruction needs in the education subsector, consisting of**

**infrastructure and service delivery restoration, are estimated at \$73.65 million** (appendix A).

The short-term needs in the education subsector amount to \$26.05 million, while medium-term needs are evaluated at \$15.88 million, and \$31.72 million is allocated for long-term needs. The rebuilding of the education infrastructure must consider resistance to landslides; and green and child-centered school designs. This would encompass the provision of temporary and semipermanent alternative learning spaces and the repair of partly damaged schools, as well as the repair of educational administrative structures. In addition, learning materials, furniture, and school-based counseling programs for the traumatized would need to be provided. Teachers will need to be trained in psychosocial counseling and recruitment of additional teachers will be required. Reconstruction of school blocks that have been destroyed should follow the recently adopted Safer School Construction Guidelines and sanitation facilities should account for the safety needs of both girls and boys.

## 7.2 Productive Sector

**Agriculture (crops, livestock, irrigation, and fisheries): Recovery and reconstruction needs related to agriculture are estimated at \$93.83 million** (appendix B). The crops subsector suffered most of the total effects, hence it has the largest recovery needs of all the agriculture subsectors, which are projected at \$51.37 million. The immediate to short-term recovery interventions in the crop's subsector include: (1) supporting farmers with inputs for the residual moisture planting and irrigation; (2) training households in food budgeting and preservation; and (3) supporting farmers with drought-tolerant and early maturing planting materials such as cassava, orange-fleshed sweet potatoes, sorghum, and millet. The medium- to long-term interventions comprise the following: (1) enforcement of policies that restrict cultivation on marginal lands; (2) promotion of riverbank rehabilitation through planting of fruit trees, such as banana plants, and pasture along riverbanks; and (3) advocacy for water harvesting technologies as well as catchment soil and water conservation measures.

**Livestock needs: In the livestock subsector, recovery interventions will minimize the further spread of parasites and vectors that could influence productivity and the livelihoods of the affected population. The total cost of recovery and reconstruction in the subsector is \$3.29 million** (appendix B). The prioritized short-term needs include enhancing production through livestock restocking programs and improved animal housing and equipment; animal health interventions in the affected districts; and supporting the technical and operational capacity of the Department of Animal Health and Livestock Development. To ensure livestock health, other interventions include increasing access to water, by rehabilitating water reservoirs/catchment areas and constructing water points; and distribution of small-scale equipment (where needed). The medium- to long-term recovery needs aim to enhance governance systems in the subsector through the finalization and implementation of the Livestock Sector Policy and its alignment with the National Resilience Strategy. The strengthening of the restocking programs will involve active disease surveillance; parasite and vector control (ticks, tsetse flies, and fleas); and establishment of water points and fodder banks (one per extension planning area in the Shire Valley Agriculture Development Division).

**Irrigation needs: Strengthening the irrigation subsector is one of the adaptation strategies for disaster preparedness, with irrigation an immediate means of recovery when crop production is reduced** (appendix B). The total recovery and reconstruction need for the irrigation subsector are estimated at about \$35.14 million. For recovery, reconstruction and rehabilitation of the partially damaged irrigation infrastructure will be undertaken. Farmers will also be provided with either treadle pumps or motorized pumps as a temporary measure. Reconstruction activities will include the conducting of surveys, production of designs, construction of schemes, and procurement of equipment.

**Fisheries needs: Recovery and reconstruction needs for fisheries are valued at \$4.02 million, with medium-term needs accounting**

**for more than half of the total needs for the subsector** (appendix B). The recovery needs include repair and reconstruction of fishing boats and landing sites, supply of fishing nets and other gear, rehabilitation of fishponds, and supply of fingerlings and fish feeds to affected fish farmers. Reconstruction will involve repair and reconstruction of infrastructure that was fully destroyed, including fish processing plants, fishponds, and fishing gear.

**Trade needs: The trade subsector (commerce and industry) would require an estimated \$6.72 million to implement reconstruction of the damaged infrastructure and recover lost capital assets across the affected districts** (table 7.2). Multistakeholder collaboration is, however, one of the factors critical to the success of planned

recovery strategies in the trade subsector (commerce and industry). While efforts should be made in the transport subsector to rebuild bridges and the road network to ease access to affected markets, the following strategies should be implemented in the trade subsector: (1) provision of affordable loans to both women and men with micro enterprises affected by the floods; (2) provision of relief items to women and other vulnerable groups as well as men to ease pressure on their capital and businesses; (3) offer both women and men a training program covering business development and management skills as well as financial management; (4) sensitization of community members, including women, on minimum standards for construction; (5) swift reconstruction of damaged community markets to provide a continued source of livelihoods; (6)

**TABLE 7.2. Recovery and Reconstruction Needs for Trade Subsector across Affected Districts (US\$, million)**

Districts	Short-Term	Medium-Term	Long-Term	Total
Ntcheu	0.00	0.01	0.01	0.02
Mangochi	0.08	0.14	0.17	0.39
Machinga	0.04	0.07	0.09	0.21
Zomba Rural	0.06	0.10	0.13	0.30
Chiradzulu	0.14	0.25	0.32	0.71
Blantyre Rural	0.08	0.14	0.19	0.41
Mwanza	0.01	0.02	0.02	0.05
Thyolo	0.05	0.09	0.12	0.26
Mulanje	0.17	0.31	0.39	0.87
Phalombe	0.16	0.29	0.37	0.82
Chikwawa	0.03	0.06	0.07	0.16
Nsanje	0.07	0.13	0.16	0.36
Balaka	0.02	0.04	0.05	0.11
Neno	0.00	0.01	0.01	0.02
Zomba City	0.10	0.17	0.22	0.50
Blantyre City	0.31	0.54	0.69	1.54
<b>Gross total</b>	<b>1.34</b>	<b>2.35</b>	<b>3.02</b>	<b>6.72</b>

Source: [PDNA 2023 Team]

reconstruction of damaged infrastructure, such as road and communication networks, to ensure connectivity to markets; and (7) mobile existing and potential villagers and women's VSLs into cooperatives.

### 7.3 Infrastructure Sector

**Transport needs: The recovery and reconstruction needs for the (road) transport subsector amount to \$161.21 million, including the rehabilitation of primary roads, secondary roads, and bridges** (appendix C). These needs cover the implementation plan activities over the short term (\$24.35 million), medium term (\$42.90 million), and long term (\$93.96 million) (appendix F). The provisions for 'building back better' to disaster resilient standards have guided the estimations for the recovery and reconstruction needs for the transport subsector. Recovery actions include the construction of bridges and drainage structures to allow access to currently inaccessible areas, and should start with road clearance, removal of rubble/obstructions, and the construction of temporary bridges, where needed, to restore access to residential areas, markets, and essential services such as health and education services. As part of the reconstruction effort, earth roads that link the rural areas with the main roads and bridges will be upgraded and rehabilitated, requiring comprehensive designs.

**Energy needs: The total recovery needs for the energy subsector amount to \$850,000** (appendix C). The energy subsector will develop strategies to reduce the impacts of future floods on the energy infrastructure, as most of the damaged assets were electricity towers and substations, and the prioritized immediate needs consist of repairing damaged transmission and distribution networks, both formal and informal. Initial efforts are expected to focus on assets that are part of the functional or used network. The total early recovery needs covering both reconstruction and service restoration are estimated at \$300,000 in the first year, followed by an additional \$550,000 in the medium to long term (appendix F).



**Water and sanitation needs: The urgency of restoring access to safe and potable water cannot be overemphasized.** The cost of recovery and reconstruction for the water and sanitation subsector is \$46.61 million (appendix C). The immediate to short-term recovery needs include rehabilitation and disinfection of damaged boreholes and protected shallow wells; temporary repairs on the damaged gravity-fed systems; and provision of safe water in the camps for the displaced communities, to ensure access to potable water. To build back better, the recovery works will adhere to standards at all levels or stages. The medium- to long-term needs include risk assessment of environmental hazards to evaluate the site location of the damaged structures; redesign of the damaged structures, based on the risk assessment findings; and training of local contractors on building standards for water and sanitation structures. The public should be aware of the importance of following resilient construction standards in constructing latrines. Behavior change messages on proper use

of sanitation and hygiene facilities, promotion of open defecation free status, and capacity building on the operation and maintenance of water supply structures will be conducted in the affected districts to restore the hygiene status of communities previously declared open defecation free.

The immediate requirement of the water and sanitation subsector is to ensure basic minimum service provision, including restoring infrastructure for safe water supply and sanitation to limit the spread of cholera, and providing funding for the operational costs for these facilities. The water utility company needs to complete the repairs to the infrastructure to resume the required level of service and ensure proper water quality. These repairs should take advantage of any opportunities to improve the design and efficiency of services (for example, by reducing energy usage).

**Water resources (flood protection) needs: Recovery and reconstruction needs in the water resources subsector are valued at \$24.84 million** (appendix C). The immediate needs for the water resources subsector include riverbank stabilization, and rehabilitation of dikes and all flood protection structures, considering that these may cause further damage to existing infrastructure as well as unprotected communities and farmland during the next rainy season. The recovery works will be performed in consideration of the principles of ‘building back better’. For dikes, this includes the raising of heights (designing for a higher return period) and installation of grouted rock protection and aprons along critical sections of dikes and spillways to allow for controlled overtopping. Dams are to have upgraded spillways and outfalls (including downstream channels) with grouted rock protection. For hydrological monitoring stations, it is proposed that weirs are installed, as they



are more robust. The design standards for flood protection structures and dams would be updated to ensure resilience against natural disasters.

**Disaster risk reduction needs: The total recovery and reconstruction needs for disaster risk management (DRM) amount to \$38.90 million, with \$16.75 million (almost 65 percent) budgeted for long-term needs.** In terms of short-term recovery strategies, the disaster risk reduction subsector will prioritize activities such as conducting gender-responsive disaster risk assessment, including capacity building of stakeholders; reviewing the implementation of the National Disaster Recovery Framework and its alignment with the recovery framework of the present PDNA; monitoring the implementation of the National Disaster Recovery Framework, which incorporates the recommendations of the present PDNA; supporting the development of evacuation plans in disaster-prone areas; and reviewing the disaster impact and needs assessment and reporting processes to include recovery needs (including over the short, medium, and long term; and capacity building of stakeholders at the national and local level). The medium-term recovery needs include strategies such as rehabilitation; establishment and strengthening of community-based flood early warning systems, with consideration for the needs of women, children, the elderly, and people with disabilities; and support for the development of DRM plans. The long-term recovery needs include the construction of four evacuation centers (one in each Chikwawa, Nsanje, Phalombe, and Zomba districts); and promotion of ecosystem and cross-boundary disaster risk reduction (catchment management, and capacity building of communities in catchment and riverbank management) with consideration for the needs of women, men, children, and people with disabilities.

**Cross-cutting needs: Including the needs for disaster risk reduction outlined above, the**

**cross-cutting issues will require a total of \$71.46 million.** The recovery phase will target cross-cutting issues in various subsectors, focusing on disaster risk reduction, gender and social inclusion, people with disabilities, governance, environment, cultural heritage, and community-based structures. The key strategy for the cross-cutting issues will be to ensure that national plans, policies, institutions, and budgets reflect government commitments to human rights and to gender equality and social inclusion, particularly of vulnerable groups. The post-disaster recovery presents an opportunity to start to redress inequalities and social exclusion; at the very least, it should not perpetuate unequal access to power and resources. Financial and human resources for recovery should therefore be allocated in a manner that fosters the meaningful inclusion and participation of marginalized or vulnerable populations at the community level.

From an Environmental perspective, immediate needs include (i) Stabilizing of landslide affected areas, using approaches of least disturbance; (ii) Sediment trapping to prevent further excess sediment reaching water resources; (iii) Securing critical ecological areas, including proactive ecosystem services rehabilitation, including bans/ limits placed on harvesting ecosystems goods and services to enable them to replenish and restock; (iv) Clearing of sediment reticulation systems; implement sediment traps at water abstraction points; clearing and regular maintenance to prevent blockage of stormwater drains; (v) Monitoring of biodiversity in fragile ecosystems and strengthening environmental governance capacity; (vi) Waste removal and sanitary facilities provision in districts and cities, including camps hosting displaced people; (vii) clear guidelines and necessary impact assessments for temporary shelters, camps and resettlement areas, in order to prevent the impacts as identified that result in future disaster and damage.





## 8. Principles for Resilient Recovery

**Tropical Cyclone Freddy and the increased disaster effects resulting from its impacts, as compared to other historical events, further enforces the following priorities outlined in the *Malawi Climate Change and Development Report* (World Bank Group 2022):**

- **Priority 1: Construct new infrastructure that can withstand climate shocks and stressors.** Closing the infrastructure deficit is vital to meeting the Malawi 2063 aspirations, and climate change impacts are predominantly in the form of damage to infrastructure assets. Moreover, rehabilitating infrastructure assets from existing climate shocks is currently consuming scarce financial resources, which will persist if not addressed. Research has demonstrated that constructing climate-resilient infrastructure does not entail a significant increase in upfront costs and leads to significant savings in maintenance and repair costs while minimizing disruptions to the economy over the infrastructure's lifespan. This would include streamlining climate-sensitive public investment management, implementing a public asset management policy, revising infrastructure standards with a resiliency focus, and enhancing capacity to enforce these standards. Malawi can fund climate-proofing investments by reallocating existing government resources and encouraging private sector participation in infrastructure. Discretionary funds for local governments' district-led climate and disaster risk reduction investments can enhance targeting and resource use efficiency. In addition, the recent approval of the Public-Private Partnership Act (2022) can create favorable conditions for private sector investments in infrastructure, provided that additional sector- and macro-level reforms are enacted.
- **Priority 2: Halt and reverse widespread land degradation.** The benefits of halting and reversing land degradation in Malawi are numerous and far-reaching, including reducing the risk of damage to infrastructure, promoting development outcomes, and strengthening climate resilience. Continued land degradation would significantly increase the damage to infrastructure from inland flooding by as much as 25 percent by 2050. Urgent implementation of government plans to restore degraded lands, including promoting soil and water conservation, agroforestry, and community forestry, is needed to improve crop productivity, reduce soil erosion rates, and boost water storage while reducing flood damage to critical infrastructure. Restoring degraded landscapes can also generate resources to offset some of the costs of land restoration, potentially generating finance linked to voluntary carbon markets in the order of \$24.8 million to \$74.3 million per year. Stronger legal and institutional frameworks to support climate financing are needed, including the establishment of monitoring, reporting, and verification systems.

- **Priority 3: Address climate impacts on labor productivity and household livelihoods.**

The adverse effects of climate change on the economy are numerous, with reduced labor productivity the second biggest impact. Heat stress caused by climate change significantly reduces the efficiency of outdoor laborers, with agriculture the most affected sector, followed by industry and services. A reduction in labor productivity could lead to a decrease in gross domestic product (GDP) of as much as 4.6 percent by 2050, affecting the poorest households the most, as they rely heavily on agriculture and informal labor for income. While adaptation measures may help reduce these negative impacts, structural transformation of the economy is necessary to shift labor away from agriculture. Social protection programs will not only help households cope with climate impacts, but also protect children from malnutrition and increase human capital.

## 8.1 Recommendations

- **Strengthen the organizational, technical, institutional, and financing arrangements for disaster risk management (DRM) in the country.** There is a need for the Government of Malawi to operationalize the implementation of existing institutional arrangements and to further clarify the roles and responsibilities of the various ministries, departments, or agencies involved in DRM at all levels. Disaster risk financing agendas need to be advanced to offset risk within the built environment and safeguard critical infrastructure, as well as to support preparedness and contingency planning efforts.
- **Enhance disaster risk knowledge to allow for effective disaster preparedness and disaster risk reduction activities, across sectors.** The impacts of Tropical Cyclone Freddy have raised concerns about the limited attention given to landslide hazard in Malawi and the adoption and utilization of flood hazard information across sectoral decision-making. Improved disaster risk knowledge is essential to identify and execute appropriate risk mitigation measures and to ensure effective disaster preparedness and response. Updating of flood models is key, to ensure infrastructure being repaired/ replaced and new infrastructure is designed appropriately and adequately to cater for future flood events.
- **Risk information should also guide land use and development planning processes as well informing design standards and approaches to infrastructure resilience across sectors.** This information is also critical in decision support around resettlement planning and incentives for relocation outside of risky areas. In complement, stronger and more effective enforcement of regulations and development controls is necessary to protect sensitive areas e.g., steep hills, watersheds, mountains, natural forests, protected areas. This includes capacity development, stricter punitive and enforcement measures, greater fiduciary management, and re-investment of resources into supporting protection of these areas
- **Develop and strengthen the early warning systems for multiple hazards to inform effective decision-making and early actions.** Early warning systems in Malawi need to consider the country's multi-hazard context and ensure service delivery to those at risk. Discussions on a mandate for landslide alerts, as part of efforts to enhance Malawi's early warning systems, have been inconclusive as specific responsibilities have not yet been assigned to agencies. This is a gap that needs to be addressed urgently to enhance preparedness for similar hazards. Furthermore, strengthening coordination among stakeholders in early warning systems to inform effective decision-making and early actions is fundamental to facilitate resilience building in the country. Government and other stakeholders, including communities, should develop a smooth information flow that will enhance national capacity to manage and monitor flood control systems, as well as forecast and communicate alerts about extreme weather events.
- **Establish building regulations for resilience and construct new infrastructure that can**

**withstand climate shocks and stressors.**

Malawi needs to review, adopt, and implement infrastructure design standards, processes, and parameters for roads, bridges, irrigation, water control systems, housing, and other structures to ensure climate-resilient construction and to streamline climate-sensitive public investment management. There is a need to disseminate and enforce the safer construction guidelines for housing and schools at all levels while paying attention to the most vulnerable groups. This priority has also been identified in the *Malawi Country Climate and Development Report*, as “Studies have shown that building infrastructure to be climate-resilient does not add significantly to the upfront costs and brings substantial savings in maintenance and repair and reduced disruptions to the economy, over the lifetime of the infrastructure” (World Bank Group 2022, 14).

- **Integrate respect for the environment in resilience building.** All recovery and reconstruction activities must aim to minimize harm to the natural environment; to avoid rebound effects; to provide green and blue infrastructure that works with grey infrastructure; to support decision-making using ecosystem information; and to reduce threats posed by the natural environment, such as trees falling on power lines. Land degradation is exacerbating disaster risk in Malawi, contributing to increased landslide and flood hazard. According to the *Malawi Country Climate and Development Report*, continued land degradation would significantly increase the damage to infrastructure from inland flooding—by as much as 25 percent by 2050 (World Bank Group 2022). Integrated catchment management activities are critical to prioritize runoff management and sediment trapping within the landscape, especially along roads, foot paths, around houses, schools, and trading centers, and infield.
- **Strengthening Stakeholder Coordination and Collaboration.** Facilitate engagement, involvement, and participation across all levels of society. Raise awareness to enable everyone to understand disaster impacts across the various sectors of the economy and

how individual contributions can ensure the achievement of resilience building. Build the capacity of different actors to understand their roles in resilient recovery. Engage with people and communities so that they have a better understanding of how they can help prevent and respond to disasters. This will facilitate shared prosperity and responsibility, thereby facilitating transparency and accountability in recovery processes.

- **Ensure resilient lifeline infrastructure and critical service provision.** Certain transport, water and sanitation, and electricity infrastructure systems are critical for life safety and emergency response operations and essential for economic activity, and continuity of service delivery must be ensured during and after disasters. Tropical Cyclone Freddy demonstrated the high vulnerability of critical infrastructure systems, leaving many communities isolated and without access to emergency and health services and humanitarian assistance. Critical lifelines need to be identified and resilience measures implemented.
- **Be dynamic and continuously adapt.** The manifestation of disaster has increasingly become unpredictable therefore recovery systems and processes should actively adapt and transform to suit the ever-changing operating environment. This principle enhances disaster preparedness; contributes to reduce system and process failures; facilitates response to the unexpected; and facilitates quicker recovery.
- **Integrate recovery and development planning.** The PDNA is a crucial first step in understanding the extent of the disaster effects and impacts and identifying critical recovery needs. The recovery strategy should establish clear objectives and appropriate interventions that meet the prioritized recovery needs and integrate with development goals. A disaster recovery framework can guide and enable the strategy’s effective implementation by establishing appropriate policy principles, governance arrangements, financing mechanisms, and implementation processes.

# Appendix A

## Appendix A. Estimated Total Effects for the Social Subsectors, by District (US\$, million)

	HOUSING			HEALTH AND NUTRITION			EDUCATION			GROSS TOTAL		
	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total
Ntcheu	0.11	0.00	0.12	-	0.09	0.09	-	-	-	0.11	0.09	0.21
Mangochi	10.55	0.45	11.00	-	0.21	0.21	0.12	0.21	0.33	10.67	0.87	11.54
Machinga	4.00	0.10	4.10	0.09	0.19	0.28	2.45	0.47	2.92	6.54	0.75	7.30
Zomba Rural	3.94	0.19	4.13	0.03	0.31	0.34	1.48	1.49	2.97	5.45	1.99	7.44
Chiradzulu	6.80	0.42	7.22	0.13	0.22	0.35	2.68	1.41	4.09	9.61	2.06	11.67
Blantyre Rural	2.74	0.23	2.98	0.14	1.36	1.50	0.37	0.32	0.70	3.25	1.91	5.17
Mwanza	0.16	0.00	0.17	-	0.03	0.03	0.07	0.05	0.11	0.23	0.08	0.31
Thyolo	4.84	0.08	4.92	0.54	0.18	0.72	0.90	0.88	1.78	6.28	1.14	7.42
Mulanje	26.32	0.27	26.59	0.36	0.41	0.76	1.52	1.46	2.98	28.20	2.14	30.33
Phalombe	24.97	0.42	25.38	1.22	0.34	1.56	12.35	1.92	14.27	38.53	2.67	41.21
Chikwawa	2.21	0.06	2.27	0.76	0.17	0.93	0.49	0.85	1.34	3.46	1.08	4.55
Nsanje	4.46	0.18	4.64	0.58	0.27	0.86	6.52	0.98	7.49	11.56	1.43	12.99
Balaka	1.25	0.05	1.29	-	0.08	0.08	0.12	0.12	0.24	1.36	0.25	1.61
Neno	0.12	0.00	0.12	-	0.13	0.13	0.05	0.03	0.08	0.17	0.16	0.33
Zomba City	1.04	0.63	1.68	-	-	-	0.46	0.14	0.60	1.50	0.77	2.27
Blantyre City	19.93	7.93	27.86	0.29	-	0.29	0.68	1.51	2.19	20.90	9.44	30.34
<b>Total</b>	<b>113.45</b>	<b>11.02</b>	<b>124.47</b>	<b>4.14</b>	<b>3.99</b>	<b>8.13</b>	<b>30.25</b>	<b>11.83</b>	<b>42.09</b>	<b>147.85</b>	<b>26.84</b>	<b>174.68</b>

Source: [PDNA 2023 Team]

### Appendix B. Estimated Total Effects for the Productive Subsectors, by District (US\$, million)

	CROPS		LIVESTOCK		IRRIGATION		FISHERIES		TRADE		GROSS TOTAL			
	Damage	Total	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total
Ntcheu	-	0.03	-	-	-	-	-	-	0.02	0.02	0.04	0.02	0.04	0.07
Mangochi	0.02	3.01	0.19	0.50	0.69	0.53	-	0.00	0.00	0.00	0.00	0.48	0.53	1.01
Machinga	0.02	2.95	0.07	0.15	0.21	0.38	0.20	0.58	0.16	0.49	0.65	0.26	0.28	0.54
Zomba Rural	0.04	6.33	0.11	0.10	0.22	0.03	0.85	0.87	0.09	0.09	0.19	0.44	0.41	0.85
Chiradzulu	0.02	3.14	1.38	0.46	1.84	1.54	0.35	1.90	0.00	0.00	0.00	0.77	0.61	1.37
Blantyre Rural	0.03	7.17	0.20	0.26	0.46	1.10	0.99	2.08	0.00	0.04	0.04	0.50	0.43	0.93
Mwanza	0.01	3.71	0.04	0.08	0.12	1.69	0.43	2.12	0.00	0.01	0.01	0.05	0.06	0.11
Thyolo	0.12	6.96	0.17	0.46	0.63	1.23	2.92	4.15	0.01	0.55	0.56	0.36	0.37	0.73
Mulanje	0.03	6.14	0.44	0.27	0.71	2.26	2.36	4.62	0.00	0.05	0.05	1.00	0.89	1.89
Phalombe	0.01	8.62	0.30	0.22	0.52	3.59	4.09	7.69	0.01	0.95	0.97	0.92	0.83	1.76
Chikwawa	-	2.81	0.08	0.00	0.08	5.83	2.79	8.62	0.11	0.04	0.14	0.22	0.91	1.13
Nsanje	0.03	2.74	0.03	-	0.03	1.22	7.58	8.80	0.11	0.26	0.37	0.35	0.32	0.67
Balaka	0.01	1.11	0.03	0.04	0.08	0.65	1.04	1.68	0.00	0.01	0.01	0.15	0.16	0.31
Neno	0.00	0.31	0.04	0.03	0.07	-	1.81	1.81	0.00	0.04	0.04	0.02	0.02	0.04
Zomba City	-	-	0.19	0.15	0.35	-	-	-	-	-	-	0.65	0.66	1.31
Blantyre City	-	-	0.24	0.32	0.56	-	-	-	-	-	-	2.22	1.77	3.99
<b>Total</b>	<b>0.33</b>	<b>55.01</b>	<b>3.50</b>	<b>3.04</b>	<b>6.54</b>	<b>20.05</b>	<b>25.41</b>	<b>45.46</b>	<b>0.50</b>	<b>2.54</b>	<b>3.03</b>	<b>8.41</b>	<b>8.26</b>	<b>16.68</b>
												<b>32.78</b>	<b>94.27</b>	<b>127.06</b>

Source: [PDNA 2023 Team]

**Appendix C. Estimated Total Effects for the Infrastructure Subsectors, by District (US\$, million)**

	Infrastructure														
	TRANSPORT			ENERGY			WASH			WATER RESOURCES			GROSS TOTAL		
	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total	Damage	Loss	Total
Nitcheu	-	-	-	-	-	-	0.02	0.02	0.05	0.44	0.52	0.96	0.46	0.55	1.00
Mangochi	26.60	0.80	27.40	0.11	-	0.11	0.70	0.23	0.93	0.58	0.25	0.83	27.98	1.29	29.27
Machinga	2.44	-	2.44	0.07	-	0.07	1.09	0.26	1.35	0.72	0.25	0.97	4.32	0.52	4.83
Zomba Rural	4.87	0.42	5.29	0.06	-	0.06	2.24	0.40	2.64	0.43	0.63	1.06	7.60	1.45	9.05
Chiradzulu	2.33	0.02	2.34	0.08	-	0.08	1.69	0.21	1.90	0.40	0.13	0.52	4.49	0.35	4.84
Blantyre Rural	5.37	0.06	5.43	0.05	-	0.05	1.86	0.12	1.98	1.30	0.64	1.94	8.58	0.82	9.39
Mwanza	0.21	-	0.21	0.01	-	0.01	0.02	0.13	0.15	0.88	0.13	1.01	1.11	0.26	1.37
Thyolo	10.45	0.82	11.27	0.16	-	0.16	1.18	0.18	1.35	0.79	0.38	1.17	12.58	1.38	13.95
Mulanje	13.30	0.37	13.67	0.10	0.01	0.11	4.28	0.49	4.77	0.57	0.25	0.82	18.25	1.13	19.38
Phalombe	13.25	0.28	13.53	10.34	0.18	10.53	7.55	0.49	8.04	0.01	0.13	0.13	31.15	1.08	32.23
Chikwawa	11.89	1.39	13.28	0.07	-	0.07	3.87	0.33	4.20	0.70	0.51	1.21	16.53	2.23	18.77
Nsanje	10.79	2.23	13.02	0.06	-	0.06	1.52	0.55	2.07	0.69	0.38	1.07	13.06	3.16	16.22
Balaka	-	-	-	0.02	-	0.02	0.41	0.13	0.54	0.29	0.25	0.55	0.72	0.38	1.10
Neno	0.51	-	0.51	0.07	-	0.07	0.12	0.07	0.19	-	0.25	0.25	0.70	0.32	1.02
Zomba City	-	-	-	0.02	-	0.02	3.22	1.32	4.54	0.00	0.13	0.13	3.24	1.45	4.69
Blantyre City	2.39	0.04	2.44	0.20	1.74	1.95	5.09	1.31	6.40	0.00	0.13	0.13	7.69	3.23	10.91
<b>Total</b>	<b>104.39</b>	<b>6.44</b>	<b>110.83</b>	<b>11.43</b>	<b>1.93</b>	<b>13.37</b>	<b>34.85</b>	<b>6.24</b>	<b>41.08</b>	<b>7.79</b>	<b>4.97</b>	<b>12.76</b>	<b>158.46</b>	<b>19.58</b>	<b>178.04</b>

Source: [PDNA 2023 Team]

## Appendix D. Prioritized Short-, Medium-, and Long-Term Needs for the Social Subsectors, by District (US\$, million)

DISTRICT	HOUSING			HEALTH AND NUTRITION						EDUCATION			Total	
	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG		
Ntcheu	0.02	0.00	0.17	—	—	—	—	—	—	—	0.07	0.05	0.09	0.40
Mangochi	2.54	0.16	17.69	—	—	—	—	—	—	0.18	0.11	0.22	20.89	
Machinga	0.81	0.05	5.64	0.02	0.13	—	—	—	—	2.00	1.22	2.44	12.33	
Zomba Rural	2.13	0.05	5.74	0.27	0.05	0.19	1.96	1.19	2.38	—	—	—	13.96	
Chiradzulu	2.87	0.14	15.55	0.09	0.21	0.02	2.58	1.58	3.15	—	—	—	26.19	
Blantyre Rural	1.50	0.05	5.14	0.02	0.18	—	—	—	—	0.64	0.39	0.78	8.70	
Mwanza	0.03	0.00	0.20	—	—	—	—	—	—	0.15	0.09	0.18	0.66	
Thyolo	0.82	0.05	5.71	0.07	0.74	—	—	—	—	1.23	0.75	1.50	10.89	
Mulanje	7.43	0.26	28.31	0.41	0.12	—	—	—	—	1.95	1.19	2.37	42.05	
Phalombe	7.00	0.29	31.67	0.68	1.27	1.24	7.71	4.70	9.39	—	—	—	63.97	
Chikwawa	0.55	0.03	3.14	0.56	1.39	—	—	—	—	0.89	0.55	1.09	8.19	
Nsanje	1.87	0.06	6.00	0.09	0.37	—	—	—	—	4.40	2.68	5.36	20.81	
Balaka	0.24	0.02	1.65	—	—	—	—	—	—	0.21	0.13	0.26	2.49	
Neno	0.02	0.00	0.17	—	—	—	—	—	—	0.48	0.29	0.59	1.56	
Zomba City	0.27	0.02	1.85	—	—	—	—	—	—	0.49	0.30	0.60	3.53	
Blantyre City	6.11	0.26	28.19	0.05	0.53	—	—	—	—	1.09	0.67	1.33	38.22	
<b>Gross total</b>	<b>34.21</b>	<b>1.46</b>	<b>156.83</b>	<b>2.26</b>	<b>5.00</b>	<b>1.45</b>	<b>26.05</b>	<b>15.88</b>	<b>31.72</b>	<b>1.45</b>	<b>26.05</b>	<b>31.72</b>	<b>274.84</b>	

Source: [PDNA 2023 Team]

### Appendix E. Prioritized Short-, Medium-, and Long-Term Needs for the Productive Subsectors, by District (US\$, million)

DISTRICT	CROPS			LIVESTOCK			IRRIGATION			FISHERIES			TRADE				
	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	TOTAL	
Ntcheu	0.03	0.04	0.01	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.11
Mangochi	1.47	2.19	0.03	—	0.02	0.02	—	—	—	—	0.06	0.07	0.07	0.07	0.39	4.30	
Machinga	1.01	1.50	0.03	—	0.02	0.02	0.25	0.76	0.08	0.06	0.06	0.35	0.05	0.21	4.32		
Zomba Rural	1.95	5.82	0.03	—	0.02	0.02	0.18	0.55	0.06	0.06	0.06	0.53	0.04	0.30	9.54		
Chiradzulu	1.14	1.70	0.02	0.00	0.02	0.02	0.01	0.04	0.00	0.06	0.06	0.06	0.03	0.71	3.81		
Blantyre Rural	2.34	3.50	0.03	0.04	0.02	1.67	0.72	2.21	0.22	0.06	0.14	0.03	0.03	0.41	11.39		
Mwanza	1.30	1.95	0.01	0.02	0.02	0.02	0.51	1.57	0.16	0.06	0.03	0.03	0.03	0.05	5.71		
Thyolo	1.33	1.98	0.03	0.02	0.02	0.02	0.79	2.42	0.25	0.06	0.19	0.06	0.06	0.26	7.41		
Mulanje	2.16	3.23	0.03	0.02	0.02	0.02	0.57	1.77	0.18	0.11	0.26	0.06	0.06	0.87	9.30		
Phalombe	3.05	3.37	0.03	0.11	0.02	0.22	1.05	3.25	0.33	0.06	0.22	0.05	0.05	0.82	12.57		
Chikwawa	1.81	2.41	0.03	0.41	0.02	0.22	1.68	5.16	0.52	0.11	0.25	0.10	0.16	12.89			
Nsanje	1.81	2.40	0.03	0.13	0.02	0.02	1.37	4.22	0.43	0.06	0.34	0.06	0.36	11.23			
Balaka	0.51	0.76	0.01	0.03	0.02	0.02	0.57	1.75	0.18	0.06	0.06	0.03	0.11	4.10			
Neno	0.11	0.16	0.01	0.02	0.02	0.02	0.30	0.93	0.09	0.06	0.05	0.03	0.02	1.82			
Zomba City	—	—	—	—	0.01	—	—	—	—	—	—	—	—	0.50	0.50		
Blantyre City	—	—	—	—	0.01	—	—	—	—	—	—	—	—	1.54	1.54		
<b>Gross total</b>	<b>20.04</b>	<b>31.02</b>	<b>0.31</b>	<b>0.81</b>	<b>0.21</b>	<b>2.27</b>	<b>8.00</b>	<b>24.64</b>	<b>2.50</b>	<b>0.84</b>	<b>2.56</b>	<b>0.62</b>	<b>6.72</b>	<b>100.54</b>			

Source: [PDNA 2023 Team]

### Appendix F. Prioritized Short-, Medium-, and Long-Term Needs for the Infrastructure Subsectors,<sup>15</sup> by District (US\$, million)

DISTRICTS	TRANSPORT			WATER AND SANITATION			WATER RESOURCES			TOTAL
	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG	
Nitcheu	—	—	—	0.10	0.06	0.12	0.92	0.56	1.12	2.89
Mangochi	3.02	5.28	29.15	0.48	0.29	0.58	0.58	0.35	0.70	40.44
Machinga	0.72	1.17	1.19	0.68	0.41	0.83	0.80	0.49	0.98	7.27
Zomba Rural	1.28	0.38	4.62	1.38	0.84	1.69	0.52	0.32	0.63	11.66
Chiradzulu	1.20	—	0.88	0.70	0.42	0.85	0.05	0.03	0.06	4.18
Blantyre Rural	2.04	1.57	3.51	0.98	0.59	1.19	0.32	0.19	0.39	10.77
Mwanza	0.01	—	0.30	0.07	0.04	0.09	0.23	0.14	0.28	1.16
Thyolo	1.06	3.85	9.91	0.72	0.44	0.87	0.90	0.55	1.10	19.39
Mulanje	3.62	5.41	7.98	1.41	0.86	1.72	0.54	0.33	0.65	22.51
Phalombe	3.96	3.66	9.04	2.27	1.38	2.76	0.06	0.04	0.07	23.24
Chikwawa	3.44	3.91	7.70	1.63	1.00	1.99	0.95	0.58	1.16	22.37
Nsanje	1.22	8.22	5.75	0.88	0.54	1.07	0.93	0.57	1.13	20.31
Balaka	—	—	—	0.01	0.01	0.02	0.73	0.45	0.89	2.11
Neno	0.01	—	0.73	0.01	0.01	0.01	0.37	0.23	0.45	1.83
Zomba City	—	—	—	3.49	2.13	4.25	0.37	0.23	0.45	10.92
Blantyre City	2.79	9.45	13.21	1.67	1.02	2.04	0.51	0.31	0.62	32.48
<b>Gross Total</b>	<b>24.35</b>	<b>42.90</b>	<b>93.96</b>	<b>16.48</b>	<b>10.05</b>	<b>20.07</b>	<b>8.78</b>	<b>5.36</b>	<b>10.70</b>	<b>233.51</b>

Source: [PDNA 2023 Team]

<sup>14</sup> Recovery needs for the energy subsector are omitted as they total only \$800,000 and are nationally targeted.

## Appendix G. Post-Disaster Needs Assessment Team Composition

Sector	Name	Ministry, department, or agency/organization
Core team	1. Peter Chimangeni	Department of Disaster Management Affairs
	2. Sam Gama	
	3. Annie Mapulanga	
	4. Adwell Zembele	Ministry of Finance and Economic Affairs
	5. Francis Nkoka	World Bank
	6. Nicholas Callender	
	7. Celina Kattan	United Nations Development Programme (UNDP)
	8. Diana Mataya	
	9. Innocent Phangaphanga Phiri	
	10. Mphanda Kabwazi	United Nations Resident Coordinator's Office
	11. Heidi Carrubba	European Union
	12. Arnold Chikavanga	Ministry of Finance and Economic Affairs
13. Richard Zimba		
14. Wisdom FrancisNyando		
15. Wezzie Mtumbuka		
16. Emmanuel Masuso		
17. Hamilton Kamwana		
18. Salim Ahmed Mapila	National Planning Commission	
19. Kingsley Manda	National Statistical Office	
20. Hector Kankuwe	National Statistical Office	
21. Yalenga Nyirenda	World Bank	
Energy	22. Nelson Seleman	Ministry of Energy
	23. Irene M. Tanga	Electricity Supply Corporation of Malawi
	24. Lawrence Chilimapunga	Electricity Generation Company Limited
	25. Rodrick Chirambo	United Nations Office for Project Services
	26. Dominic Njue Mugo	
Transport	27. Florence Ndenguma	Roads Authority
	28. Sydney Phiri	World Bank
	29. Chikondi Nsusa	
	30. Patsani Kumambala	
Water and sanitation	31. John Chingawale	Ministry of Water and Sanitation
	32. Gertrude Makuti	
	33. Hastings Mbale	
	34. Tamala Zembeni	
	35. Leman Ngwena	
	36. Chimwemwe Nyimba	United Nations Children's Fund (UNICEF)
	37. Jean Mthethiwa	World Bank
Health	38. Francis Chigalu	Ministry of Health and Nutrition
	39. James Jere	
	40. Sylvester Kathumba	
	41. Try Malikebu	UNICEF
	42. Elsie Mawala	
	43. Palikena Kaude	Joint United Nations Programme on HIV/AIDS
	44. Grace Hiwa	United Nations Population Fund
	45. Bernard Mijoni	
	Education	46. Shanever Chamba
47. Margret Zimba		UNICEF
48. Cosnat Ntenje		

<b>Sector</b>	<b>Name</b>	<b>Ministry, department, or agency/organization</b>
Housing	49. Shadreck Bulukutu Chirwa	Ministry of Lands, Housing, and Urban Development
	50. Alinafe Ngulube	
	51. Gladwell Phiri	Department of Buildings
	52. Stern Kita	United Nations Human Settlements Programme
	53. Jacqueline Mpanyula	International Organization for Migration
Agriculture	54. Alfred Chilinda	Ministry of Agriculture, Irrigation, and Water Development
	55. John Hennock	Department of Crops Development
	56. Dalitso Chandire	
	57. Gregory Alinafe	Department of Animal Health and Livestock Development
	58. Francis Wadi	Department of Irrigation
	59. Benjamin Banda	
	60. Angela Kafembe	Food and Agriculture Organization of the United Nations
Trade	61. Adwell Zembele	Ministry of Finance and Economic Affairs
	62. Master Mzuzi	Ministry of Trade
	63. Patrick Makondesa	ILO
Disaster risk reduction	64. Lomuthowo Simwawa	Department of Disaster Management Affairs
	65. Boyd Hamella	
	66. Hanke Ndau	
	67. Ephod Kachigwada	
	68. Davie Chibani	
	69. Amos Ntonya	Department of Climate Change and Meteorological Services
	70. Yamikani Dakalira	UNDP/Department of Disaster Management Affairs
	71. Robert Msuku	Malawi Resilience and Disaster Risk Management Project
	72. Wonderful Kunje	Malawi Red Cross Society
	73. Harry Satumba	Ministry of Gender, Children, Disability, and Social Welfare
Cross-cutting issues	74. Anastazio Matewere	
	75. Owen Nalivaka	Local government
	76. Nisile Mwaisunga	Environmental Affairs Department
	77. Allan Milanzie	Concern Worldwide
	78. Christina Maseko	UNDP
	79. Guadalupe Kabia	
	80. Victor Maulidi	United Nations Entity for Gender Equality and the Empowerment of Women
	81. Sophie Kiarie	
	82. Vincent Kavala	ILO

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