ZIMBABWE RAPID IMPACT AND NEEDS ASSESSMENT (RINA)

May 2019

WORLD BANK GROUP

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Global Facility for Disaster Reduction and Recovery

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FOREWORD

Zimbabwe has experienced the most devastating natural disaster in the country's recorded history. Cyclone Idai hit the eastern part of Zimbabwe on 15th March 2019. Strong winds and heavy rain totaling 200mm to 600mm (equivalent to 1–2 seasons) caused flash flooding across parts of the provinces of Manicaland, Mashonaland East and Masvingo, which are home to 44 % of the country's population. At least 344 people have been recorded dead and at least 257 people are still missing, and about 60,000 people have been displaced by the Cyclone.

Cyclone Idai has had a devastating impact on an already fragile region. It is the latest natural disaster in a succession of economic and climatic shocks. The El Nino induced drought linked to climate variability and change, had already put the affected areas at high risk of food insecurity, further escalating the surge in the number of poor and vulnerable households recorded over the past 6 months. The likely ripple effects on the entire region are also significant, as the affected regions produced 1/3 of total agricultural output in Zimbabwe. The impacts of these crises are further compounded by broader national challenges associated with limited fiscal space, liquidity challenges, high public debt, and a difficult "political" environment which will make the Cyclone recovery more difficult to mobilize support for.

Given the need for concerted action and in response to the Presidents' of the Republic of Zimbabwe declared 'State of Disaster' in the affected areas, Government of Zimbabwe sought the support of the World Bank in conducting a Rapid Impact and Needs Assessment (RINA) The report has benefitted throughout the process from the constructive and informative engagement of the Government, WB and Partners. Of importance was the cross- government engagement both in the RINA preparation and validation of the report. Their input has been crucial, for the subsequent recovery and resilient framework which will be delivered by government and various stakeholders. The results of the RINA will feed into an RRF that will define a multi-sectoral approach to identifying key development policies and investment priorities to mitigate the impacts of climatic shocks, tied to an associated financing

framework, situated within Office of the President and Cabinet (OPC). The RINA is an important building block for the future vision of Zimbabwe. We appreciate the support of our partners in undertaking this exercise within a tight timeframe, allowing for the timely initiation of much-needed recovery and resilience-building action, and we look forward to working with them on this strategic initiative.

LIST OF ABBREVIATIONS AND ACRONYMS

ARI	Acute respiratory Infections
BBB	Building-back-better
BMS	Breast Milk Substitutes
CCEDPM	Cabinet Committee on Environment, Disaster Prevention and Management
CPU	Civil Protection Unit
CSA	climate smart agriculture
DCP	Department of Civil Protection
DDF	District Development Fund
DHO	District Health Offices
DRM	Disaster Risk Management
DTM	Displacement Tracking Matrix
DOR	Department of Roads
DRR	Disaster Risk Reduction
EO	Earth Observation
FEWSNET	Famine Early Warning Network
GER	Gross Enrollment Ratio
GDP	Gross Domestic Product
GIS	Geographic Information System
GNI	Gross National Income
GPI	Gender Parity Index
Grade	Global Rapid Post-Disaster Damage Estimation
GOZ	Government of Zimbabwe
IEC	Information, Education and Communication
IDPs	Internally Displaced Persons

IDMC	International Displacement Monitoring Centre
IUCN	International Union for Conservation of Nature
IYCF	Infant and Young Child Feeding
kV	Kilo Volts
kW	Kilowatt
MCH	Maternal and Child Health
MESA	Monitoring of the Environment and Security in Africa
MDGs	Millennium Development Goals
MLAWCRR	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
MoEPD	Ministry of Energy and Power Development
MOHCC	Ministry of Health and Child Care
MoTID	Ministry of Transport and Infrastructure Development
MOLGPWNH	Ministry of Local Government, Public Works, and National Housing
MSD	Meteorological Services Department
m/s	
mt	Metric tonnes
mv	
NAC	National Action Committee on Water Supply and Sanitation
NCDs	Noncommunicable Diseases
NCU	National Coordinating Unit
NER	Net Enrollment Ratio
NFi	Non-food Items
NTDs	Neglected tropical diseases
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PMD	Provincial Medical Directorate
PSIP	Public Sector Investment Program
RCDF	Rural Capital Development Fund
RDCs	Rural District Councils
REF	Rural Electrification Fund
RINA	Rapid Impact and Needs Assessment
RTTN	Regional Trunk Road Network
RTGS	Real-time gross settlement
RWIMS	Rural Water Information Management System
SADC	Southern African Development Community
SDC	School Development Committee
SDGs	Sustainable development goals
SGBV	Sexual and gender-based violence
SMF	
T&D	Transmission and distribution
TWh	
UN	United Nations
UNICEF	United Nations Children's Fund
UNHCR	United Nations High Commissioner for Refugees
ZETDC	Zimbabwe Electricity Transmission and Distribution Company
ZILGA	Zimbabwe Local Government Association
ZIMVAC	
ZINARA	Zimbabwe National Road Association
ZINWA	Zimbabwe National Water Authority
ZPC	Zimbabwe Power Company
ZPP	Zimbabwe Power Company
WES	Water Environmental Sanitation Working Group
WASH	Water and Sanitation

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EXECUTIVE SUMMARY

The impact of Cyclone Idai is compounding Zimbabwe's already fragile humanitarian situation. Tropical Cyclone Idai made landfall over eastern Zimbabwe on 15 March 2019, producing heavy rains and strong winds impacting nine districts in three provinces of Manicaland, Masvingo, and Mashonaland East, and severely impacting Chimanimani and Chipinge districts (in Manicaland). The cyclone caused substantial flooding, resulting in numerous deaths and significant damage to infrastructure, property, crops, and livestock. This included damage to water distribution and water infrastructure, as well as an elevated risk of water-borne diseases, including cholera. To date, the Cyclone left 270,000 people in need of humanitarian assistance, including 129,600 children, more than 10,000 newly displaced people, and has exacerbated already high emergency-level malnutrition rates.[1] The Government of Zimbabwe (GoZ) declared an emergency on 16 March 2019, activating a government-led response directed by the Civil Protection Unit (CPU) in coordination with humanitarian partners, the military, and sub-national flood command centres.

Need for Targeting the Most Critical Needs of the Cyclone – Affected People: In April 2019, the GoZ initiated a joint exercise to assess the losses and damages arising from the cyclone and to develop a strategy for immediate recovery and longer-term resilience building. The result was the Zimbabwe Rapid Impact and Needs Assessment (RINA)—an effort to assess and quantify cyclone recovery and resilience building needs across ten sectors [2] Completed in May 2019, the RINA found there had been between US$542–616 million in damages or losses due to the cyclone across nine districts (table 01). Nearly half of the damages are in the two most impacted districts of Chimanimani and Chipinge. Nearly 90 percent of the overall damages are on transport (US$163.8 million), agriculture (US$155.3 million), and housing (US$131.5 million).[3] The RINA includes the following damages:

- Transport (US$163.7 million): An estimated 865 kilometers of road and 20,354 meters of bridge were damaged by the cyclone. Roads that connect

towns and villages in the affected districts have been severely damaged, disrupting economic activities, delaying relief operations, and hindering school access.

- Agriculture (US$155.3 million): Estimates indicate that nearly 50,000 farming households were affected and 1.4 million hectares of arable land were destroyed, with the districts of Mutare and Gutu Districts the most severely impacted. The destruction of road infrastructure and mobile networks disrupted market access. Damage to livestock and small ruminants, crops (including high value cash crops), food stocks, agricultural inputs, water points, and water infrastructure were widespread, affecting productive assets, food production, and livelihood systems.
- Housing (US$131.4 million – US$205.3 million): Between 10,373–17,715 housing units (3 percent of the total number of housing units) were damaged by Cyclone Idai. This includes between 6,324–6,795 in Chimanimani and 1,520–6,579 in Chipinge and representing 18 and 9 percent each of the total housing stock across all the affected districts.
- Environment (US$37.4 million): The cyclone caused soil erosion, landslides, and the formation of gullies, while damaging 1.17 million hectares of forest including 104,620 hectares of highly impacted land in protected areas. Damage to forest areas was particular acute in riparian zones, with potential long-term watershed management impacts.
- Water Supply and Sanitation (US$23.2 million): Water and sanitation facilities suffered extensive damage or destruction, such as wells, dams, irrigation canals, and household water systems. The risk of outbreak of water, sanitation and hygiene (WASH) related diseases is now very high, particularly for cholera.
- Health (US$14.7 million): A total of 294 health facilities were damaged, disrupting access to health services and increasing the risk of disease outbreaks.
- Disaster Risk Management (DRM) (US$13.1 million): Includes impacts to dams in nine districts, such as damages to outlet valves, spill ways, embankments, and gauging stations.
- Education (US$6.3 million): An estimated 971 schools were damaged or destroyed, impacting more than 60,000 school children. This includes damage to school water and sanitation facilities, while many schools are serving as temporary shelters, disrupting school attendance and enrollment.
- Energy (US$3.1 million): Power transmission and distribution infrastructure were heavily impacted, resulting in extensive power disruptions. Damage to the Beira pumphouse was particularly disruptive, temporarily shutting down the Beira-Harare fuel pipeline.
- Displacement: More than 59,000 persons are internally displaced as a result of the cyclone, residing in host communities, camps, and transit centers. Many of these displaced persons were already affected by the drought emergency, with the cyclone compounding their emergency needs. Furthermore, Zimbabwe hosts over 20,000 refugees and asylum-seekers from Somalia and Ethiopia, with the cyclone damaging camp infrastructure.
- Macroeconomic: Zimbabwe's anticipated economic contraction for 2019 is projected to widen in the aftermath of Cyclone Idai, with annual real GDP projected to decline by 3.1 percent compared to an earlier projected contraction of 1.6 percent. The anticipated deterioration comes as a result of important losses in agricultural production and livestock, along with losses in trade-related activities due to the significant damage caused to critical infrastructure such as roads, buildings, and ports.

Summary Table of Damages and Needs

Sectors	Cost (USD)	
	Damages	Needs Recovery
Productive Sectors		
Agriculture	$ 155,362,963	$ 59,068,000
Productive Sectors Total	**$ 155,362,963**	**$ 59,068,000**
Physical Sectors		
Energy	$ 3,078,500	$ 3,229,800
Environment	$ 37,360,000	$ 37,360,000
Transport	$ 163,794,000	$ 196,552,800
Water Supply & Sanitation	$ 23,228,563	$ 27,867,076
Physical Sectors Total	**$ 227,461,063**	**$ 265,009,676**
Social Sectors		
Education	$ 6,385,210	$ 7,662,151
Health	$ 14,767,800	$ 17,727,360
Social Protection (for 50% HHs)		$ 60,000,000
Housing		
Low Range	$ 131,456,777	$ 36,454,809
High Range	$ 205,267,273	6 246,320,727
Social Sectors Total (low range)	**$ 152,609,787**	**$ 121,844,320**
Social Sectors Total (high range)	**$ 226,420,283**	**$ 331,710,239**
Cross-Cutting Sectors		
DRM	$ 13,100,000	$ 91,700,000
Displacement		$ 19,600,430
Cross-Cutting Sectors Total	**$ 13,100,000**	**$ 111,300,430**
Total (with low range housing)	**$ 548,533,813**	**$ 557,222,425**
Total (with high range housing)	**$ 622,344,309**	**$ 767,088,344**

Unprecedented scale of unmet needs. The total need for recovery across the ten sectors is between US$557–767 million. The highest recovery needs are for Transport (US$196.5 million), followed by DRM (US$91.7 million), Housing (US$246 million higher range), Social Protection (US$60.0 million) and Agriculture[4] (US$59 million).

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INTRODUCTION

Background Context

Zimbabwe has experienced the most devastating natural disaster in the country's recorded history. Between 15–16 March 2019, Cyclone Idai hit the eastern part of Zimbabwe. Its peak strength has been recorded as being equivalent to a Category 3 major hurricane in the Atlantic or eastern Pacific oceans. Cyclone Idai was first tracked into north-central Mozambique as a tropical depression with torrential rain before moving back over water and rapidly strengthening over the northern Mozambique Channel, making landfall in both Mozambique and Malawi during its trajectory. The result has been strong winds and heavy precipitation totaling 200mm to 600mm (equivalent to 1–2 seasons of rainfall), resulting in severe flash flooding across parts of the provinces of Manicaland, Mashonaland East and Masvingo, home to 44 percent of the country's population of 16.5 million. A total of 270,000 people have been directly impacted so far, with more than 18,000 houses destroyed. At least 344 people have been recorded dead and at least 257 people are still missing, although estimates are hampered by limited understanding of pre-crisis population numbers. As the search and rescue effort for more than 300 missing people missing is still ongoing, and numbers keep coming in, the death toll is expected to rise significantly, as areas previously cut-off become reachable by road and the full extent of the damage is known.

Cyclone Idai has displaced close to 17,000 households, many of whom lost their homes in landslides that wiped away entire villages, neighborhoods and growth points. The worst-affected district is Chimanimani with 8,000 households displaced. Other districts are: Chipinge 3,000; Buhera 1,000 and Mutare, 4000. Nyanga district also has displaced households, although the extent is yet to be established. The United Nations (UN) estimates that all displaced households require shelter, food and nonfood items (NFIs) for the next 13 months.[5] About 25,300 refugees and host community persons from the area surrounding the Tongogara Refugee Camp (TRC) were also affected, as 49 percent of the shelters in the camp were completely or partially destroyed. Slowness in the immediate response has meant that few of the affected persons have access to shelter at the Skyline temporary camp where most agencies are camping offering services onsite. Rebuilding homesteads in a debilitating economic environment is a huge challenge for most affected households who have lost all their assets through the cyclone. This is particularly the case as the required building material is not able to reach the most affected districts, and continued rock and landslides mean that reconstruction might not be advisable even if material is made available.

The damage to food production has been extensive, as the affected areas accounted for one-third of national agriculture production and the third largest maize growing province in the country.[6] Initial estimates indicate that the cyclone has damaged 24,300 hectares (ha) of food and cash crops in Chipinge (24,000 ha) and Chimanimani (300 ha) alone, and that 37 per cent (121,000 people) of the rural population in Chipinge district will require urgent food assistance,while 77 percent (114,000 people) in Chimanimani will need food assistance.[7] Household income and food security in the region has also been severely impacted by agricultural losses already impacted by the El Niño related drought, and now devastated by Cyclone Idai. The loss of food production is particularly large since the cyclone coincided with the annual harvest period. Prior to the cyclone, the food security situation in Manicaland and part of Masvingo provinces was already serious—all districts had been classified as being in IPC 3 and the district of Buhera as being in IPC 4.[8] Based on the previous season production data, an estimated amount of 82,313 MT[9] of maize is at risk of being lost. Estimated at 2016 price,[10] the total value of the losses for maize would be US$27 million, assuming 100 percent losses. Beyond the potential direct impact on yield losses, supply chain shocks will raise prices drastically and affect supply of essential food products to main urban markets, including Harare. About 70 percent of the population (1,752,698) in Manicaland province would be food insecure because of the cyclone and the El Niño induced drought.[11] The cyclone also devastated 16 percent of a herd of 257,309 livestock in Chipinge, Chimanimani and Buhera. Agricultural markets within the area are dysfunctional due to roads inaccessibility, and the timber industry has been significantly hampered by damaged roads, including for exports through the Beira corridor.

Cyclone Idai has caused significant infrastructure damage and has affected service-delivery in Zimbabwe. Key road infrastructure to the country's two worst affected districts which lie on the border with Mozambique have been destroyed—the UN estimated that that 95 per cent of the road network and at least ten critical bridges have been damaged or destroyed in Chimanimani alone after the cyclone hit,[12,13] hampering the rescue and recovery effort, and severely limiting the supply of goods and transportation to and from the region.[14] Large portions of the region are still in the dark as downed electricity pylons have not been restored due to impassable roads. The floods also compromised access to safe water, basic sanitation and hygiene practices in both rural and urban areas. damaging water supply stations Schools and health facilities have also been severely damaged, and many have been closed and inaccessible, unable to operate due to the flooding in the region.

The infrastructure damage will have long-term negative local and regional impact. The Beira Corridor,

which is the lifeline not only for the interior of northern Mozambique but also for eastern and northern Zimbabwe, Zambia and Malawi, was partially damaged on both sides of the border. Beira was isolated for days in the aftermath of the event due to flooded roads and damaged bridges, and damage to the port and road network in Beira has resulted in stranded imports including fuel, urgent medical supplies, wheat, fertilizer and other critical goods at the port. Trade revenue from the Forbes border post dropped to a quarter of normal levels for several weeks and is only now starting to recover. The damage to the port also means that critical export-related income will be cut off for the affected population, and urgent repairs are required to prevent a long-term impact on the economy of Zimbabwe and its neighbouring landlocked countries.

The risk of water borne (e.g. cholera) and vector-borne diseases is high and growing and must be contained urgently. Historically, epidemic diseases, particularly bacterial and parasitic, contribute to a significant proportion of total deaths and people affected by natural hazards. Zimbabwe had not recovered from an earlier outbreak of cholera and typhoid in September 2018 which recorded 10,730 suspected cholera cases, 317 of which were confirmed. In addition, typhoid fever (39 cases) had also been reported. The UN has now reported a surge in malaria in the Tongogara camp. As access to clean water and health services are severely constrained in the aftermath of the cyclone, the risk of epidemics is high, and this could prolong recovery of the region. About 4,000 cases of cholera have already been recorded along the main trade corridor between Beira and Zimbabwe—there is also a risk of regional contagion. A regional response to surveillance and service delivery is essential.

The regional impact of the crisis will also likely be felt through rising outmigration. About half a million Zimbabweans migrated to neighboring countries as a direct consequence of the droughts in 2002 and 2004, and the cumulative effect of climate-related and economic shocks have the potential to accelerate the upward trend in outmigration even further. Historical evidence suggests that the scale and pace of such migration is likely to cause severe socio-economic strain in receiving countries.

Cyclone Idai has had a devastating impact on an already fragile region, undermining political and development gains. It is the latest natural disaster in a succession of economic and climatic shocks. Price distortions caused by exchange rate and fiscal reforms, and a drought linked to climate variability and change, had already put the affected areas at high risk of food insecurity, further escalating the surge in the number of poor and vulnerable households recorded over the past 6 months. The likely ripple effects on the entire region are also significant, as the affected regions produced one-third of total agricultural output in Zimbabwe and the Beira Corridor is the lifeline for both the interior of northern Mozambique, most of eastern and northern Zimbabwe, Zambia and Malawi. The brewing humanitarian crisis had already raised the prospects of regional contagion and spillover, which could result in faster emigration from Zimbabwe, mainly to South Africa but also to Mozambique, Malawi, Botswana, and other neighboring countries. The impacts of these crises are further compounded by broader national challenges associated


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with limited fiscal space, liquidity challenges, economic fragility, joblessness, inequality, poverty, high public debt, and dilapidated infrastructure, as well as a difficult "political" environment which will make the cyclone response more difficult to mobilize support for.

The impact of the cyclone has overwhelmed national response capacities in Zimbabwe. The President of the Republic of Zimbabwe, Emmerson Mnangagwa, has prioritized the response to avert further challenges, and as a result declared a 'State of Disaster' in the affected areas on 17 March 2019. An official domestic and international appeal for assistance has been crafted to respond to the cyclone's heavy rains, strong winds and flooding. The Government of Zimbabwe (GoZ) activated the national disaster response mechanism and has allocated US$100 million RTGS (approximately US$25 million) for immediate relief. The Ministry of Local Government Public Works and National Housing's Department of Civil Protection (DCP) through its structures at national, provincial and district level has been tasked to coordinate disaster response, and an inter-ministerial high-level committee has also been established to oversee the response at the level of the Cabinet. Despite this, Zimbabwe's institutions have limited capacity to plan, coordinate or lead recovery and reconstruction efforts, and have no fiscal space. Without external help, it would be difficult to reconstruct many of the roads and bridges—several bridges washed away by floods more than 10 years ago are yet to be reconstructed.[15]

While humanitarian, development and bilateral partners have significantly scaled up their response with commitments made to the US$60 million United Nations (UN) Flash Appeal, the needs remain high, and full coverage and access—particularly in rural areas—remain constrained. This comes on top of the US$234 million that had already been requested to address the emerging impacts of the El Nino drought and food crisis that had hit the country before the cyclone. The Flash Appeal aims at providing immediate life-saving and life-sustaining assistance, with the major share of the appeal amount dedicated to food security, agriculture, water and sanitation (WASH), early recovery and shelter. Many of the affected will remain vulnerable to further deterioration of their situation through the coming year unless immediate, medium-term support is provided.

Objectives, Approach and Scope

Objectives

The Zimbabwe Rapid Impact and Needs Assessment (RINA) aims to support GoZ efforts "to identify and quantify the damages caused by the cyclone, develop sector and cross cutting recovery strategies and broadly estimate the corresponding recovery needs and assistance required by the country." This could lead to potentially developing a recovery framework and to facilitate the government's recovery planning efforts. This will entail the following key activities:

- Identify, assess and quantify the social, infrastructure and environmental impact of the cyclone;
- Develop sector and cross-cutting recovery strategies and estimate the corresponding recovery needs;
- Launch an analysis of DRM systems and

capacity-building needs, including for preparedness and resilience building in Zimbabwe.

The Zimbabwe RINA will be a preliminary tool for assessment and recovery planning, defining a strategy for recovery including the estimation of the required financial resources. The RINA will produce a consolidated initial assessment report that presents a multi-sector, comprehensive assessment of the impact and needs from the cyclone.

The report will include an initial recovery strategy that clarifies each assessed sector's objectives and interventions, expected results, timeframe, and expected cost of recovery. The report will also explore initiating capacity-building efforts.

The rapid technical information provided through this support is also expected to inform the recovery and reconstruction plan and framework and provide some build back better recommendations. This assistance will also help the GoZ to:

- Develop a better structured and shared framework for recovery and reconstruction;
- Support a more focused dialogue with donors;
- Encourage the national agencies better use of available data for informed decision-making.

The data and information gathered from the RINA will provide the GoZ with the necessary tools to encompass future impact in its path to sustainable recovery and resilience-building.

The RINA produces the following deliverables: A **consolidated database**, **GIS mapping dashboard** and a **consolidated report** on the damages and impacts created by the recent cyclone event, and a preliminary estimation of needs and recovery strategies for the selected sectors.

Approach and Scope

Approach and timeline of the RINA. The Zimbabwe RINA is an internal assessment meant to inform World Bank engagement in recovery and resilience building related to Cyclone Idai. The RINA could form the basis for a more intensive assessment that could inform the engagement of other partners and ultimately inform the GoZ decision-making about recovery planning and implementation strategy.

After the President of Zimbabwe declared a state of disaster , the World Bank began to consider options for support, including the RINA. The RINA began as an initial assessment in April 2019 using primary data gleaned from remote sensing technologies; the assessment covered key aspects such as the extent of the cyclone, damages to housing and transportation, social infrastructure such as health and education facilities, the displaced population, quality of water sources, agricultural losses—and secondary sources from the government and UN partners operating in Zimbabwe.

Temporal scope. Given the impact of the cyclone, the temporal scope of the RINA includes the impacts and needs arising from the cyclone event of March 2019 and extending to the time that such damages continue to accrue (until a reasonable cut-off date determined by each sector report).

Geographical scope. Geographically, the RINA encompasses all the areas that have been affected by Cyclone Idai.

Sectoral scope. The assessment focuses on the following key sectors and cross-cutting thematic areas that have been severely impacted, including housing, energy, transport, agriculture and irrigation, water and sanitation, environment (with a focus on vegetation, landslides and debris), health and nutrition, education, disaster risk management, and displacement. All of the sector inputs will converge to inform a broad macroeconomic and fiscal impact assessment of the cyclone. A thorough analysis of the overall macroeconomic impact of the cyclone was also conducted.

Methodology

Damage Quantification. The effects of the cyclone on each sector have been assessed in terms of damages.

Damage is defined as total or partial destruction of physical assets existing in the affected area. Damages occur during and immediately after the disaster and are measured in physical units (i.e. number of damaged houses, schools, boreholes, hectares of land, etc.). Their monetary values are expressed as the replacement costs according to prices prevailing just before the event.

Classification and Quantification of Recovery Needs. Recovery needs are the costs of recommended interventions and resources that include: (i) the reconstruction needs estimated as the requirements for financing reconstruction, replacement or repair of the physical assets that were damaged or destroyed by the disaster; and (ii) recovery needs estimated on the basis of the financial resources required for the rehabilitation of basic services, reactivation of productive activities, or immediate reactivation of personal or household income. Recovery needs also include capacity building and operational costs for service delivery that are necessary for the implementation of interventions. Costing for recovery needs include differentials for building back better to consider quality improvements and disaster risk reduction (DRR) measures to be implemented to increase resilience against future disasters. For the purpose of this assessment, recovery needs are classified as: (i) Transitional Phase (1–2 years), and (ii) Medium-Term Recovery Phase (2–3 years).

Data Collection and Validation. The key source of information for the estimation of damages and needs was primary data from remote sensing techniques from Ipsos and secondary data from the government and UN partners. Data validation techniques included the use of remote sensing techniques to validate key impact data for each sector.

Further validation of data was performed using process verification techniques and empirical plausibility checks. Using such techniques, a cyclone reduction factor was applied to many of the sectors to ensure that damages captured by the RINA were attributable to the cyclone.

Alignment with Humanitarian Assessments. Informed as it is by contributions from UN partners on the ground, the RINA complements other international rapid humanitarian assessments to avoid overlaps, minimize gaps; and ensure strategic alignment.

The RINA and the resulting recommended needs are designed to move beyond the traditional and artificial distinction between humanitarian and recovery interventions. International best practice has shown that the most effective recovery strategies work seamlessly across the humanitarian-recovery-development spectrum and take a multi-partner, multi-sectoral, integrated approach that combine both humanitarian, recovery and resilience building interventions in the short term to meet immediate humanitarian needs, strengthen livelihoods and begin to build community resilience future disasters.

Remote Sensing Methodology

Flood Extent

In the first phase, we focused on identifying the extent of the flooding. For the flood extent layer, we looked at 2 different dates to determine change. The different dates, 19 March and 24 March, corresponded to the dates of Sentinel-2 multispectral imagery overflies over the area of interest. This process allowed us to analyze the flooding that occurred right after the cyclone event in the first image and then look at the receding floodwaters in the second image. Imagery analysis was used to isolate the spectral band combinations that highlight standing water for each imagery date. Those datasets were overlaid with all the other sector datasets to determine impact based on flooding. By using the multiple dates, we could highlight features that were still directly impacted by flooding a week after the cyclone. In addition, we also used a digital elevation model to enhance this layer with slope. The digital elevation model was derived from Shuttle Radar Topography Mission (SRTM)[16] 30m resolution. This process allowed us to identify areas of potential landslides as well as to verify that the floodwaters are receding and moving downstream.

Rainfall Intensity

In the second phase, we identified the intensity within the flooding extent. For the rainfall intensity layer, we

used a dataset called CHIRPS[17] (Climate Hazards Group InfraRed Precipitation with Station data). This dataset incorporates satellite imagery with ground station data to create a rainfall time series for trend analysis and monitoring. We looked at data from 12 March (right before the cyclone impacted Zimbabwe) to 19 March (when the rainfall from the cyclone died out over Zimbabwe). The eight datasets were merged to aggregate the rainfall over the area of interest. We then broke the aggregated dataset into three tiers: high intensity (greater than 50mm), medium intensity (between 25mm and 50mm), and low intensity (less than 25mm). This dataset was overlaid with all the other sector datasets to determine immediate impact from the cyclone itself.

Housing

Using an OpenStreetMap[18] (OSM) housing dataset, we created a housing baseline from before the cyclone. From that, we overlaid the rainfall intensity dataset to determine the number of houses damaged and the percentage of damage compared to the baseline. We also completed a detailed housing damage analysis of a portion of Chimanimani that had clear (no clouds) imagery after the cyclone. We utilized Digital Globe 50cm resolution image from March 27, 2019 to conduct this analysis.

Internally Displaced Persons (IDPs)

Our data on IDP camps and waves of migration was derived from Government of Zimbabwe and IOM's Displacement Tracking Matrix.[19] We created a geospatial layer of the camps adding the number of persons at each camp. This dataset was overlaid with the districts of highest impact to provide an overview of potential IDP needs.

Transportation

We extracted all the roads with in the area of interest from Open Street Map (OSM). We identified the primary, secondary, trunk, and tertiary roads as well as the bridges from this dataset. Original data was derived from 30–50cm high resolution imagery and previously complied road infrastructure data. We calculated the length of the roads and bridges within the districts. Using the aforementioned flooding extents and rainfall intensity datasets we were able to identify road segments from each road type that were impacted during and after the cyclone. We aggregated the length of the impacted segments for each road type in each district to highlight the districts with the highest transportation impact.

Health

For the health sector, we aggregated data from two sources, the Zimbabwe Ministry of Health and OSM. This data was overlaid with the flooding extents and rainfall intensity datasets to determine impact to the health facilities within each district. Then the percentage of damaged facilities for each district was calculated to determine the districts that had the most impact to their health sector.

Education

For the education sector, we used Zimbabwe Ministry of Education and OSM data to identify the education facilities. This data was overlaid with the flooding extents and rainfall intensity datasets to determine impact to the education facilities within each district. Then the percentage of damaged facilities for each district was

calculated to determine the districts that had the most impact to their education sector.

Water Supply and Sanitation (WSS)

For the Water Supply and Sanitation (WSS) sector, we used data from OSM to highlight facilities and feature in the WSS sector, including dams, reservoirs, wastewater facilities, water pumps, wells, boreholes, water towers, and water tanks. We also used FAO and Care International data to identify additional dams and incorporated those into the OSM data we collected. We overlaid the rainfall intensity later with the WSS features to determine impact from the cyclone. We also identified the type of dam using satellite imagery, separating the dams into large concrete dams and small natural dams. We used this to identify dams and reservoirs that were impacted by flooding.

Agriculture

For the agriculture sector, we collected Landsat 8 multispectral imagery over the area of interest. Using this imagery, we used imagery analysis at 10 meter resolution of raster band combinations to highlight areas of maize. This dataset was overlaid with the flooding extent and rainfall intensity layers to determine the impact to maize crops. We have also consulted Syngenta remote sensing and ground validated data for baseline maize collection from 2016–2018.

Forests and Protected Areas

For this sector we collected data from multiple sources. The forests data came from a land cover/land use dataset supplied by the Regional Centre for Mapping of Resources for Development.[20] The data was classified using Sentinel-2 imagery. We extracted the appropriate land cover classification codes for forests to create the forest layer. For the Protected Areas, we used data from the World Database of Protected Areas. We sorted the data in that database by type within the area of interest.[21] We overlaid these layers with the rainfall impact to identify areas that were likely impacted during the cyclone.

3

SECTORAL IMPACT AND NEEDS

Macroeconomic

Background and Pre-disaster Context

Zimbabwe has experienced a slowdown in economic growth in recent years. Between 2014 to 2017, the country's Gross Domestic Product (GDP) growth averaged 2.7 percent, which is only marginally above population growth and insufficient to improve average per capita income. As a result, Zimbabwe's Gross National Income (GNI) per capita has fallen behind the comparable figure for the Southern African Development Community (SADC) (US$1,170 vs. US$1,250 for SADC in 2017) .

According to the 2017 Poverty, Income, Consumption and Expenditure Survey (PICES), some 70.5 percent of the population was assessed to live in poverty, while some 29.3 percent of the population was estimated to live in extreme poverty. The incidence of poverty and extreme poverty was even greater in rural areas (at 86.0 percent and 40.9 percent of the population, respectively) where reliance on rain-fed agriculture remains significant.

The population living in poverty is more likely to have limited access to basic services. Only 4 percent of rural households are estimated to have access to flush toilets, compared to 97 percent of urban households. Less than five percent of rural households have access to piped water in their homes, compared to 38 percent of urban households. At the national level, only 38 percent of the population has access to electricity, which is less than the average of countries in sub-Saharan Africa and for low-income countries. While education and health outcomes are better for Zimbabweans measured at the national level compared to the average of Sub-Saharan African countries or low-income countries, the rural population is confronted with much lower access to health and education.

While projected GDP growth of 6.2 percent in 2018 was strong, economic outcomes began deteriorating in the last quarter of 2018 with shortages in foreign currency[1] and in basic commodities limiting the private sector's ability to invest and trade goods. These conditions were worsened by an El Nino induced drought in early 2019. This, combined with intensified inflationary pressures on the economy in recent months[2], resulted in significant declines in real personal disposable incomes and a consequent rise in the poverty rate and food insecurity. The number of extreme poor is expected to have increased to around 4.4 million people in 2018 up from 3 million in 2012.

Limited fiscal space is constraining the government's ability to provide social assistance to the increasing number of poor and to engaged in much needed investments in human capital and infrastructure. The Government has embarked on a fiscal adjustment program as part of its Transitional Stabilization Program's goal to stabilize the economy and set the foundations for a private sector led growth. The fiscal adjustment program, supported by a recently agreed Staff Monitored Program (SMP)[3], aims to reduce fiscal imbalances by containing the key drivers of fiscal deficits in the absence of opportunities for external financing due to Zimbabwe's debt situation. Fiscal deficit was reduced to 7.1 percent of GDP in 2018 from 9.7 percent in 2017.

External sector pressures intensified in 2018. The current account deficit widened from 1.3 percent of GDP in 2017 to 4.5 percent in 2018 on the back of expanding trade deficit. Growth of imports exceeded the growth of exports as the economy continued to import necessities such as fuel, electricity, and crude soya bean oil (worsened by higher import prices). Gross official reserves were depleted and stood at approximately one week of imports by the end of 2018. The local currency weakened on the parallel market from $1.4 (local currency) per US$ in January 2018 to $3.3 (local currency) per US$ in end-2018.

Impact on the Sector

The macroeconomic impact of Cyclone Idai has been channeled through losses in agricultural production and in livestock, along with losses in trade-related activities due to the significant damage caused to critical infrastructure, such as roads and bridges, and to the electricity distribution network.

The provinces of Manicaland, Masvingo and Mashonaland which were affected by Cyclone Idai were among the main producers of key agricultural staples in Zimbabwe. These key staples consisted in the production of maize (36 percent of country's total planted areas), sorghum (38 percent of country's total planted areas), pearl millet (46 percent of country's total planted areas), tobacco (32 percent of country's total planted areas), avocado (96 percent of country's total planted areas) and bananas (93 percent of country's total planted areas). Similarly, a significant share of the country's livestock were concentrated in these three provinces, with the three province's share of the country's total livestock estimated at 44.1 percent for sheep, 56 percent for goats and 55 percent for pigs.

According to the World Bank assessment, crop losses due to Cyclone Idai have been estimated US$135.1 million, while losses related to the cultivation of fruits have been estimated at US$12.6 million. Livestock production did not incur significant losses according to the World Bank's assessment which estimates it at US$561,000. While a portion of these losses were climate-related, a portion of the losses came as a result of damages caused to agricultural infrastructure, such as irrigation schemes and water catchments.

In addition to agricultural losses suffered because of Cyclone Idai, significant losses have been registered in trade and trade-related activities due to the damages

1 Foreign currency shortages heightened since October 2018 when the Government separated accounts in US$ and in domestic currencies and further in early 2019 when an official interbank market exchange rate and a new currency was introduced (RTGS$).

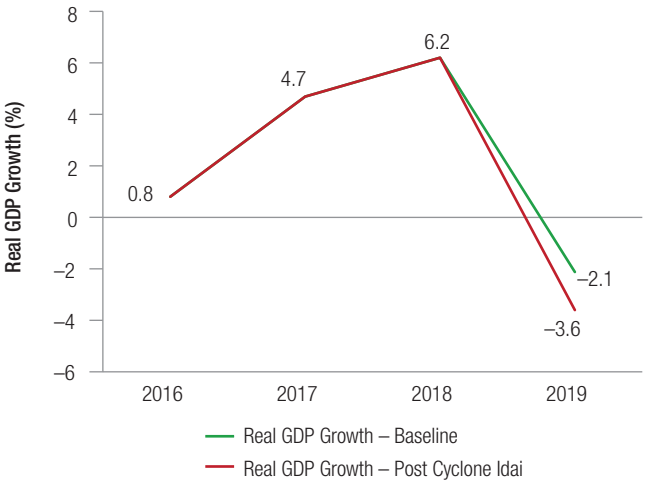
2 Year-on-year inflation spiked to 75.9 percent in April 2019 with food prices and transport services contributing most to the spike as the import component is the highest

3 The SMP was approved on May 15, 2019.

caused to critical infrastructure, such as roads and bridges, and to the electricity distribution network. Based on the World Bank assessment, some 865 km of roads and 20,354 m of bridges have been damaged as a result of Cyclone Idai, having major repercussions on the transportation networks for agricultural producers and businesses. Similarly, some 88.9 km of 33 kv line, 106.2 km of 11 kv line and 33.6 km of mv line, along with 44 sub-stations, were adversely affected by Cyclone Idai, thereby undermining the production capability of energy-intensive sectors, such as the mining sector. Furthermore, the port of Beira, which is Mozambique's second largest port, and which serves as an important transit route for imports of fuel and other products to a number of inland countries, including Zimbabwe, has been severely affected by Cyclone Idai. Lower imports of fuel, machinery and equipment—all critical to private sector production processes—have weakened the country's economic prospects for 2019.

Based on this assessment, we project a 3.6 percent contraction in real GDP growth in 2019, against a baseline contraction of 2.1 percent, representing a 1.5 percentage point decline which is attributable to the impact of Cyclone Idai (figure 3.1). Cyclone Idai disproportionately affected the most vulnerable segment of the population, with roughly a third of the country's poor located in the provinces of Manicaland and Masvingo.

Figure 3.1: Annual Real GDP Growth (%), Baseline and Post Cyclone Idai



Source: Government of Zimbabwe and World Bank staff projections.

Fiscal Accounts

In response to the cyclone, the GoZ committed RTGS$100 million (close to US$33million based on the average monthly official exchange rate for April) on reconstruction of basic infrastructure to provide road access for the delivery of humanitarian support, and other basic services such as water supply, but needs will be significantly higher in line with the official emergency appeal for US$612 million to support the recovery effort. Additional public spending for humanitarian and reconstruction needs resulting from the cyclone will exert significant pressure on the budget, particularly in the context of limited opportunities for external financing, upcoming sizable domestic debt repayments, rising costs in delivering public services and foreign currency shortages. While measures to ensure fiscal consolidation and financial sector stability are being put in place by the Government, supported by an IMF SMP, achieving an overall balance of 4 percent of GDP will be challenging. Spending pressures are already high and mounting as a result of Cyclone Idai, while revenue generation is being limited by lackluster economic growth and recently introduced excise rate cuts on fuel.

Similarly, the local governments' ability to deliver services will be severely constrained by low collection of user fees, which have been exacerbated by the economic recession, as well as institutional and capacity constraints. The significant reliance of local governments on real estate sales fees as a main source of revenue will limit the revenue generation capacity of local governments in the Cyclone-affected areas.

Recovery and Resilience Needs

The economic recovery strategy should consist in supporting the livelihoods of farmers through cash and in-kind support, rehabilitating damaged infrastructure, and averting any future risk of flooding as water shift inlands and existing flood defense mechanisms are overrun. While the Government of Zimbabwe has already

committed RTGS$100 million to rehabilitate damaged infrastructure as a result of Cyclone Idai, additional financing, through domestic and external sources, will be required to adequately respond to recovery needs.

Agriculture

Background and Pre-disaster Context

Agriculture and the smallholder farming remain a dominant sector to the Zimbabwean economy contributing about 11 percent[22] of gross domestic product (GDP) to the country's economy and accounting for about 16 percent of export earnings.[23] The sector provides livelihood for about 70 percent of the population[24] and agriculture-related employment supports 52.3 percent of the economically active persons[25]. According to FAO STAT 2016, women constitute 72 percent of the agricultural labor force, mostly as unpaid family labor. Food and agriculture is crucial for livelihoods and income generation of Zimbabweans and the country's economic growth and for reduction of poverty. It is the backbone of the economy through employment, foreign exchange earnings, and food security.

Most agricultural land has been worked by small-scale producers since the Fast Track Land Reform was introduced after 2000. The fact that agriculture is dominated by small-scale production presents important challenges to the government with respect to increasing productivity, linking producers to markets, and managing risk.

Zimbabwean agriculture is widely diversified, owing to diverse agro-climatic conditions that make it possible to produce over 20 types of food and cash crops as well as poultry, pigs, and dairy and beef cattle. The most important agricultural commodities are the staple food grains that constitute the basis of local diets—maize, wheat, small grains (millet and sorghum), groundnuts, and beans—and export and cash crops (mainly tobacco, cotton, sugarcane, and horticultural crops).

Four of these commodities play particularly critical roles. Maize is the main staple food crop and therefore at the center of national food security. Groundnuts are critical for household nutrition. Tobacco is the major agricultural export commodity, contributing 25.2 percent of agricultural GDP in 2016, accounting for over 50 percent of agricultural exports, and representing an average of 29 percent of the country's total exports in 2016 and 2017.[26] Cotton is a crop of strategic importance for promoting inclusive economic growth, poverty alleviation, rural development, and food security in Zimbabwe, because in various regions cotton production offers the main link to markets and is a key component of livelihood strategies among isolated and vulnerable rural households. After tobacco, cotton is Zimbabwe's second or third (together with sugar) largest agricultural foreign exchange earner, contributing 12.6 percent to agricultural GDP.

Livestock contributes to livelihoods but over all its contribution to the GDP has been limited; with bulk of the product sold domestically and less than 10 percent exported. The livestock sector comprises beef, dairy, poultry, pigs, goats and sheep. Other major commercial livestock species are domesticated wildlife in the form of ostrich, fish and crocodiles. These products are mainly destined for foreign markets, with less than 10 percent consumed locally.[27] It is estimated that up to 60 percent of rural households' own cattle, 70–90 percent own goats, while over 80 percent own chickens.[28]

Zimbabwe has considerable irrigation potential of 2 million ha, currently only about 155,000 ha (representing 8 percent of the potential) of land is developed for irrigation.[29] Currently the government is promoting the development of affordable and sustainable technologies for small scale irrigation to complement large scale irrigation investments. These efforts will increase the hectares under small scale irrigation.

According the recent agriculture sector disaster risk assessment of the World Bank (March 2019), the sector is highly exposed to weather-related disaster risk. The assessment examined the impact of drought on the agriculture sector and Zimbabwe's capacity to management risk. The assessment found that Zimbabwe loses about US$126 million each year on average due to production risks that could be better managed. These

losses represent 7.3 percent of agricultural GDP. Losses in years when production risks are high can escalate to virtually catastrophic levels. For example, losses in the drought year of 2001 were estimated at US$321 million, and in 2008, when agriculture was seriously affected by drought and financial restrictions, losses escalated to US$513 million. Such losses have a direct impact on overall economy wide growth. Due to agriculture' s strong linkages with the rest of the economy, the impact of disaster on the sector significantly slows down growth. Figure 3.2. below shows the correlation between agriculture value added and overall GDP growth.

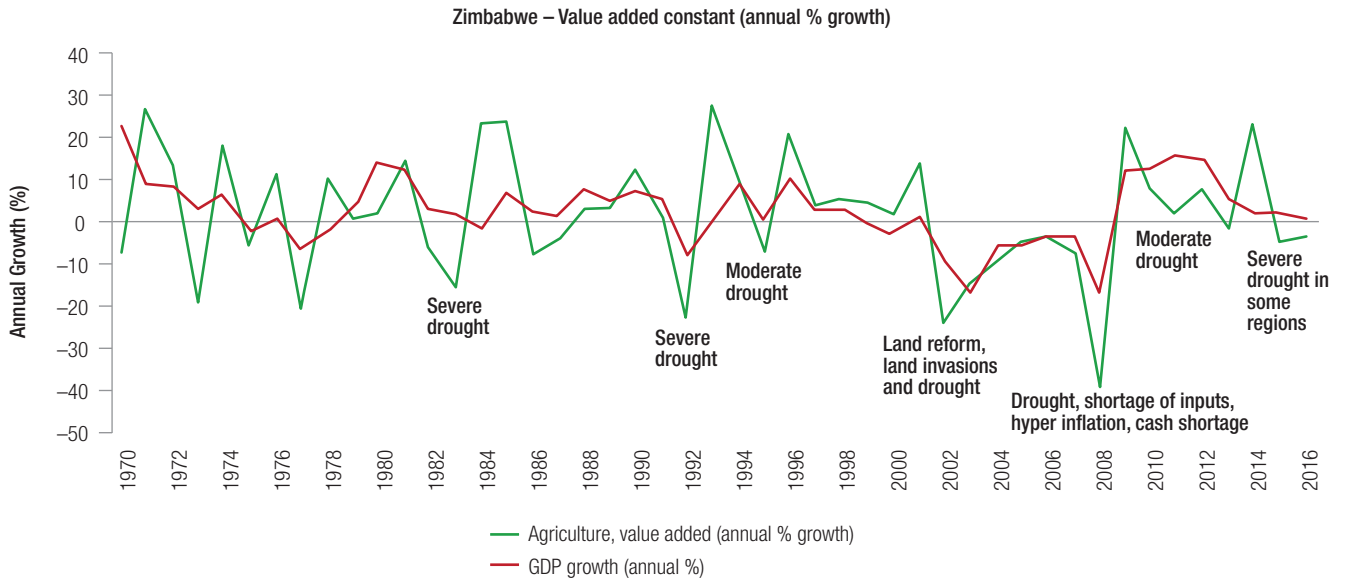
The food and agriculture sector in the remaining of the document is organized in four distinct sub-groups: (i) grains, plants and trees; (ii) livestock and small ruminants; (iii) agriculture infrastructure, small business, and value chains; (iv) risk reduction and capacity building. The 2018 seasonal crop assessment notes that the total cultivated land in the affected districts is over 578,000 ha and the RINA assessment estimates the total arable land in the affected districts at 1.4 million ha. As table 3.1. below shows, maize, sorghum, pearl millet, sugar bean and sweet potatoes are the main crops produced. Additionally, tree fruit crops are significant source of livelihood and income in the area.

Additionally, tree fruit crops are significant source of livelihood and income in the area. For example, 88 percent of the affected area produce bananas, pineapple are cultivated in 131 ha, mangoes in 49 ha; oranges in 17 ha; and macadamia nuts in 19 ha. The region also produces coffee, tea and macadamia mostly for export. See table 3.2. below.

Risk management capacity

Zimbabwe's capacity to manage and effectively respond to disaster risk in the agriculture sector is weak. Smallholder farmers that dominate Zimbabwe's agriculture sector are increasingly vulnerable to disaster shocks and are not equipped with capacity to minimize the impact of shocks on production. The same is true for other stakeholders in agriculture supply chains besides producers. Over the years of economic crisis, the Government's ability to provide effective farm risk management support to enhance adaption and mitigation of small producers has deteriorated. Agriculture innovation systems—particularly extension service and public research

Figure 3.2: Relationship between Agriculture Value Added and Overall GDP Growth



Source: Government of Zimbabwe and World Bank staff projections.

Table 3.1: Crop Production in Chimanimani, Chipinge and Mutare Districts of Manicaland

	Chimanimani		Chipinge		Mutare	
Crop	Area (Ha)	Production (MT)	Area (Ha)	Production (Ha)	Area (Ha)	Production (MT)
Maize	11919.00	16168.00	54087.00	47048.00	39347.00	28243.00
Sorghum	750.00	255.00	7768.00	7797.00	4788.00	2154.00
Pearl Millet	775.00	209.00	2878.00	841.00	9233.00	3935.00
Finger Millet	101.00	57.00	538.00	144.00	1519.00	358.00
Rice	46.66	23.45	0	0	9.60	3.09
Groundnut	535.90	247.00	4008.76	2065.18	8720.21	4502.00
Sunflower	23.40	16.42	345.24	102.15	117.77	60.48
Soyabeans	2.12	1.06	1881.67	1457.51	1.00	0.06
Sesame	3.62	0.67	1079.19	728.32	0	0
Sugar Beans	642.80	423.49	874.27	460.62	1706.26	1530.65
Roundnuts	237.32	118.18	1791.35	418.03	5615.17	2084.87
Cowpeas	49.71	18.91	1781.38	653.83	2315.83	850.13
Paprika	0	0	0	0	0	0
Sweet potato	652.90	5911.37	955.00	16707.78	1012.42	7768.17
Cassava	0.67	0.00	720.40	123.28	0	0

Source: Second Round Crop and Livestock Assessment 2017/18 Season.

are seriously under-funded operating under capacity. Extension agents are overstretched with limited resources to effectively reach out the smallholders for advice and dissemination of technology. Public research into technologies vital for building resilience of smallholder farming is very limited, largely due to lack of resources for operational research. Effectively collaboration among key agriculture institutions—research, extension and education has weakened. This has limited an integrated response to managing agricultural risk. Looking ahead, improving the agriculture innovation system institutions that need to support risk mitigation at the farm level should be a priority. This can go a long way to reduce agricultural volatility, manage food insecurity, and assist smallholders to adapt to climate change.

Table 3.2: Exports of Coffee, Tea and Macadamia in 2017

Crop	Quantity (MT)	Value Exported (US$)
Coffee	142	58,2000
Tea	12,249	21,376,000
Macadamia	4,155	4,159,000

Source: International Trade Center, TradeMap.

Early Warning Systems

Zimbabwe's long history of drought and climate vulnerability has led to the progressive establishment of more effective early warning systems, yet a number of opportunities exist to strengthen these systems, improve the coordination of early warning efforts, and use increasingly sophisticated technology.[30] Zimbabwe's well-established hazard and monitoring systems are supported by institutional structures at all administrative levels, including the DCP and Meteorological Services Department, which are the key institutions for disaster risk and preparedness. Even so, there is a need to strengthen cross-institutional coordination for early warning activities that are complementary or require improved coordination across institutions. Investments that develop early

warning infrastructure are also needed for Zimbabwe to take advantage of new technology and data sources, which will be particularly important for rapidly triggering financial preparedness and funding responses.

It would also be interesting for Zimbabwe to develop agroclimatic zoning that can help stakeholders make decisions based on historical probability estimates, which can help to forecast the level of risks for specific crops in specific areas.

Impact on the Sector

At least 270,000 people were affected by Cyclone Idai and it is estimated that 49,717 farmer-households lost their crops, livestock, assets and livelihoods and seen their coping mechanisms vanish and have become nutritious-food insecure and assets poor.

The remote sensing assessment estimates the total arable land in the affected districts at about 1.4 million hectares, with 46 percent of the arable land indicating possible flood damage in the first week. In the most affected districts of Chimanimani and Chipinge, the assessment indicates a combined 80 percent of possible flood damage to the arable land. The remote sensing data also shows that Mutare (61 percent) and Gutu (79 percent) had high possible flood damage. This may suggest the high spatial flood extent and catchment runoff.

The delayed start of the season, followed by lower than normal rainfall in many parts of the country (see figure 3.3 below), which is now topped by the catastrophic impact of Idai in Eastern parts of the country will certainly lead to higher levels of impact in terms of food-insecure households. Very limited rainfall in the December—February period created extremely dry soils dry which prevent torrential rainfall from being absorbed, exacerbating run-off and worsening flash floods.

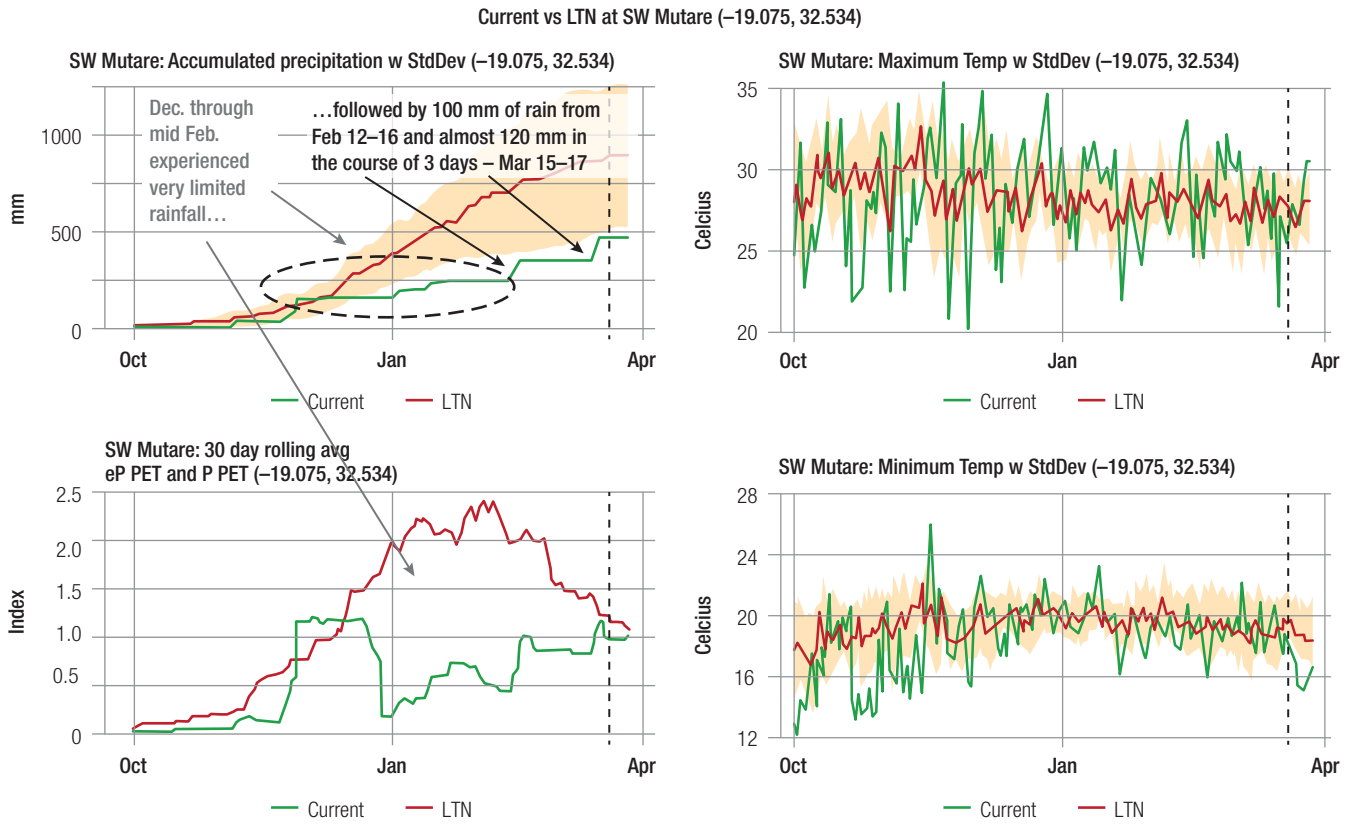
Despite experiencing almost 120 mm over a period of three days (March 15–17), the accumulated expected (as for the past 10 years) amount (904 mm) of rainfall still very much below normal (474 mm). The spikes and dips in temperatures are also quite far from normal, which may be reflective of a very dry environment.

Rapid assessments in the affected districts have shown that crop fields were washed away or flooded and covered in mud resulting in total loss of crops. The

Table 3.3: Possible Flood Damage to Arable Land

District	Arable Land Baseline	Limited to no flood damage	Possible Damage	Limited to no flood damage	Possible Damage
Bikita	366,891	205,649	161,243	350,976	15,915
Buhera	115,754	53,027	62,727	105,862	9,892
Chikomba	150,391	67,241	83,150	108,319	42,072
Chimanimani	64,457	32,132	32,324	62,262	2,194
Chipinge	108,610	76,065	32,545	103,330	5,280
Chipinge Urban	20	20		20	
Gutu	130,074	26,892	103,182	109,593	20,481
Masvingo	213,086	162,108	50,978	211,857	1,230
Masvingo Urban	346	187	160	305	42
Mutare	132,283	52,124	80,159	128,789	3,494
Mutare Urban	1,082	503	579	993	89
Mutasa	59,464	44,050	15,413	53,711	5,753
Zaka	30,871	15,931	14,940	30,823	48
Total	**1,373,329**	**735,929**	**637,400**	**1,266,840**	**106,489**

Figure 3.3: Current vs. LTN at SW Mutare



Source: Agriculture Observatory.

household-food stocks are reported to have been soaked in water when granaries collapsed or when houses were flooded. The recent harvest of the October 2018 planted irrigated-cereal crops was soaked in the rain and started sprouting.

Small livestock, e.g. chickens, turkeys, guinea fowl, have been washed away. It is reported that the cyclone resulted in extensive loss of livestock and crops, irrigation infrastructure, forestry, orchards, farming equipment/infrastructure, and market-access roads. The impact of the cyclone was augmented by the effects of the heavy rains, strong winds, and landslides when the cyclone tracked into the country as well as the severe drought that has been experienced in several regions in the country. The drought had already led to significant losses in crop and pasture production, weakening the capacity of households to cope with new major shocks.

Damages and Losses to the sector

The assessment defines damages as follows; the main direct damages reported, i.e. loss to physical infrastructure/assets; horticultural crops/trees and harvest; and damages to the irrigation equipment. Losses are defined as crop production losses arising from both reduced land area under cultivation (affected) and reduced yields at harvest.

According to the GRADE assessment report, the estimated damages to the agriculture sector are approximately US$196 million.[31] The rapid impact and needs assessment estimates the total aggregate production losses estimated at US$155.5 million. Current crop estimates indicate the harvest will be below average across all provinces due to the poor performance of the 2018/19 rainfall season and effects of Tropical Cyclone Idai in eastern areas.[32] Crop production loss for districts affected was calculated based on the projected production for

2018/19 season; multiplied by the percentage area affected by the floods. The percentage area affected was determined by a rapid Government assessment. The monetary crop loss value was estimated by multiplying the crop production lost and the market prices as determined by the Grain Marketing Boards.

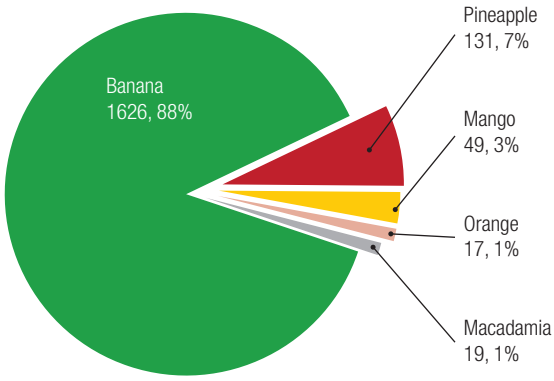
The severe aggregate economic impact of the cyclone on agriculture crops production has been unprecedented, with total aggregate production losses estimated at US$135 million. Maize crop losses are estimated at US$119.6 million (88 percent) of the total production losses recorded. Despite such high losses and the many challenges this sector has faced, the country's crops agricultural sector remains both viable and critical to the country's economic recovery and long-term development. If the next season's rains stay at normal levels, there could be expanded production of irrigated main crops, oilseeds, fruits and vegetables.

Assessment considerations or assumptions in calculating the economic value of the damages to the fruit trees are as follows: (i) estimate the yield per hectare of the fruit tree based on assumptions at lower value (because of drought and economic factors); (ii) estimate average production; (ii) estimate the economic value of the fruit; and (iii) calculate the monetary damage from the tree loss.

Government assessment indicated that 1,626 ha of fruit trees were affected by the cyclone. 88 percent of the affected area was banana trees with an estimated damage and loss value about US$11 million. The other fruit trees which had land area damaged by flooding include pineapple, 131 ha (US$840,000); mangoes 49 ha (US$163,200); oranges 17 ha (US$270,000) and macadamia nuts 19 ha (US$350,000).

Damage in the livestock sub-sector refers to the death of animals due to the flooding and disease prevalence. Livestock damages were calculated based on unit average cost per animal. It is estimated that during the cyclone, Zimbabwe lost over 1972 of its total livestock population valued at over US$462,000 in addition to losses in productivity in terms of milk yield and body weight not accounted. A population of over 12,000 poultry was

Figure 3.4: Fruit Tree Total Ha Affected



Source: Government of Zimbabwe and World Bank staff projections.

Table 3.4: Production Losses

Crop	Projected 2018/2019 (MT)	% flood affected area (Ha)	Production Loss (MT)	Market Price (RTGS$/ MT)	Market Price US$/ MT	Value of Crop Loss (in US$)
Maize	1,700,702	31	527,218	726	227	119,612,498
Sorghum	77,514	15	11,937	726	227	2,708,242
Pearl Millet	48,844	23	11,039	726	227	2,504,415
Finger Millet	9,085	12	1,054	726	227	239,094
Groundnut	127,202	15	19,462	918	287	5,583,134
Round Nut	47,594	15	7,282	918	287	2,088,990
Sugar Beans	21,320	15	3,262	2,500	781	2,548,406
Total	**2,032,261**	**127**	**581,253**	**7,240**	**2,263**	**135,284,780**

Table 3.5: Fruit Trees Monetary Damage Loss, in US$

Ward	Banana	Pineapple	Mango	Orange	Macadamia
Manyuseni	2,294,250	360,000	40,800	100,000	50,000
Ngorima A	2,992,500	164,000	36,000	90,000	75,000
Ngorima B	2,331,000	168,000	43,200	70,000	75,000
Gwindingwi	2,520,000	124,000	24,000	10,000	112,500
Nyahode	656,250	24,000	2,400	—	37,500
Tilbury	162,750	—	16,800	—	—
Chikukwa	31,500	—	—	—	—
Totals	**10,988,250**	**840,000**	**163,200**	**270,000**	**350,000**

Table 3.6: Livestock Loss

	Number of livestock				Total loss value (US$)			
District	Cattle	Goats	Sheep	Poultry	Cattle	Goats	Sheep	Poultry
Chimanimani	1354	49	561	12313	406,200	1,960	33,660	61,565
Chipinge	59	0	0	130	7,700	—	—	650
Buhera	0	0	0	0	—	—	—	—
Mutasa	0	0	0	0	—	—	—	—
Nyanga	0	0	0	0	—	—	—	—
Makoni	0	0	0	0	—	—	—	—
Mutare	8	0	0	1000	2,400	—	—	5,000
Total	**1362**	**49**	**561**	**12 413**	**426,300**	**1,960**	**33,660**	**67,215**

Source: Government assessment; Idai report 10 April 2019.

estimated to have been killed, at an estimated value of US$67,000.

The direct damage reported to agriculture physical infrastructure was to irrigation equipment and dip tanks, tobacco barns and farm offices. The assessment estimates the current damage to the irrigation schemes to approximately US$4.9 million. The damages to irrigation infrastructure were only recorded in Chimanimani and Chipinge districts with more than 5,000 farmers being affected and approximately 2,300 ha of land area affected. The nature of damages included weir submerged and damaged; conveyance pipeline washed away; and canals silted; gate valves swept away; and boreholes submerged and pumps destroyed.

In Makoni, Mutasa and Mutare about US$ 782,400 in damages have occurred to tobacco barns and the government reports that some farmers are modifying their kitchens into tobacco barns while others are using makeshift tobacco barns as a coping mechanism.[33] Also, 79 dip tanks (15 percent of total) amounting to approximately US$ 1.4 million were recorded damaged in seven of the Manicaland districts.

Economic and social impact to the agricultural sector

Some 49,717 farming households in the affected districts lost their food, livelihoods and source of income. It is estimated that 37 percent (121,000) of the rural population would require urgent food assistance in Chipinge

Table 3.7: Damages on Agriculture Irrigation Infrastructure

District	Name of irrigation scheme	Land area (Ha)	No. of farmers	Estimated cost US$
Chimanimani	Nyanyadzi	440	721	1,800,000
	Tonhorai	72	89	40,000
	Gudyanga	48	60	80,000
	Mhandarume	7		100,000
	Chakohwa	87		30,000
	Nenhowe	107		25,000
	Nyabande	37		340,000
	Cashel Valley and Mutambara			1,216,000
	Zimunda			50,000
	Bvumbura			50,000
Chipinge	Musikawanhu	750	3125	214,000
	Chibuwe Block B & E	320	614	120,000
	Mutema	180	113	250,000
	Maunganidze	65.5	84	180,000
	Bwerudza	180	235	100,000
	Kushinga Gambadziya			150,000
	Musinzwi			50,000
	Mugondi			80,000
	Delivery pipeline washed away			15,000
Total		**2,293.50**	**5,041**	**4,890,000**

Source: Government Idai Report 10 April 2019.

Table 3.8: Other Infrastructure Affected

District	Dip tanks before cyclone	No of dip tanks destroyed	No. of offices	Number of barns replacement cost	No of dip tanks destroyed
Chimanimani	53	7	0		126,000
Chipinge	—	25	5		450,000
Buhera	0	15	0		270,000
Mutasa	0	9	2	3,200	162,000
Nyanga	0	3	2		54,000
Makoni	0	12	2	459,200	216,000
Mutare	0	8	0	320,000	144,000
Totals	**53**	**79**	**11**	**782,400**	**1,422,000**

Source: Government Idai Report 10 April 2019.

district, while 77 percent (114,000) of the population in Chimanimani will required urgent food assistance.[34] The impact on crop production and markets could lead to price increases and/or scarcity of food in markets. Stored cereals were soaked in water becoming unfit for consumption affecting food and nutrition security at household level.[35] The impact of the cyclone has further compounded the food-insecurity situation. As reported in February

2019, 5.3 million Zimbabweans required food assistance with 2.9 million people, 31 percent of the total rural population facing IPC-3, Crisis (1.9 million people) or IPC-4, Emergency (1 million) levels of food insecurity.[36]

Typical seasonal livelihoods, e.g. crop sales, casual labor and self-employment activities and livestock sales, will most likely remain constrained, negatively impacting access to food.[37] Compounded by the volatile macroeconomic situation and increasing foreign exchange shortages, staple and non-staple food prices continue to increase further negatively affecting household purchasing power and food access. The Government increased the maize producer price by 80 percent and provided a 38.5 percent subsidy to commercial millers.[38] Despite Government efforts this forced commercial millers to increase maize meal prices by up to 30 percent.

Road network destroyed disrupted markets and as a result prices of food stuff and other goods were likely to

Table 3.9: Cost Estimates and Gaps – Recovery and Resilience Needs for Sector (in US$)

Intervention	Short term (humanitarian and early recovery needs)	Medium term (recovery/ resilience)	Long Term (recovery/ resilience)	Total Needs
Replanting of fruit trees, afforestation and land preparation	6,000,000	6,000,000	8,000,000	20,000,000
Provide seeds, tools and equipment, fertilizer, insecticides and pesticides, etc. Grains and tubers (maize, wheat, sweet potatoes) pesticides)	3,600,000	1,800,000	600,000	6,000,000
Distribute and restock livestock and small ruminants to the affected households and vulnerable groups	700,000	200,000	100,000	2,000,000
Vaccination against diseases and Strengthening community-based animal health service delivery	800,000	600,000	600,000	2,000,000
Restore, restock, and recreate e.g. SMEs and value chains including small businesses and enterprise; selling of livestock, food inclusive fruits and vegetables, grains, meat, honey, fish, etc.	1,000,000	2,000,000	2,000,000	5,000,000
Rehabilitation of damaged irrigation schemes	3,375,000	1,125,000		5,868,000
Rehabilitation of livestock water catchments, existing dip tanks, provision of dipping chemicals and establishment of handling facilities in the relocated areas.	900,000	540,000	360,000	1,800,000
Rehabilitation and reconstruction of destroyed agriculture infrastructure/assets, e.g. granaries, barns, etc	700,000.0	1,750,000.0	1,050,000.0	3,500,000
Cash for work – Rural farm work/labor and income that is lost (including flood protection and controls, water harvesting, etc.)	3,150,000.0	1,350,000.0		4,500,000
Implement water-saving frontier agriculture growing systems (simple hydroponics, micro-livestock)		320,000.0	480,000.0	800,000
Support post-harvest management, including drying and storage of grains, fruits and vegetables		1,200,000.0	1,800,000.0	3,000,000
Conduct a detailed study on resettlement options for farmers in the flood plains	100,000			100,000
Installation of flood protection measures in affected irrigation schemes and other high-risk areas	500,000	1,000,000	1,000,000	2,500,000
Capacity building and strengthening extension services to foster Climate smart agricultural (CSA) practices	200,000	1,000,000	800,000	2,000,000
Total	**17,425,000**	**17,085,000**	**16,190,000**	**59,068,000**

go up due to high transport costs. Transportation business was also affected, for example delivery trucks that took fruits grown by local farmers to city markets across Zimbabwe were affected and some of farmers who used to hire transportation of their produce died. Value chains and markets were also affected, for example farmers needed to process the grain/legumes/fruits into various products at the farm to add value to the crop and maximize profits. The yield was significantly reduced due to ensuing crops losses, and led to lower profits. This thus also cascades to the markets were prices of commodities increases and also local manufacturers of processing equipment used in value addition are indirectly affected. Markets were disrupted as the flooding destroyed dozens of small grocery stores and market stalls.

It should be noted that the government crop and livestock assessments are still in progress. A more in-depth agriculture impact assessment is urgently required to further determine and validate projections of damages and losses to the sector.

Recovery and Resilience Needs

The total recovery needs for the agriculture sector are estimated at more than US$59 million. In recognition of the importance of agriculture to livelihoods, employment and food security of the affected communities, an immediate priority is supporting the provision of agriculture inputs such as high-quality seeds, fertilizers, pesticides, and farming implements.

Given the significance and value of livestock to rural communities both as a source of income and draught power for farming as well as transportation, there is need for restocking and distribution of livestock to affected rural households as a short-term early recovery need. Provision of veterinary services and vaccination of livestock against water borne diseases associated with flooding disasters.

In the context of increasing crop production as well as building resilience, it is critical to rehabilitate damaged irrigation infrastructure and urgently improving/establishing irrigation systems for small scale farmers. Also as a resilient strengthening measure and to mitigate future risks, installation of flood protection or control systems is required for long term resilience. Moreover, grain storage and other post-harvest measures are also high priority in order not to lose more grains, etc. to insects and pests.

Housing

Pre-Cyclone Sector Context & Analysis

Information on pre-cyclone housing conditions in typically shows the average household size in Zimbabwe, the types of homes that are occupied, and how their living conditions are with regards to access of electricity, water and sanitation, and food. Typically, most households in Zimbabwe have access to improved sources of water and sanitation, while the main source of energy for cooking in rural areas was wood compared to urban areas which used electricity. The assessment thus focuses on either the Cyclone Idai-affected provinces of Manicaland, Mashonaland East, Midlands and Masvingo, and where possible the analysis will focus at the district-level for these provinces.

A typical home in Zimbabwe has an average household size of 4.2 persons. Table 3.10 shows the average across the 4 cyclone-affected provinces of Manicaland (4.2), Mashonaland East (4), Midlands and Masvingo (4.6). Close to half of the households in the country also live in these affected provinces.

In Zimbabwe, households live in an array of different types of housing units that are characterized as per the following:[4]

- "Traditional dwelling" units are found in the old-style family settlement in which a number of buildings are made of pole and dagga/bricks with thatched roofs;
- "Mixed dwelling unit is found in old style family settlement where one or more of the buildings in a cluster are built of materials more modern than pole and dagga/bricks and thatch;
- "Detached dwelling" unit is a structurally separate dwelling unit which is built of materials other than pole and dagga. Access to the street is by means of

[4] Zimbabwe ICDS, 2017.

Table 3.10: Population in Private Households by Number of Households and Average Household Size and Province[a] – Cyclone Idai – Affected Provinces are Circled

Province	Population	Number of Households	Average Household Size
Bulawayo	738,600	184,692	4.0
Manicaland	1,861,755	444,536	4.2
Mashonaland central	1,441,944	338,369	4.3
Mashonaland East	1,366,522	339,654	4.0
Mashonaland West	1,567,449	366,654	4.3
Matabeleland North	744,841	163,568	4.6
Matabeleland South	810,074	192,666	4.2
Midlands	1,514,325	354,201	4.3
Masvingo	1,533,145	340,784	4.6
Harare	1,973,906	530,668	3.7
Total	**13,572,560**	**3,255,463**	**4.2**

[a] Zimbabwe ICDS, 2017. Information not available per district so by province was used.

a path, or steps, directly on to the pavement, not shared by other dwelling units;

- "Semi-detached dwelling" units consist of two dwelling units with a common wall between them;
- "Flat/town-house" consists of three or more dwelling units in a row divided by common walls;
- "Residential buildings" with several floors are also included in this category.

The distribution of households by type of housing unit in table below indicates that in the cyclone-affected districts, 2/3rds of the

Table 3.11: Percent Distribution of Households by Districts and Type of Housing Unit – Cyclone Idai-Affected Districts[a]

District	Traditional	Mixed	Detached	Semi-detached	Flat/townhouse	Shack
Bikita	41%	51%	5%	2%	0%	0%
Buhera	33%	57%	7%	2%	0%	0%
Chikomba	0%	0%	0%	0%	0%	0%
Chimanimani	26%	37%	27%	7%	0%	3%
Chipinge Rural	44%	33%	13%	8%	1%	0%
Chipinge Urban	0%	2%	67%	11%	3%	17%
Gutu	36%	55%	7%	2%	0%	0%
Masvingo	42%	40%	10%	7%	1%	0%
Masvingo Urban	0%	0%	73%	20%	6%	0%
Mutare	23%	59%	14%	3%	1%	0%
Mutare Urban	0%	1%	69%	18%	7%	4%
Mutasa	19%	56%	15%	6%	2%	1%
Zaka	45%	46%	7%	2%	0%	0%
Makoni	26%	63%	7%	3%	0%	0%

[a] Based on World Bank estimates derived from the Zimbabwe ICDS, 2017.

Table 3.12: Estimated Number of Housing Units in the Cyclone Idai-Affected Districts

District	Housing Baseline
Buhera	60,504
Chimanimani	35,087
Chipinge Urban	7,216
Chipinge	69,655
Mutare	50,623
Mutare Urban	62,125
Mutasa	45,109
Makoni	68,021
Total	**398,339**

household-occupied housing units which are either traditional or mixed.

As Table 3.10 notes that the 4 provinces affected by the Cyclone account for half of the country's number of households, the effects of the cyclone are thus going to be more devastating in their associated districts.

Table of Key Baseline Data for the Sector

The housing sector in the affected districts analyzed for the housing assessment consist of a baseline of 398,339 units[5] that accommodate more than 1,593,356 residents[6]

Post-Cyclone Context and Impact on the Sector

Effects to the Sector (damages)

To estimate and validate the to the housing sector, the proportion of the affected communities was used as a proxy. At the time of the assessment, data on damages to the housing units in the affected districts were largely estimated through government and Ipsos. The findings indicate that between 10,373–17,715 housing units (3% of the total number of housing units used for the baseline) were damaged[7] by Cyclone Idai. This

[5] Given the lack of reliable data on private housing in Zimbabwe, the assessment team developed a model to arrive at a reasonable estimate of private housing units, based on the Zimbabwe ICDS 2017.

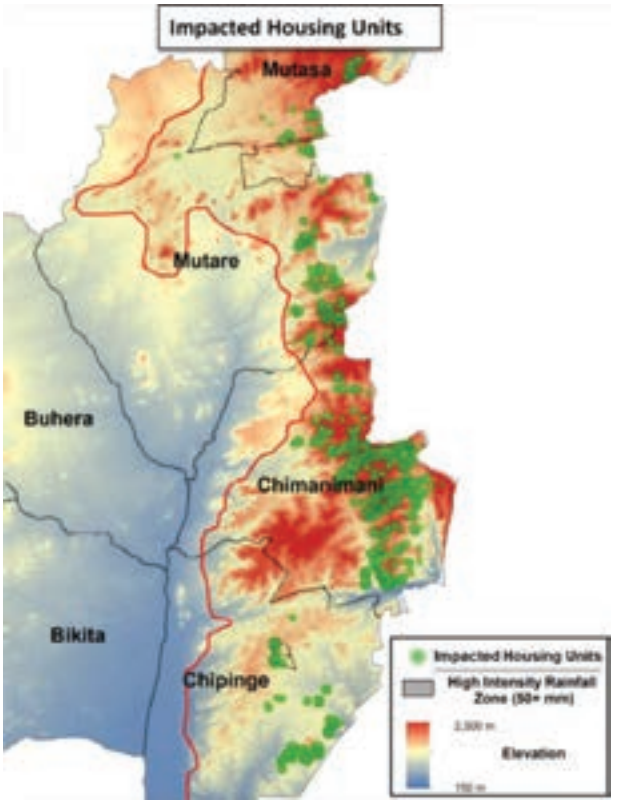
[6] Derived from the average number of people in a household multiplied by the number of households.

[7] Given the lack of reliable data on private housing in Zimbabwe, the assessment team developed a model to arrive at a reasonable estimate of private housing units, based on the Zimbabwe ICDS 2017 and Ipsos' remote sensing.

Table 3.13: Estimated Total Number of Houses Damages

		Remote Sensing Data	Remote Sensing Data	Government Data	Government Data
District	Housing Baseline	% Houses Damaged	% Houses Damaged	% Houses Damaged	% Houses Damaged
Buhera	60,504	—	—	3,120	5%
Chimanimani	35,087	6,795	19%	6,324	18%
Chipinga Urban	7,216	303	4%	681	9%
Chipinge	69,655	1,520	2%	6,579	9%
Mutare	50,623	1,213	2%	386	1%
Mutare Urban	62,125	94	0%	474	1%
Mutasa	45,109	805	2%	137	0%
Makoni	68,021		0%	14	0%
Total	**330,318**	**10,730**	**3%**	**17,715**	**4%**

Map 3.1: Areas Where Housing Units were Impacted by the Cyclone



Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

includes between 6,324–6,795 in Chimanimani and 1,520–6,579 in Chipinge and representing 18% and 9% each of the total housing stock across all the affected districts.

The map abo indicates that the rainfall intensity from the cyclone in the areas of Chipinge (Urban and Rural), Chimanimani and Mutasa severely damaged the housing units in these districts, with a large concentration found in Chimanimani.

By looking at the number of houses damages by the cyclone, the analysis has determined that the costs of the housing ranges between US$131 million-US$205 million of damages. Chimanimani is the most affected district with damage costs estimated between US$66 million-US$ 71 million.

Recovery Needs and Strategy for the Sector

Recovery Needs and Strategy

Although the affected areas have been previously known to not be prone to multi-hazard disasters such as cyclones, floods, windstorms and landslides, it is important to still consider that an event like Cyclone Idai could possibly become something of a recurring threat when looking at the evolving climate in the region.

The suggested recovery and reconstruction strategy comprise a variety of activities and modes

Table 3.14: Estimated Total Housing Damage Cost

District	Housing Baseline	Remote Sensing Data Houses Damaged	Government Data Houses Damaged	Remote Sensing Data Total Damage (USD)	Government Data Total Damage (USD)
Buhera	60,504	—	3,120	—	32,421,687.31
Chimanimani	35,087	6,795	6,324	71,430,970.20	66,479,684.41
Chipinga Urban	7,216	303	681	4,451,219.14	10,011,557.58
Chipinge	69,655	1,520	6,579	16,577,562.37	71,747,045.11
Mutare	50,623	1,213	386	20,831,960.92	6,631,470.86
Mutare Urban	62,125	94	474	3,255,034.35	15,225,154.91
Mutasa	45,109	805	137	14,910,030.21	2,537,483.40
Makoni	68,021	—	14		213,189.21
Total	**398,339**	**10,730**	**17,715**	**131,456,777.18**	**205,267,272.78**

of assistance aimed at helping the households transition from their current state of displacement to being re-housed in permanent housing. Many of these options will operate in parallel as households have a continuum of needs and are not all starting at the same point.

However, in the interim, it is recommended that two immediate options are provided by the government for those who have lost their homes:

1. **Compensation model:** whereas all those affected by the cyclone that has had their homes damaged would be provided with an amount that equals the cost of their damaged house.
2. **Subsidized model:** whereas all those affected by the cyclone that has had their homes damaged would be provided with a uniform house subsidized the government.

Transitional Phase (1–2 years)

1. ***Distribution of basic building materials and tools/ cash.*** Provision of materials and the necessary tools in quantities equivalent to producing a very basic shelter is preferable to tent solutions. It allows families to stay in the same locations, and utilizes their labor, cash and salvaged materials for an immediate shelter solution. Alternatively, cash may be given to the affected households to purchase these materials.
2. ***Cash for self-relocation and host families.*** Some families have taken refuge with relatives in other locations. A cash grant support to those families willing to relocate temporarily themselves can accelerate this process and reduce the need for immediate shelter. Some subsistence support could also be considered for the families prepared to host others.
3. ***Relocation to camps/transition shelter.*** Thousands of dispersed villages cannot be serviced easily or too quickly. On a strictly voluntary basis, some villagers could be encouraged to temporarily relocate to nearby camps that are being established. Transition shelter options will be required in these sites for those households who need to remain there for more than the immediate term because their original settlement sites require to be relocated all together. These longer-term inhabitants would require arrangements for provision of services as well as access to livelihoods.

Medium-term Recovery Phase (2–3 years)

1. ***Cash grants for permanent, basic housing assistance.*** The core of the government's assistance to affected households in the affected areas should be cash grants for permanent, basic housing assistance. Households will thus be able to utilize their own labor, use hired labor, or enter into an arrangement with a partner organization/NGO to reconstruct their houses. ideally reconstruction of houses should be based on acceptable structural standards with appropriate hazard-resistant features incorporated.
2. ***Flood, cyclone, landslides and other site investigations.*** Detailed studies need to be undertaken to identify land susceptible to future natural disasters like severe and recurrent flooding, cyclones, landslides, and erosion/settlement. Re-building on original plots in some of these areas will be ill-advised due to serious future risk to property or life. Other studies of

urban centers where the opportunities for, and potential benefits of, land consolidation are high should also be conducted.

3. ***Training for safe construction.*** Training in multi-hazard resistant construction for artisans, contractors, home-owners, and construction supervisors should be an integral part of government's reconstruction strategy. Assistance for permanent housing will need to be tied to the adoption of the improved construction practices. With the scale of devastation fresh in the minds of so many households, there is a unique window of opportunity to gain buy-in for these changes. While the cyclone and accompanying rains have been a terrible disaster for the affected areas, it also presents an opportunity for introduction of improved construction materials and practices in them.
4. ***Information Dissemination.*** A crucial part of the government's strategy should be effective and widespread consultation and dissemination of information to the affected communities. This should include information on the full range of assistance options, their eligibility criteria, and the means of accessing them, as well as on improved construction methods for hazard-resistant houses.
5. ***Developing appropriate hazard-resistant structural design options for houses.*** Since different parts of the affected area are prone to one or a combination of flood, cyclone risks, government's housing reconstruction strategy should require a different structural design solution for each area for cost-effectiveness as some of the affected areas might be prone to future disasters than others.
6. ***Resettlement support through planning and coordination.***

Water and Sanitation (WASH)

Background and Pre-disaster Context

The water sector in Zimbabwe is managed by multiple stakeholders. A summary of the sector institutional arrangements and a compilation of the data available on the infrastructure baseline before the cyclone.

Institutional arrangements

The Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement (MLAWCRR) presides over the overall planning, development and management of water resources in Zimbabwe.[39] The Zimbabwe National Water Authority (ZINWA). Catchment Councils and Sub-Catchment Councils supports the ministry in the delivery of services and managing water resources.

Table 3.15: Summary Table of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector

	Remote Sensing Data	Government Data	Remote Sensing Data	Government Data	Remote Sensing Data	Government Data
District	Total Damage (USD)	Total Damage (USD)	Compensated Needs	Compensated Needs	Subsidized Needs	Subsidized Needs
Buhera		32,421,687.31		38,906,024.77		10,616,544.84
Chimanimani	71,430,970.20	66,479,684.41	85,717,164.24	79,775,621.29	23,097,970.78	21,496,919.39
Chipinga Urban	4,451,219.14	10,011,557.58	5,341,462.97	12,013,869.10	1,028,906.19	2,314,187.02
Chipinge	16,577,562.37	71,747,045.11	19,893,074.84	86,096,454.13	5,156,149.78	22,315,615.67
Mutare	20,831,960.92	6,631,470.86	24,998,353.10	7,957,765.03	4,119,020.49	1,311,214.27
Mutare Urban	3,255,034.35	15,225,154.91	3,906,041.21	18,270,185.89	319,198.62	1,609,113.53
Mutasa	14,910,030.21	2,537,483.40	17,892,036.25	3,044,980.08	2,733,562.65	465,215.01
Makoni		213,189.21		255,827.05		47,490.90
Total	**131,456,777.18**	**205,267,272.78**	**157,748,132.62**	**246,320,727.34**	**36,454,808.51**	**60,176,300.63**

Coordination in the water sector is undertaken by the National Action Committee on Water Supply and Sanitation (NAC), Chaired by MLAWCRR and supported by a National Coordinating Unit (NCU), which is the apex inter-ministerial body that was formed to coordinate all aspects of water development and management in Zimbabwe. It comprises three sub-committees; the Water Resources Management, Urban and Rural Sub-committees, responsible for sub-sector coordination. In terms of section 34 of the Water Act, no person shall abstract water for any purposes other than primary purposes except in terms of a permit. ZINWA issues the permits.

Relationship between ZINWA and local authorities

Countrywide, ZINWA manages 534 water treatment plants which supply water mainly to growth centres, rural service centres and small towns. Additionally, ZINWA manages more than 800 large and small dams that provide raw water for local supply systems, farmers, mines and agricultural estates. ZINWA is mandated to supply raw water to the local authorities which are then responsible for treatment and distribution. ZINWA also manages wastewater services in small towns, while Local Authorities provide sewerage services in their areas of jurisdiction.

Rural Water and Sanitation Services Arrangements

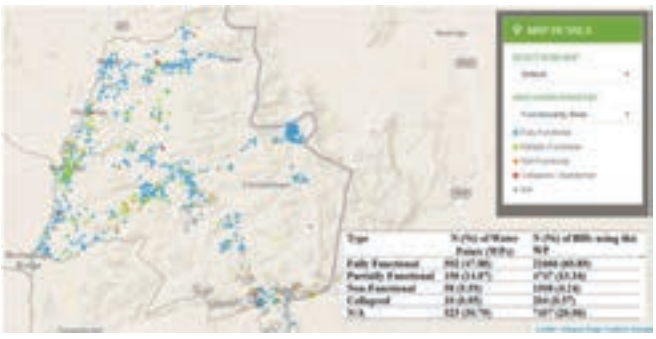
The key entities active in rural water and sanitation are the NAC, the Rural District Councils (RDCs), the District Development Fund (DDF), and the Water Environmental Sanitation Working Group (WES).[40] The NAC's responsibilities include the review and approval of all rural WASH project proposals and plans originating at district level, setting of policies and standards for the sector, and formulation of strategies for sanitation projects. RDCs are responsible for all development activities in their districts. DDF is responsible for the development and maintenance of non-commercial water supplies in communal and resettlement areas. Development funds for water and sanitation are channeled to the RDCs through the Rural Capital Development Fund (RCDF) for minor activities. Major capital items are funded through the Public Sector Investment Program (PSIP). With the re-engagement of the donor community in 2008, the Water Environmental Sanitation Working Group (WES) was established and is coordinated by UNICEF. This working group facilitates a coordinated and collaborative humanitarian response, resource mobilization, networking and information sharing, and its primary focus is rural communities, but its activities include support in urban areas.

WASH Infrastructure Status before Cyclone Idai collected through the Rural Water Information Management System (RWIMS)[41]

RWIMS is the central geographical information system (GIS) for the nation's rural WASH Sector, maintained in real time on communal and institutional WASH infrastructure. The system's geo-database is powered by Government extension workers conducting mobile data collection and mapping using the RWIMS Field-Force mobile application at ward level, as well as community key informants submitting data in real-time via SMS.

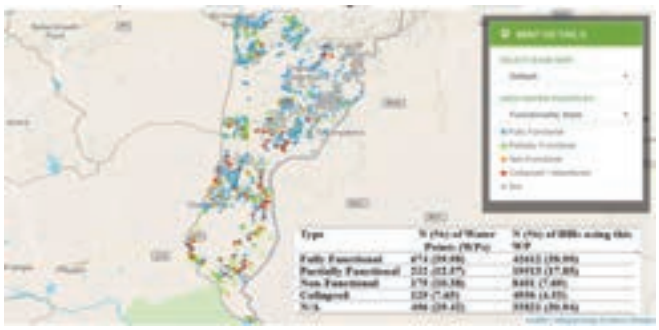
The team could not obtain maps on dams and irrigation infrastructure in the period before Cyclone Idai,

Map 3.2: Pre-Cyclone Distribution of Water Points by Functionality Status and Number of Beneficiary Households in Manicaland Province



Source: Rural WASH Information Management System (RWIMS 02:19).
Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Map 3.3: Pre-cyclone distribution of water points, by functionality status and number of beneficiary households in Masvingo Province



Source: Rural WASH Information Management System (RWIMS: 02:19). Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

however we were able to access data on the impacts as presented in Section 3.

Impact on the Sector

Wind, flooding and landslides brought extensive damage to the infrastructure. Water supply systems and sanitation (in private households, health facilities, schools, and government buildings) suffered extensive damage or were destroyed. The massive flooding impacted sources of potable water jeopardizing safe supply. The damages included submerged and washed away pumping stations, water reticulation networks and sanitation infrastructure.

Reports indicate that about 270,000 vulnerable people have been affected across all districts in Manicaland and parts of Masvingo and Mashonaland East provinces.[42] The force of the cyclone was very destructive in Chimanimani and Chipinge districts, but also in other areas, for example, in the Zaka district, 78 households reported their toilets had collapsed and seven boreholes were damaged due to the excessive rains.[43] First responders have been distributing water-disinfecting tablets to

Table 3.16: Summarizes the Baseline Data for Water Points, as of 28 February 2019

District	Artisan well	Boreholes	Dam	Deep Well	Rain Water Harvester	River	Sand Abstraction	Shallow Well	Spring	Other
Buhera	4	846	5	138	3	80	11	271	51	16
Chimanimani	1	416	2	104	1	77	5	36	359	36
Chipinge	2	923	4	46	2	51	12	61	570	15
Makoni	2	880	2	331	1	11	3	228	117	10
Mutare	2	1065	18	331	4	34	26	245	235	46
Mutasa	3	444	8	192	1	165	8	278	505	59
Total	**14**	**4574**	**39**	**1,142**	**12**	**418**	**65**	**1119**	**1837**	**182**

Table 3.17: Shows Baseline Data of Estimated Numbers of Households Using Water Points

District	Artisan well	Boreholes	Dam	Deep Well	Rain Water Harvester	River	Sand Abstraction	Shallow Well	Spring	Other
Buhera	212	36,317	252	3,833	372	4,211	342	8,561	1,930	207
Chimanimani	3	17,703	3	2,620	0	5,446	96	1,083	7,285	592
Chipinge	100	63,544	185	2,695	0	5,345	572	2,937	31,457	2,368
Makoni	500	25,315	25	6,459	25	307	55	4,481	2,724	62
Mutare	0	51,318	741	9,816	0	1,136	847	5,475	10,168	727
Mutasa	58	10,758	201	4,009	0	4,447	41	5,659	12,361	1,400
Total	**873**	**204,955**	**1407**	**29,432**	**397**	**20,892**	**1,957**	**28,196**	**65,925**	**5,356**

Table 3.18: Summary of WASH Facilities Destroyed by Cyclone Idai, Aggregated by District, Type and Institution

	Community Water sources affected					Community Sanitary facilities affected			Schools Water facilities affected					School sanitary facilities affected		Health facility water sources affected				Health Sanitary facilities affected	
District	BH	PWS	Spring	DW	SW	BVIP	uBVIP	WC	BH	Water harvester	PWS	Spring	DW	BVIP	WC	BH	PWS	Spring	DW	BVIP	WC
Buhera	16	0	0	25	0	426	0	6	0	0	0	0	0	426	0	0	0	0	0	0	0
Chimanimani	61	438	642	22	0	2559	0	0	11	0	32	26	0	587	19	1	0	0	0	0	7
Chipinge	48	2	631	4	0	1956	0	0	16	0	3	20	0	486	0	0	0	0	0	0	0
Mkoni	2	0	0	1	0	109	0	0	0	0	0	10		11	0	0	0	0	0	0	0
Mutare	0	0	0	11	0	722	0	0	0	3	1	1	0	12	0	0	0	0	0	2	0
Nyanga	0	0	0	0	0	12	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
Zaka	0	0	0	12	0	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**127**	**440**	**1273**	**75**	**0**	**5862**	**0**	**6**	**27**	**3**	**36**	**57**	**0**	**1530**	**19**	**1**	**0**	**0**	**0**	**2**	**7**

Key: BH Boreholes; PWS Piped Water Schemes; DW Deep wells; BVIP: Latrines: WC Water Closet.
Source: Manicaland Provincial Water Sanitation Sub-Committee.[45,46]

mitigate the risk of diseases outbreaks such as cholera. Some immediate and temporary repairs have been managed, while more sustainable recovery interventions are still necessary. Many of the damaged WASH facilities were managed by communities through Water Point Committees. The table below illustrates a summary of the impacts of cyclone Idai on WASH facilities in the seven affected districts.[44]

Dams were damaged and irrigation canals silted and destroyed .

Following the Cyclone Idai there was significant loss of crops, livestock and particularly infrastructure that includes irrigation canals. Dams used for storing irrigation water, but also for multipurpose were impacted. Significantly a number of irrigation schemes where washed away including roads resulting in farmers having no access to their markets. About 1,500 irrigation schemes have been completely swept away or damaged. A number of water infrastructures managed by ZINWA were impacted. Tables 3.19 to 3.22 below illustrate the extent of the losses.

The damage to the irrigation infrastructure alone came to **US$ 4,890,000.00,** as weirs and pipelines were washed away and wells were flooded; this amount includes losses in crop production by the affected communities.

Recovery and Resilience Needs

The water infrastructure is vital for Zimbabwe's economy and for the livelihoods of the agropastoral communities affected by the cyclone. The strategy is to proceed with speedy recovery of priority infrastructure, mainly related to WASH services and main supplies and ensure safety of

Table 3.19: Summary of ZINWA Infrastructure Affected[47]

Issue	Number of facilities affected
Water pumping stations affected	19
Conveyance canals	2
Dams affected	9

Table 3.20: Summary of Irrigation Schemes Affected[48]

District	Name of Irrigation Scheme	Infrastructure Damaged
Chimanimani	Mhandarume	740m, pipeline swept away
	Chakohwa	Canal silted
	Nenhowe	Pumphouse & pumps flooded
	Nyanyadzi	Weir silted, conveyance pipeline & canal from Nyanyadzi river silted, 525mm AC delivery pipeline from Odzi washed away
	Gudyanga	Fence and gabion baskets stripped, grading shaded and offices silted, borehole collapsed
	Tonhorai	Boreholes flooded
	Cashel Valley & Mutambara	A number of weirs and main canals washed away
	Zimunda	Weir partly damaged. Delivery pipeline swept away
	Bvumbura	Weir partly damaged. Delivery pipeline swept away
	Nyabande	Conveyance pipeline destroyed 300m fence washed away
Chipinge	Bwerudza	Canal partly silted
	Mutema	Boreholes flooded, sprinkler system washed away on 51ha, 15 ha banana plantation reported to have been destroyed recovered from being submerged
	Maunganidze	Boreholes flooded and 2 out 3 collapsed
	Chibuwe	Pump sets for block B & E submerged
	Musikavanhu	1 borehole swept away, 2 boreholes flooded fields flooded
	Kushinga Gambadziya	Weir & pipeline washed away, infield requires upgrading
	Musinzwi	Weir & pipeline washed away
	Mugondi	Weir & pipeline washed away
	Delivery pipeline washed away	Delivery pipeline washed away

Table 3.21: Estimated Damage to WASH Facilities

Item	Activity	Qty	Unit Cost (USD)	Total Cost (USD)
Water supplies	Borehole rehabilitation	155	1,000	155,000
	PW scheme repairs	476	1,200	571,200
	Spring rehabilitation	1,330	500	665,000
	Deep well rehabilitation	75	1,000	75,000
	Water harvester	3	200	600
Sanitary facilities	BVIP construction	7,394	300	2,218,200
	Water closet	32	400	12,800
Total				**3,697,800**

Table 3.22: ZINWA Estimated Unit Costs and Damages

Issue	Total Number affected	Cost
Water Pump stations affected	19	3,781,000.00
Number of canals affected	2	130,000.00
Number of dams affected	9	9,914,742.00
Total		**13,825,742.00**

Table 3.23: Summary of Cost Estimates and Gaps – Recovery and Resilience Needs

Districts	Transitional phase (1–2 years)	Medium-term recovery phase (2–3 years)	Total needs (US$)
Iervention in WSS/WASH			
District 1 Buhera	Drill boreholes and rehabilitate WASH infrastructure. Rehabilitation of ZINWA pump stations. Rehabilitation of Dams		299,000 173,000 52,000
District 2 Bikita	Rehabilitation of Dams Rehabilitation of Canals		650,000 75,000
District 3 Chiredzi	Rehabilitation of Dams		1,500,000
District 4 Chimanimani	Drill and rehabilitate WASH infrastructure. Rehabilitation of ZINWA pump station.	Construction of WASH infrastructure at new settlements. (Communal and Institutional)	1,947,200 1,482,000
District 5 Chipinge	Drill and rehabilitate WASH infrastructure. Rehabilitation of ZINWA pump stations Rehabilitation of Dams		1,132,100 1,326,000 5,129,742
District 6 Maoni	Rehabilitation of ZINWA pump stations		44,000
District 7 Mutare	Drill and rehabilitate WASH infrastructure. Rehabilitation of ZINWA pump stations Rehabilitation of Dams		234,100 455,000 2,383,000
District 8 Gutu	Rehabilitation of ZINWA pump stations		120,000
District 9 Masvingo	Rehabilitation of ZINWA pump station Rehabilitation of Canals		120,000 55,000
District 10 Zaka	Drill and rehabilitate WASH infrastructure. Rehabilitation of ZINWA pump station boreholes		35,400 105,000
Grand Total			**17,317,542**

dams. The roll out of implementation will be determined based on risk and vulnerability prioritizations. Works will be designed and tendered promptly with the support of international donors and in close coordination with the GoZ, supported by specialized UN agencies. Adequate supervision will need to be provided to ensure social and environmental safeguards are applied, and in the case of dams, safety is guaranteed. The table below summarizes the interventions per sector. It is expected that all rehabilitation works can be launched in years 1 or 2, and that all works will be completed by year 4.

The Ministry has provided an assessment of the damage to irrigation infrastructure (details could not be obtained) estimated at about US$4,890,000.

Health

Background and Pre-disaster Context

Despite improvements in key health outcomes post 2009, Zimbabwe's health sector did not meet its Millennium Development Goals (MDGs) and current progress falls short of the Sustainable Development Goals (SDGs) milestones. Zimbabwe's human capital index[49] is 0.44, which is on par with the Southern African Development Community (SADC) average.[50] Life expectancy at birth reached 61 in 2016. Maternal and infant mortality has decreased, as has HIV and tuberculosis (TB) prevalence. However, Zimbabwe remains a high disease burden country and its maternal and child

health (MCH) outcomes are among the SADC regions worst. Sixty-five percent of annual deaths are attributed to communicable, maternal, perinatal and nutritional illness, although the share of deaths attributed to non-communicable diseases has been increasing.[51] The poor and rural populations shoulder a disproportionate burden of disease and health risks.

The Zimbabwean health system has both public and private players. The public sector is the main provider of health care services. The rest are non-profit and church affiliated facilities (referred to as mission facilities), private for-profit facilities and company operated clinics.[52] Health services are provided at the primary, secondary, tertiary and quaternary levels. The Provincial Medical Directorate (PMD) office administers provincial and all district health facilities within its province. At the district level, District Health Offices (DHOs) have responsibilities like their provincial level-counterparts, except that they play a more direct role in administering and managing rural health clinics (the lowest level of primary care facilities), as rural health facilities may only have a nurse on staff to provide primary care services and no administrative staff. District hospitals are overseen by a District Health Executive. A district health council provides oversight to the district health office. Rural Health Clinics are also overseen by a Rural District Council. PMDs and DHOs are representatives of the MOHCC.[53]

The availability of human resources has improved since 2008/09, when the health system reached a point of near collapse. The health workforce grew by 23 percent between 2009 and 2015, with an additional 5,496 posts filled in the establishment, resulting in a decline in vacancy rates over this period from 32 percent in 2009 to 20 percent in 2015 (Health Sector Assessment 2016). Distribution of health workers is, however, unequal between provinces; poorer areas have fewer key health staff per population than richer areas. Although distance still presents a barrier to access, such inequities are not associated with poverty prevalence.

Access to essential medicines in facilities is increasingly problematic. The macroeconomic risks related to limited fiscal space, inflation, foreign currency shortages, parallel foreign exchange and market distortions are leading to cash shortages in the country, affecting the prices of goods and services and, in turn, health providers' ability to execute planned activities. Barriers to accessing care and treatment have been further reinforced, as supplies of medicines in public facilities remain critically low due to a lack of foreign currency for purchasing medical commodities and medicines.

Table of Key Baseline Data for the Sector

Overall, key baseline health indicators in Manicaland province are worse than for the national average, reflecting a poorer health status in the province before the cyclone compared to other parts of the country. Table 3.24 presents the latest data for key outcome indicators and utilization of health services in Zimbabwe (national average) and in Manicaland province, where the districts mostly hit by the cyclone are. For most indicators, Manicaland province has worse indicators than the national average: infant and under five mortality rates were higher before the cyclone; similarly, HIV/AIDS prevalence was higher, both for men and women. Utilization of health services (assisted deliveries, immunization, treatment for diarrhea or family planning) is also lower in Manicaland province compared to the national average.

Impact on the Sector

Many facilities are possibly damaged as a result of Cyclone Idai in the country. Table 3.25 reports that out of 430 facilities, 182 were possibly damaged by 24 March. Hospitals and rural health centers are the most affected (possible damage) type of health facilities (Figure 3.5). In Chiminimani and Chipinge districts, 41 facilities were probably damaged: 18 in Chiminamani district and 21 in Chipinge districts (table 3.26). These numbers differ from the WHO April 30 report which lists only 12 facilities damaged by Cyclone Idai in the two districts (table 3.27).These also differ from MOHCC's recent estimates which report 12 partially damaged facilities and one fully damaged facility in Chimanimani districts and 15 facilities partially damaged in Chipinge district resulting in 28 facilities damaged in the two districts.[54]

Table 3.24: Key Baseline Data for the Sector

Indicator	National Average	Manicaland province
Total fertility rate 15–49	4	5
Infant mortality rate	50	59
Under-five mortality rate	82	112
Children stunted	26.8	30.3
Children wasted	3.1	2.4
Children underweight	8.2	8.2
HIV prevalence among women	11.3	13.0
HIV prevalence among men	7.9	10.6
Place of delivery: Health facility	79.2	71.4
Received all 8 basic vaccinations	76	71.7
Treatment of diarrhea: Either ORS or RHF	69.3	67.3
Married women currently using any modern method of contraception	65.8	56.7
Unmet need for family planning	10.4	10.1

Source: Zimbabwe 2015 Demographic and Health Survey.

Table 3.25: Estimated Damage for Healthcare Facilities, by Type of Facility

	19-Mar-2019		24-Mar-2019		Rainfall				
Facility type	Limited to no flood damage	Possible Damage	Limited to no flood damage	Possible Damage	Likely no damage or light damage	Likely moderate damage	Probable damage	Total	Damage level change
Clinic	1	2	2	1	3			3	–50.0%
Council Clinic		2	2				2	2	–100.0%
Government Clinic		3	1	2		1	2	3	–33.3%
Hospital	13	212	94	131	119	61	45	225	–38.2%
Mission Clinic		8	3	5	3	2	3	8	–37.5%
Mission Hospital		14	7	7	9	2	3	14	–50.0%
Other		1	1		1			1	–100.0%
Private Clinic		1	1				1	1	–100.0%
Rural Health Centre	2	40	15	27	28	11	3	42	–32.5%
Rural Hospital	2	14	7	9	7	8	1	16	–35.7%
Total	**18**	**297**	**133**	**182**	**170**	**85**	**60**	**315**	**–38.7%**

Source: IPSOS.

Poor/nonexistent network in certain areas affects communication, data transmission, as well as patient referral. In the short term, damaged health institutions need tents to shelter an increased patient load and additional health staff. In the medium term, health institutions will need to be rehabilitated and/or rebuilt.

WASH infrastructure of health facilities and people living in their catchment areas were severely affected by the Cyclone. An estimated 120,486 individuals in

Table 3.26: Estimated Damage for Healthcare Facilities, by District

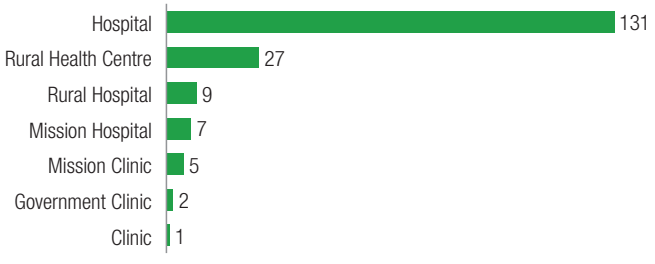
	Possible Damage							Rainfall			
District	Clinic	Government Clinic	Hospital	Mission Clinic	Mission Hospital	Rural Health Centre	Rural Hospital	Likely no damage or light damage	Likely moderate damage	Probable damage	Total
Bikita	4				1	4		9			9
Buhera	24		1			6	3	29	5		34
Chikomba	24		2	2	1	2	2	14	19		33
Chimanimani	**13**			**1**		**2**	**2**	**1**	**2**	**15**	**18**
Chipinge	**21**				**1**	**1**		**5**	**14**	**4**	**23**
Gutu	18		1	2	2	4	1	28			28
Masvingo	8		1			1		10			10
Mutare	15	2			2	7	1	4	21	2	27
Total	**127**	**2**	**5**	**5**	**7**	**27**	**9**	**100**	**61**	**21**	**182**

Source: IPSOS.

the catchment areas of healthcare facilities in Chimanimani and Chipinge districts were affected by Cyclone Idai, out of which 50,885 had their water points affected.[55] In Chimanimani, 80 percent of health facilities declared that their area was affected by the Cyclone, 60 percent that the Cyclone affected their water point, most of the time being washed away. In Chipinge, 68.4 percent of facilities had their area affected, 58.3 percent had their water point affected, most of the time flooded or collapsed (Key informant survey).

***Health impact*: The immediate and long-term health effects of the cyclone include physical and emotional trauma which requires medical management, including mental health.** The destruction of infrastructure including water supply and sanitation may predispose the community to diarrhea and other water borne epidemic prone diseases especially cholera and typhoid. As of 30 April 2019, acute respiratory infections (ARI), malaria, dysentery and diarrheal were the priority diseases reported. The risk of diarrhea diseases remains high in the districts affected by the cyclone due to the interruption in the water and hygiene infrastructure. Surveillance has been stepped up at the facilities. The number of diarrhea cases reported are higher than the two preceding years for the fourth consecutive weeks in Chimanimani. To date, there are no cholera, typhoid, AFP, no suspected measles and rubella cases reported (WHO). The Presidential appeal also emphasizes the disruption of HIV services particularly in Chimanimani District which may lead to increased vulnerability of people living with HIV, increased risk of new HIV infections due to disruption of prevention services, etc.

Figure 3.5: Healthcare Facilities with Possible Damage (as of 24 March 2019



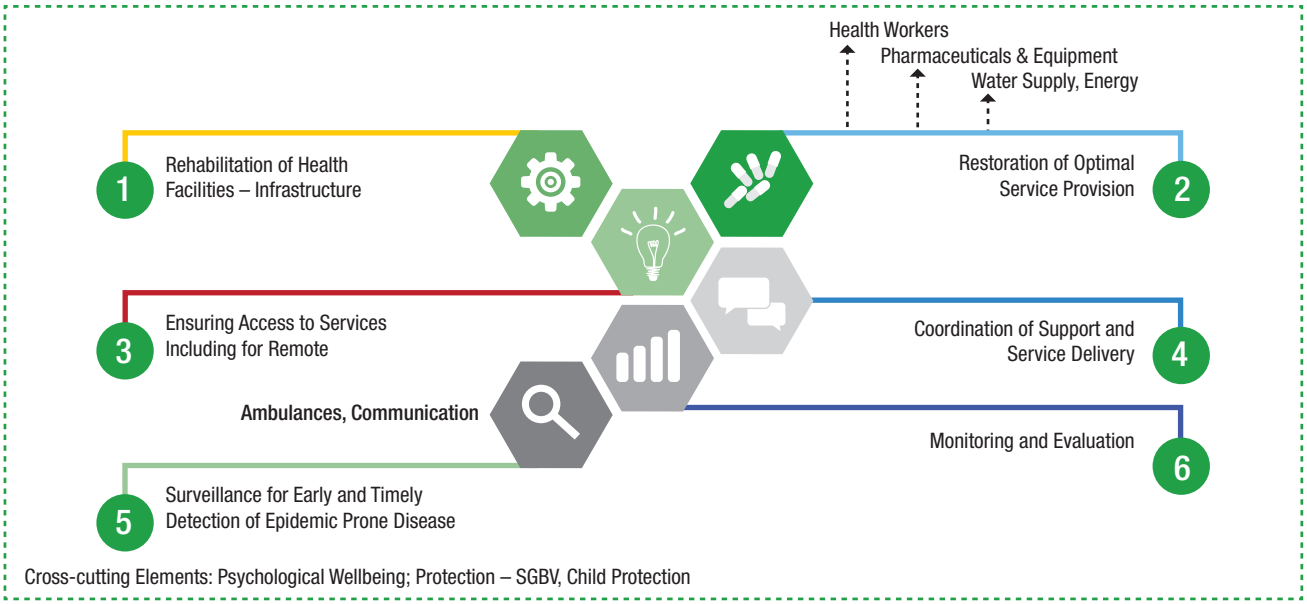
Source: IPSOS.

Table 3.27: WHO's Estimate of Affected Facilities (30 April 2019)

District	Name of Facility	Damaged Area	Accessibility
Chipinge	Kopera	Water pump washed away together with concrete slab	
	Paidamoyo	Kitchen for waiting mother's shelter was destroyed	
	Gumira	Part of roof blown away	
	Ngaone	Part of roof blown away	
	Nyunga	Extend of damage to be established	
Chimanimani	Muchadziya	1 staff house roof blown off, 2 rooms (EPI, Male ward) blown off and health records destroyed	Inaccessible by road
	Mutsvangwa	1 staff house roof blown (3 rooms) staff toilet destroyed	Accessible by road
	Nyahode	Water source damaged at clinic and staff fetching water from a borehole 2km away	
	Biriri	Water source damaged	
		Staff houses leaking	
	Rusitu	• Water source damaged • Sister in Charge office, dining hall and kitchen roof-ridges were blown off	
	Ngorima	Water source washed away	
	Nyahode	• Three deep wells supply destroyed • 8 BVPs collapsed in population serviced by Nyahode clinic • Roof of waiting mother's shelter blown away • No electricity supply	

Source: World Health Organization. Situation report on cyclone Idai, Issue 0015. 30 April 2019.

Figure 3.6: Protected Areas with Names within Most Affected Districts



***Nutrition impact*: The loss of livelihoods, resulting from the Cyclone, predispose children in affected areas to undernourishment.** The Flash Appeal estimated 46,000 people in need for nutrition support. Affected children need micro-nutrients to prevent malnutrition especially for the under-five aged children. Adults affected by displacement also require food aid until the next harvest.

***Drugs and human resources for health:* In terms of critical inputs of the health sector (human resources and drugs), the impact of the cyclone was significant, though difficult to estimate with available data.** The shortage of essential drugs is worsening due to increased demand. Additional staff are needed to cope with increased demand for health services in affected areas.

Recovery and Resilience Needs

The UN flash appeal highlighted the following response priority areas for the health sector:

- Prevention of epidemic prone diseases focusing on malaria, cholera and typhoid through improvement of water quality, provision of sanitation, distribution of long-lasting insecticidal nets (LLIN), larval source management, oral cholera vaccination campaigns
- Epidemic preparedness including strengthening of surveillance and early warning systems as well as appropriate prepositioning of stocks and surge personnel for epidemic response
- Managing injuries and other conditions arising out of the disaster including mental illnesses
- Providing capacity for the management of chronic diseases arising directly or indirectly from the cyclone
- Increasing access to obstetric services to pregnant women at high risk of developing obstetric complications
- Procurement and distribution of essential drugs and medical supplies
- Rehabilitation of health facilities
- Strengthening and scaling up primary health care services, mainly through outreach services (to include services for neglected tropical diseases (NTDs), non-communications diseases (NCDs), sexual and reproductive health (SRH) and chronic infections, e.g HIV)
- Strengthening laboratory capacity for detection of epidemic prone pathogens.

The UN Flash Appeal also highlighted the following response priority areas for the nutrition sector:

- Capacity building of health workers and potential partners on the management of acute malnutrition and proving life-saving treatment for children through both inpatient and outpatient services
- Training of community health workers on active screening, identification, referral for treatment of severe acute malnutrition while ensuring follow-up of children in the community
- Pre-positioning of life-saving therapeutic nutrition supplies in the affected districts and at health facility level to ensure efficient nutrition supplies chain management up to the end user
- Reporting and data management for nutrition will be strengthened at all levels.
- Working with MOHCC, UNICEF will further build capacity of partners, health workers,

Village health workers and volunteers for counselling breastfeeding mothers on Infant and Young Child Feeding (IYCF) in emergencies with emphases on supporting and protecting breastfeeding

- Strict monitoring and control of untargeted distribution of Breast Milk Substitutes (BMS) products to protect breastfeeding.
- Establishment of mothers' support and care groups for Maternal, Infant and Young Child Feeding to ensure availability of safe, adequate and acceptable complementary foods for children.
- Development and dissemination of information, education and communication (IEC) messages on IYCF-e to primary care givers through VHW and other volunteers.

Table 3.28: Summary of Available Cost Estimates, by Source

Source	Costing estimates		
	Health needs	HIV/AIDS needs	Nutrition needs
UN Flash appeal	**US$3.1M** No budget breakdown but Annex I includes priority activities		US$4.3M No budget breakdown but Annex I includes priority activities
WHO health sector situation report	**US$4.19M** (with a gap of US$2.28M) Annex II includes breakdown by 10 budget categories		N.A.
Presidential Appeal (for 8 affected districts)	**US$2.57M** Breakdown: • UD$1.3 (medicines) • US$0.4 M (Immediate outbreak response) • US$0.5M (long term measures)	US$5.2M	US$6.67M Food supply for balanced, nutritional meals for 13 months
MOHCC plan for Chipinge and Chimanimani districts	**US$6.83M** Breakdown: • US$26,350 to coordinate, monitor and evaluate the health response • US$58,505 to strengthen the surveillance system and response for early and timely detection of epidemic prone diseases • US$ 2,199,318 to ensure provision of essential medical supplies and medical equipment • US$145,851.00 to establish adequate health workforce positions to improve quality of service delivery • US$4,399,000 to increase access to service provision through rehabilitation of damaged health facilities and construction of 14 health posts		

- For monitoring and evaluation, conducting a nutrition assessment under the ZIMVAC in May 2019 to facilitate an evidence-based response.

The MOHCC is leading the health response to the effects of cyclone Idai with support from partners with overall guidance by the Civil Protection Unit at all levels. The MOHCC response plan has four objectives: (i) plan, coordinate, monitor and evaluate the health response to the cyclone; (ii) provide emergency medical care to those directly and indirectly affected by the cyclone; (iii) ensure continuity of operations across health service provision across the province; and (iv) prevent outbreaks of epidemic prone diseases. Daily Health Sector Coordination meetings are held at the Emergency Operations Centre in the Office of the Provincial Medical Director. Field level coordination among partners is now happening at Chimanimani and Chipinge districts guided by the District Medical Officers.

Summary Table of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector

Costs estimates, and funding gaps vary according to the source. This is partly explained by the variations in scope of interventions, geographical areas, and time horizons used (emergency response versus medium term response). None of the existing estimates provide detailed costing estimates by specific intervention or by district (table 3.28).

Table 3.29 provides World Bank estimated needs for Chimanimani and Chipinge districts. Transitional phase costs refer to costs of facilities that were classified as having likely no damage or light damage and those classified as having likely moderate damage. The medium-term phase costs refer to costs for facilities that were classified as having probable damage. Estimates are based on Ipsos classifications and estimates. Unit costs are those used for the costing of the National Health Strategy.

Table 3.29: World Bank Estimates of Health Infrastructure Needs for the Two Most Affected Districts, in US$

Districts	Transitional Phase (1–2 years)	Medium-term Recovery Phase (2–3 years)	Total Needs (US$)
Health Facilities Rehabilitation			
Chimanimani	55,000	**2,982,600**	3,032,600
Chipinge	200,000	**4,120,000**	4,320,000
Coordination, monitoring and evaluation of health response			
Chimanimani	13,175		26,350
Chipinge	13,175		
Strengthening surveillance system and response for early and timely detection of epidemic prone diseases			
Chimanimani	29,252.5		58 505
Chipinge	29 252.5		
Ensuring essential medical supplies and medical equipment			
Chimanimani	1,144,659		2,109,318
Chipinge	1,054,659		
Procurement of ambulances and equipment for ambulances			
Chimanimani	157.500		315,000
Chipinge	157.500		
Electronic Health record			
Chimanimani	1,000,000		2,000,000
Chipinge	1,000,000		
Capacity building			
Chimanimani& Chipinge	72,925.5		145,851
	72,925.5		
Establish adequate health workforce positions to improve quality of service delivery in the cyclone affected area			
Chimanimani	401,115.88		828 617.56
Chipinge	427,501.68		
Provision of water supply and energy source and provision of cold chain			
Chipinge	120,000		120,000
Total			**12,956,241.56**

Note: non-infrastructure costs are drawn from MOHCC health system recovery proposal for Chipinge and Chimanimani districts.

Education

Background and Pre-disaster Context

Zimbabwe is on a recovery path from the effects of a protracted economic crisis of 2000 to 2008. With the inception of the Government of National Unity (GNU) in 2009–2013, the GoZ has made steady strides in the restoration of service delivery in education. Public funding for primary and secondary education increased from 2 percent of GDP in 2009 to about 5.4 percent of GDP in 2013, dropping to 4.6 percent in 2018. Education has maintained the highest allocation of the national budget at an average of 20 percent for the past five years. Owing to strong investment in education by the GoZ, households, and donors, the country has seen a steady increase in pass rate at Grade 7 from 49.6 percent in

2012 to 55.6 percent in 2014, dropping to 52,08 percent in 2018, with the drop being attributed to the addition of agriculture as a new mandatory examinable subject. 'O' level pass rates have been improving but remain low (32.83 percent in 2018) with almost two thirds of candidates failing to reach the required pass grade of 5 subjects including Math and English, suggesting that quality focused interventions may be required for the secondary sector.

School attendance has also significantly increased over the years, for example in the most affected provinces the gross enrollment rates (GER) at primary for 2017 stood at 114.4 percent, 109.8 percent and 106.7 percent in Manicaland, Masvingo and Midlands provinces respectively, while net enrollment rates (NER) for the same provinces stood at 94.6 percent, 92.3 percent and 90.1 percent respectively. Secondary enrolment rates in the affected provinces are, however, lower as compared to primary, for example the GER and NER for secondary schools in Manicaland was 84.1 percent and 57.4 percent respectively. This is reflective of the national trends as the national GER and NER for lower secondary was 76.9 percent and 55.5 percent respectively in December 2017. Prior to the cyclone, the gender parity index (GPI) at all levels in the affected provinces, at both primary and lower secondary was very close to 1.00, suggesting that significant efforts have been made in terms of equal success in the affected provinces, as such, post-cyclone interventions should also aim at ensuring that the issue of equal access is promoted to maintain the pre-cyclone levels.

The affected provinces are predominantly rural as such most of the affected schools are rural schools. For example, Chipinge District has 202 schools, 191 of which are P3 and S3[56] schools, while Chimanimani has 102 schools of which 98 are P3 and S3 schools. All the 214 schools in Buhera District are P3 and S3 schools while 129 schools of the total 137 schools in Mutasa District are S3 and P3# schools.[57] This is also the trend in other affected Districts such as Bikita, Gutu, Zaka, Chikomba and Chirumanzi. While the government of Zimbabwe has phased out school fees for all rural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schools, schools still charge levies which are agreed by the Parents' Assembly of each school officially known as the School Development Committee (SDC).

The bulk of the schools in the affected Districts are owned by respective Rural District Councils (refer to the table below). Support from the Councils to their schools has mostly been for ad-hoc infrastructure projects hence most schools have to self-finance their day to day operations including procurement of teaching and learning materials through school levies. Most rural schools charge levies of between US$15 and US$25 per term.[58] Over the past 8 years, a significant amount of government allocation (on average 98 percent)[59] has been supporting teachers' salaries leaving schools to fend for all their day to-day operations from private resources that are collected from parents through school levies. Most rural schools in Zimbabwe are poorly resourced as the parents and guardians cannot afford the levies that are charged regardless of the low cost. Hence, challenges such as shortage of teaching and learning materials, infrastructure and age appropriate furniture exist. The effects of the cyclone are thus going to be more devastating given that the most affected Districts are rural districts where majority of residents are from the lowest income quantile.

Table 3.30: GER and NER by Province and Sex, Junior Level

	GER				NER			
Provinces	M	F	Total	GPI	M	F	Total	GPI
Bulawayo	104.07%	99.52%	101.72%	0.96	88.19%	86.68%	87.41%	0.98
Harare	84.01%	79.81%	81.84%	0.95	71.66%	69.55%	70.57%	0.97
Manicaland	107.83%	105.89%	106.86%	0.98	77.83%	81.45%	79.64%	1.05
Mashonaland Central	101.07%	100.09%	100.58%	0.99	74.30%	77.69%	75.99%	1.05
Mashonaland East	104.14%	102.62%	103.39%	0.99	78.60%	81.40%	79.99%	1.04
Mashonaland West	103.42%	102.67%	103.05%	0.99	76.45%	80.39%	78.40%	1.05
Masvingo	102.51%	102.96%	102.73%	1.00	76.05%	81.04%	78.53%	1.07
Matabeleland North	100.14%	100.36%	100.25%	1.00	80.13%	82.98%	81.54%	1.04
Matabeleland South	95.07%	95.12%	95.09%	1.00	74.96%	77.95%	76.44%	1.04
Midlands	99.54%	100.17%	99.85%	1.01	74.58%	79.59%	77.08%	1.07
Grand Total	100.30%	98.99%	99.65%	0.99	76.41%	79.29%	77.85%	1.04

Source: MoPSE 2017 EMIS Report.

Impact on the Sector

While the recorded infrastructure damages vary from school to school, on the overall the cyclone left significant damages to infrastructure that resulted in some schools completely closing before the end of the first term which closed on 11 April 2019. The damages include complete collapse of building to partial collapse, blown away roofs, destruction of property including teaching and learning materials and partial and complete damage to sanitary and latrine facilities.

The total damages to education related infrastructure as summarized in the graph below are estimated at US$6,570,934 as per government calculations. The graph shows that multiple damages were prevalent in Chimanimani, Chipinge and Chikomba Districts. The rampant damage which affected almost all the Districts was the blowing away of roofs, destruction of sanitary and latrine facilities was also rampant as it accounts for a significant share of the cost estimates at about 27.2 percent of the total infrastructure cost estimate. For a country that has recently emerged from a ravaging cholera epidemic, water and sanitation interventions may need to be prioritized as part of the education recovery strategy. Teachers' houses also account for a firm share of 27.69 percent of the total cost estimate.

Impact to the Sector (economic and social impact)

The overall economic impact of the cyclone to the education sector is of notable levels. As highlighted above, the recovery and restoration costs based on government's calculations are estimated to be around US$6,570,934[60] for infrastructure rehabilitation only. Additional US$3,381,565[61] is also required for procurement of teaching and learning materials, psycho-social support programs, DRM training and provision of other support services to support restoration of teaching and learning in the affected schools. These costs are likely to further increase, when other interest group's needs such as sanitary ware provisions for adolescent girls are factored in. The devastating effects of the cyclone also destroyed and disturbed the surrounding communities means/sources of livelihoods and this may impact on the education sector as the overall macro economy of the affected communities was negatively affected.

Cyclone Idai has also affected communities' social welfare in education, health, sanitation, and housing, among others. In terms of education, it is likely that affected schools will experience high drop-out

Table 3.31: Summary Baseline Data on All Schools in Affected Districts

		# of Schools			Registration status		Responsible Authority					District Enrolment		
Province	District	Primary	Secondary	Total schools	Registered	Satellite	RDC	Church	GVt	Farm	Other	Male	Female	District Enrolment
Manicaland	Buhera	141	73	214	179	35	196	12	6	0	0	57,563	56,239	113,802
	Chipinge	136	66	202	148	54	140	20	13	3	16	74,584	73,045	147,629
	Chimanimani	75	27	102	91	11	76	8	3	5	10	27,963	26,862	5, 825
	Mutare	167	93	260	228	32	153	39	30	6	32	78,163	76,589	154,752
	Mutasa	91	46	137	118	19	80	36	2	3	16	33,269	33,446	66,715
Masvingo	Bikita	89	41	130	119	11	115	9	3	0	12	37,557	35,824	73,381
	Gutu	168	76	244	210	34	210	20	9	1	4	44,613	43,160	87,773
Midlands	Chirumanzi	77	26	103	67	36	79	10	8	4	6	16,791	16,080	32,871
Mash East	Chikomba	123	56	179	138	41	160	7	7	1	4	25,260	24,055	49,315

Source: 2018 Draft EMIS Report.

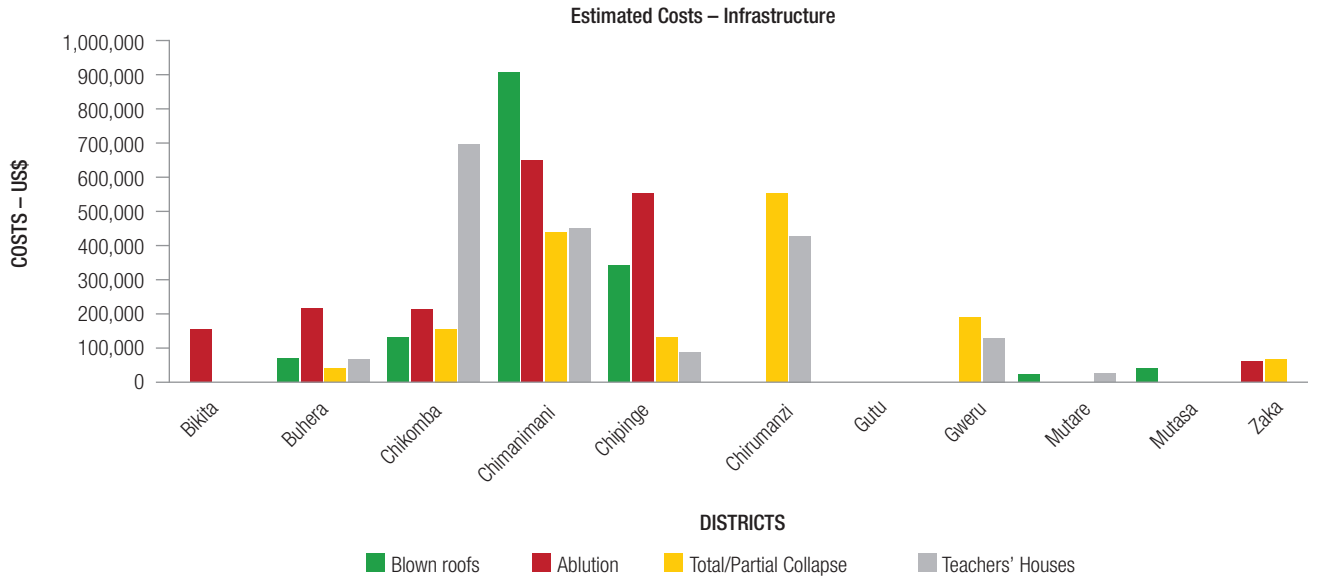
Key

RDC – Rural District Council

Other – refers to schools owned by other line ministries, individuals, town board, mine or Trust

Satellite Schools – these are unregistered schools that are yet to meet the minimum standards required to register a formal school such as infrastructure, number of learners etc. The schools are normally attached to a nearby school (referred to as the Mother School) for supervisions purposes and are heeded by a Senior Teacher who reports to the School Head of the mother school.

Figure 3.7: Estimate of Education Infrastructure Costs



Source: Authors Calculations based on Government Report – Education Infrastructure Damaged by Cyclone Idai.

rates due to prolonged absenteeism as a result of disturbance to the social structures such as the family or any other pre-existing social arrangements. Care International[62] estimates that in some affected Districts school attendance dropped to as low as 13 percent while some schools had to completely close. While the government has made significant efforts to ensure that normalcy is restored when schools re-open for the 2nd term on the 7th of May 2019, it is imperative to note that the need for post cyclone interventions is inevitable given the long term effects of the cyclone, including interventions aimed at access and retention of all leaners into the formal school system. Psycho-social support for affected children will also have to be prioritized as the cyclone was a traumatic experience to both learners and teachers especially considering the significant loss of human lives experienced in some of the affected districts like Chimanimani and Chipinge

Recovery and Resilience Needs

The rehabilitation of infrastructure to restore teaching and learning in affected schools is the most urgent needs for the education sector as this will allow the children in affected areas to have uninterrupted access. This will include: (i) repairing damaged classrooms and construction of destroyed school facilities and school latrines; (ii) restocking teaching and learning materials; (iii) provide psycho-social support programs for both teachers and learners; (iv) DRM training for the MoPSE structures; and (v) provision of other support services to support the full restoration of teaching and learning in the affected schools.

The recovery strategy will focus on:

- Review and improve the school infrastructure (classrooms, latrines, teachers houses, etc.) designs to make them more resilient to natural disasters;
- Reconstruction and rehabilitation of affected infrastructure (classrooms, latrines, teachers' houses etc.);
- Relocation and Construction of St. Charles Luwanga Secondary (The Catholic Church has decided to abandon the original site);
- Identification of schools to be used as safe havens and holding camps in future disasters;

Table 3.32: Summary of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector (education Infrastructure Only)

Districts	Transitional Phase (1–2 years)	Medium-term Recovery Phase (2–3 years)	Total Needs (US$)
Rehabilitation of blown roofs			
Buhera	60,000		60,000
Chikomba	120,000		120,000
Chipinge	332,000		332,000
Chimanimani	900,000		900,000
Mutasa	12,434		12,434
Mutare	30,300		30,300
Construction and rehabilitation of WASH facilities			
Bikita	142,800		142,800
Buhera	204,000		204,000
Chikomba	204,000		204,000
Chipinge	642,000		642,000
Chimanimani	544,000		544,000

(continued on next page)

Table 3.32: Summary of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector (education Infrastructure Only) *(continued)*

Districts	Transitional Phase (1–2 years)	Medium-term Recovery Phase (2–3 years)	Total Needs (US$)
Gutu	3,400		3,400
Zaka	51,000		51,000
Reconstruction of completely collapsed structures			
Buhera		30,000	30,000
Chikomba		145,000	145,000
Chimanimani		430,000	430,000
Chipinge		120,000	120,000
Chirumanzi		545,000	545,000
Gweru		180,000	180,000
Zaka		55,000	55,000
Rehabilitation and reconstruction of teachers' houses			
Buhera	57,500		57,500
Chikomba	690,000		690,000
Chimanimani	440,000		440,000
Chipinge	76,500		76,500
Chirumanzi	420,000		420,000
Gweru	120,000		120,000
Mutare	16,000		16,000
Total			**6,570,934**

- Identified Schools to be made disaster resilient through provision of relevant infrastructure;
- Ongoing psycho-social support to learners and teachers including in-service training of teachers in psycho-social support so that they may be able to assist affected learners;
- Procurement of teaching and learning materials including replacements of destroyed materials;
- Procurement of furniture; and
- Coordinate with WASH, health and nutrition sectors to address health hygiene and nutrition issues.

The strategy shall be pivoted on coordinated efforts between the government and development partners to avoid duplication of efforts while focusing on increasing efficiency in project implementation.

All the below estimates are based on government calculations as submitted in the Education Infrastructure Damage Report. It is also important to note that the MOPSE has drafted an additional budget of US$3,381,565 as summarized in table 3.33 below. This budget is anticipated to cover procurement of teaching and learning materials, psycho-social support programs and DRM among others.

Transport

Background and Pre-disaster Context

A report on the inventory and conditions of roads in Zimbabwe was published recently by the Ministry of Transport and Infrastructure Development (MoTID), Zimbabwe National Road Association (ZINARA) and

Table 3.33: Expenses for Non-Infrastructure Costs[a]

Education Sectoral Budget for 80,000 learners and 2000 teachers					
Areas of Response	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Total Cost (USD)**
Psychosocial Support-Training of teachers, camps for children, support social services and counselling for children and teachers, recreational kits	District Trainings on Psychosocial @$30 per person for 3 days		90	488	43,920.00
	Psychosocial materials for children and teachers	Each	2	80,000	160,000.00
	Recreational kits	Class	154	890	137,060.00
Provision of teaching and learning materials- textbooks, science kits, school in a box kits and ECD kits	School in a box kits	Class	145	1,500	217,500.00
	ECD kits	Class	153	400	61,200.00
	Science Kits	Class	584	1,000	584,000.00
	Teaching aids (Boards)	Class	450	15	6,750.00
	Reprint lost textbooks		1.9	10,000	19,000.00
WASH facilities	20 squat holes per school @$400 per squat hole		400	800	320,000.00
	Rehabilitate toilets which have been flooded through honey sucking @100 per toilet		100	100	10,000.00
	Repair toilets whose roofs were blown away @ 150 per toilet		150	100	15,000.00
	Water purification tablets	Box	50.59	122	6,171.98
	Soap, toilet bar, approx. 1kg/CAR-10	Box	10.69	1,220	13,041.80
	Bucket, plastic, 20 l	Each	5.85	1,220	7,137.00
	Sanitary ware for 20,000 girls.	Each	1.5	100,000	150,000.00
Temporary classrooms	Tents, 72sqms	Each	1,880.9	150	282,135.00
Temporary staff housing-tents	Tents, 24sqms	Each	713	50	35,650.00
Provision of solar mechanisation/power (solar lamps)	Solar lamps, 10 per school @50	Each	50	1,220	61,000.00
School furniture	Pupil's chairs	Person	10	1,000	10,000.00
	Pupil's desks	Person	20	1,000	20,000.00
	Teachers' chairs	Person	20	400	8,000.00
	Teachers' tables	Person	30	400	12,000.00
Teacher training on DRM	8 district trainings @5000 each	District	5,000	8	40,000.00
Special needs provision-assistive devices (hearing aids, wheel chairs etc)	Assistive devices @ 500 per school	School	500	122	61,000.00
School feeding	Feeding @ 0.20 per day per learner for 3 months (66 days)	Person	13.2	80000	1,056,000.00
Provision of IEC materials on flooding, dangers of rainy season	Flyers	Person	0.3	150,,000	45,000.00
Total					**3,381,565.78**

[a]Adopted from the MOPSE Cyclone Idai Report, March 2019.

Zimbabwe Local Government Association (ZILGA). As this report, Roads Conditions and Inventory Report (Conditions Report), was based on a comprehensive country-wide survey carried out in 2016/17, the first time since the previous survey in 1999, it provides a good baseline for the purpose of this assessment.

Table 3.34: Road Classification in Zimbabwe[a]

Road Class	Definition	Length (Km)	% of total
RTTN	Roads linking countries within the Southern African region	3,182km	3%
Primary	Roads not part of the RTTN but link RTTN with urban centres or between urban centres	8,053km	8%
Secondary	Roads connecting RTTN, primary, tertiary and urban roads, industrial and mining centres, tourist attractions and minor border posts to each other	14,084km	14%
Tertiary	Roads providing access to schools, health centres, dip tanks and other service facilities within a rural district council area or connects and provides access to secondary, primary and RTTN within and outside a rural district council area	56,368km	57%
Urban	(a) Any roads within an urban council area, other than secondary, primary or regional road; (b) Any road located on urban land in a rural district council, other than tertiary, secondary, primary or RTTN	10,065km	10%
Other	Roads not falling into above-mentioned classifications	6,298km	6%
Total		**98,051km**	**100%**

[a]Roads Conditions and Inventory Report – Results of the National Roads Condition & Inventory Survey Project, Ministry of Transport & Infrastructure Development (MoTID), Zimbabwe National Roads Administration (ZINARA), Zimbabwe Local Government Association (ZILGA).

Table 3.35: Road Lengths, by Road Class and Road Authority

	Road authority						
Road class	DoR	RDC	Urban	DDF	Not Stated	Total	% of Total
RTTN	3,039	6	66	0	71	3,182	3%
Primary	3,717	721	50	3,475	91	8,053	8%
Secondary	7,912	2,372	9	3,671	119	14,084	14%
Tertiary	3,271	34,670	366	17,242	819	56,368	57%
Urban	14	533	9,359	0	159	10,065	10%
Not stated	478	1,904	1,485	645	1,786	6,298	6%
Total	**18,431**	**40,206**	**11,335**	**25,033**	**3,045**	**98,050**	**100%**
% of Total	**19%**	**41%**	**12%**	**26%**	**3%**	**100%**	

Zimbabwe had a total road network of about 98,000km, composed of the regional trunk road network (RTTN), primary road, secondary road, tertiary road and urban road. The definition of the road classes and their lengths are shown in Table 3.34.

Different classes of roads are administered by different Road Agencies designated under the Road Act, such as the Department of Roads (DoR) of MoTID, the Rural District Councils (RDCs), the Urban Councils (Municipality, Town Council or Local Board), and the District Development Fund (DDF). The lengths of road by road class, managed by different Road Authorities are shown in table 3.35. The demarcation of road management responsibilities among RDCs, Urban Councils and DDF depends on various factors, including the location, and the history of development. There are 30 Urban Councils and 60 RDCs in the country, and they are mapped under the Ministry of Local Government, Public Works, and National Housing (MoLGPWNH). Separate from the Road Agencies, ZINARA, which is mapped under MoTID, manages the Road Fund through the collection of road user charges and the allocation of funds to Road Agencies for the maintenance and rehabilitation works, among other mandates.

Table 3.36: Road Surface Types, by Road Authority

Road surface	Road Authority						
	DoR	RDC	Urban	DDF	Not Stated	Total	% of Total
Sealed	9,311	974	7,100	54	407	17,846	18%
Gravel	8,351	15,689	2,319	20,228	894	47,479	48%
Earth	406	20,562	1,319	4,257	989	27,532	28%
Gravel or earth	211	2,547	28	381	62	3,229	3%
Not stated	155	434	568	115	690	1,962	2%
Total	**18,433**	**40,206**	**11,334**	**25,034**	**3,043**	**98,048**	**100%**

Table 3.37: Road Condition, by Province

Province	Very Poor (0–15)	Poor (15–30)	Fair (30–55)	Good (55–80)	Very Good (81–100)	No Info	Total
Harare Metro	82	126	225	213	115	115	875
Manicaland	1,507	2,199	5,814	2,160	994	659	13,335
Mash Central	667	1,148	3,929	1,514	231	543	8,033
Mash East	1,849	2,649	3,535	1,743	887	820	11,483
Mash West	2,683	2,179	3,878	2,015	1,110	811	12,676
Masvingo	1,266	2,673	4,282	2,436	983	749	12,390
Mat North	732	1,290	2,568	1,390	1,123	729	7,832
Mat South	856	2,050	5,658	1,994	941	432	11,931
Midlands	906	2,527	6,098	1,827	747	970	13,075
Bulawayo	152	332	862	469	251	324	2,389
Harare Municipality	799	426	1,118	796	532	357	4,029
Total	**11,499**	**17,601**	**37,967**	**16,557**	**7,913**	**6,510**	**98,048**
% of Total	**12%**	**18%**	**39%**	**17%**	**8%**	**7%**	**100%**

Key baseline data for the sector

About 18 percent or 17,846km of the total length of the roads in Zimbabwe is sealed (paved), followed by 48 percent gravel roads and 28 percent earthen (soil) roads. Half of the sealed roads (9,311km) are with DoR, which is presumed to be most of RTTN and Primary, and some of Secondary roads. While most urban roads (7,100km) are sealed, rural roads managed by RDC and DDF are predominantly gravel or earthen roads.

The Conditions Report classified the condition of roads into the following five categories based on the score assessed through a visual observation survey: very poor (12 percent, 11,499km), poor (18 percent, 17,601km), fair (39 percent, 37,967km), good (17 percent, 16,557km), and very good (8 percent, 7,913km). Province-wise road condition is provided in table 3.37.

The general condition of sealed roads was reported to be fine, with 13 percent of the network length categorized either very poor or poor, while structural problems were quite prevalent as to edge breaks (existed for 64 percent of the network), longitudinal cracks (52 percent), transverse cracks (47 percent), crocodile cracks (37 percent), rutting (18 percent), and raveling (disintegration of the asphalt layer, 28 percent).

Table 3.38: Bridges by Province, Type and Condition of Parapet

Province	Total	Type			Condition of Bridge Parapet				
		Over Rail	Over River	Over Road	Accident Damaged	Poor	Fair	Good	None
Bulawayo	45	9	36		2	1	8	27	7
Harare Metro	54	2	51	1	4	3	14	12	21
Manicaland	141	2	138	1	93	4	10	20	14
Mash Central	117		117		4	5	14	30	64
Mash East	166		166		2	3	13	25	123
Mash West	149	3	145	1	4	12	25	61	47
Masvingo	38		38		1	1	8	13	15
Mat North	48		44	4		1	4	16	27
Mat South	99		99		4	1	12	34	48
Midlands	126		124	2	2	11	15	45	53
DoR Highways	415	18	396	1	45	17	57	193	103
Total	**1,398**	**34**	**1,354**	**10**	**161**	**59**	**180**	**476**	**522**
Total in %	**100%**	**2%**	**97%**	**1%**	**12%**	**4%**	**13%**	**34%**	**37%**

The general condition of gravel and earthen roads are significantly worse than sealed roads, with 37 percent categorized as either very poor or poor. The thickness of gravel on gravel roads is also an issue with 37 percent having less than 50mm and 17 percent between 50 to 100mm, where the standards are 100mm or 200mm thick.

The Conditions Report also surveyed various road structures, such as bridges, box culvert, pipe culvert, Shelverts and Armco culverts, pipe causeways, drifts, signs, junctions, grid, traffic lights, street lights, bus stops, laybys, rail crossings, toll gates, and foot bridges. It was reported that there were 1,398 bridges, 5,323 box culverts, 443 rail crossings and 37 footbridges. The Conditions Report found there were 8,049 impassable sections. The number of bridges in each province with the bridge type and the condition of parapet is provided in table 3.38.

Impact on the Sector

Major damages on road infrastructure have been confirmed in such forms as: washed away road sections; erosion on road shoulder and lanes; washed away surface and sub-surface pavement materials; clogging and erosion of drainage; and road blockage by landslides, fallen rocks and boulders, and debris. Road structures were also heavily impacted, including washed away bridges and approaches; damaged or clogged culverts, drifts and inverts; washed away or damaged ancillary infrastructure, such as guard rails, fences, signs, street lights, and traffic lights.

The districts of Chimanimani and Chipinge in Manicaland province were among the most heavily affected districts as they are in a mountainous area at the eastern border of the country. Roads that connect towns and villages in these districts with the main city of Manicaland, Mutare, have been severely damaged due to the heavy rain, inundation, and the flow of water and debris.

Based on the report from the Government, approaches have been washed away at seven bridges on Chimanimani-Wengezi road, and at two bridges on Chimanimani-Tilbury-Nyahodi road. Road sections have been washed away at a few locations on these roads as well.

Using the remote sensing data (see details in Section 5 of this chapter), the length of damaged roads (in kms) and bridges (in m) are assessed in Table 3.39.

Table 3.39: Length of Damaged Road and Bridges in Districts of Manicaland Province

District	Road (km)					Bridges (m)
	RTTN	Primary	Secondary	Tertiary	Total	
Bikita	3		11	6	20	???
Buhera	1	34	92	132	259	3,401
Chikomba	19	16	17	96	147	1,380
Chimanimani	20	4	2	5	31	1,228
Chipinge	49			22	71	1,444
Chipinge Urban					0	
Gutu	5	36	34	154	228	4,831
Masvingo			0	6	6	3,035
Masvingo Urban					0	
Mutare	4		31	61	96	3,157
Mutare Urban	1			1	1	60
Mutasa	2	4	0		6	625
Zaka		0	0	0	1	1,192
Total	**103**	**94**	**186**	**482**	**865**	**20,354**

Impact to the Sector (economic and social impact)

Impassable road sections such as those washed away will be a major factor to delay the emergency relief and reconstruction efforts in all sectors in the areas connected via those bridges. Access delays to those areas due to detours or slowing down will have a long lasting and broad impact.

Importing and exporting of goods to and from the neighboring countries will also be affected as strategic regional corridors pass through Zimbabwe. The damages on the road network is likely to affect particularly the Beira Corridor, Beira – Mutare – Harare – Lusaka, which transport export products like mineral ores, especially coper from Zambia and chromium from Zimbabwe, tobacco, food product, cotton, hides and skins, and import products like fuel oils, fertilizers, wheat, heavy machinery and equipment, textiles, and beverages.

Roads serve as the lifeline of the disaster-affected region. Road was virtually the only mode of transport for people in the regions to ship goods to markets and factories, to go to cities to receive health and civil services, and to commute to the schools in the nearby towns. The extensive damages on road would significantly stall the economic activities of the region and reduce the quality of life of the people.

Reconstruction efforts on road will take a long time because of the difficult terrains and the amount of structures such as bridges, foot bridges, culvert, Shelverts, pipe causeways. Road work in the hilly environment and construction of structures can easily take multiple years. Until the completion of the work, the areas connected via such roads and structures will suffer from the loss or limited access to market, services, and employment.

Recovery and Resilience Needs

Recovery needs for the road sector have been assessed as in Table 3.40. The assessed total cost of reconstruction is US$164M, which is composed of US$139M for road and US$24M for bridges. If the agencies are to take the build-back-better approach, the reconstruction cost estimate will be 20 percent more at US$197M.

The strategy for recovery is suggested as follows:

Table 3.40: Total Recovery Cost, by District

	Road		Bridges		Total Cost (US$ 000)	
District	(km)	Cost (US$ 000)	(m)	Cost (US$ 000)	Recovery	if +20%
Bikita	20	3,220		0	3,220	3,864
Buhera	259	38,122	3,401	4,081	42,203	50,644
Chikomba	147	23,510	1,380	1,656	25,166	30,199
Chimanimani	31	7,675	1,228	1,474	9,149	10,979
Chipinge	71	17,062	1,444	1,733	18,795	22,554
Chipinge Urban	0	0		0	0	0
Gutu	228	33,751	4,831	5,797	39,548	47,458
Masvingo	6	798	3,035	3,642	4,440	5,328
Masvingo Urban	0	0		0	0	0
Mutare	96	13,390	3,157	3,789	17,179	20,615
Mutare Urban	1	244	60	73	317	380
Mutasa	6	1,485	625	750	2,235	2,682
Zaka	1	112	1,192	1,430	1,542	1,850
Grand Total	**865**	**139,369**	**20,354**	**24,425**	**163,794**	**196,553**

1. Carry out clearing landslides and temporary reconstruction of roads, bridges and bypass roads on strategic network to allow passage of vehicles for relief and reconstruction. This can improve the access to remote locations while accelerating the reconstruction of infrastructure in the region.
2. Concurrently with the above, plan and carry out disaster impact surveys to develop an inventory of road infrastructure requiring reconstruction and repair works. Due to the extensive damages caused by the cyclone, the road agencies would need to take a holistic and coordinated approach to recover to the pre-disaster state. Since this RINA assessment is based primarily on remote sensing data, there is a good chance that the actual damages and the recovery costs could be substantially different. An inventory based on field surveys would help establish the actual cost required for roads managed by different road agencies and allows them to prioritize the road sections to be reconstructed.
3. **Start the reconstruction works as per the priority list developed based on the inventory** once road connections among the strategic locations are re-established, even through temporary structures and materials.
4. **Develop a medium to long term plan for reconstruction** as the amount of time and resource required to fully recover is much greater than what the road agencies has spent annually before the disaster.
5. Consider utilizing the funds that ZINARA manages to be allocated for the reconstruction work on a priority basis.
6. Road agencies, NGOs, and local communities to divide the recovery work according to the legal and technical capacity of each organization and coordinate their efforts.
7. Communicate the reconstruction progress so that road users are kept updated on the status of road and the construction works.

Summary Table of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector

The district-wise total needs of recovery were divided into needs in the transitional phase (second and third

Table 3.41: Breakdown of Total Recovery Cost Into Phases

District	Transitional Phase (Year 1–2)	Medium-term Recovery Phase (Year 2–3)	Total (USD)
Bikita	1,068,000	1,596,000	3,220,000
Buhera	18,405,193	21,560,257	42,203,000
Chikomba	7,805,909	12,710,545	25,166,000
Chimanimani	4,442,160	3,812,547	9,149,000
Chipinge	7,676,873	8,067,164	18,795,000
Chipinge Urban	0	0	0
Gutu	7,188,983	20,164,644	39,548,000
Masvingo	1,099,722	1,933,962	4,440,000
Masvingo Urban	0	0	0
Mutare	3,111,583	8,851,444	17,179,000
Mutare Urban	107,775	141,033	317,000
Mutasa	865,097	895,129	2,235,000
Zaka	452,138	628,184	1,542,000
Total	**52,223,432**	**80,360,909**	**163,794,000**

years), medium-term recovery phase (second and third years), and thereafter. The summary of the estimates is provided in table 3.41.

Energy

Background and Pre-disaster Context

Zimbabwe is endowed with a wide variety of energy resources, including hydro, coal, and coal-bed methane. This includes coal reserves estimated at about 10.6 to 26 billion tons in situ, coal bed methane deposits estimated to be over 600 billion cubic meters, hydropower potential on the Zambezi river shared system is estimated at 37 TWh per annum, and solar radiation available at an average of 2,000 kW per hour per square kilometer per annum. Though wind speeds are relatively slow (3.5m/s), there is also considerable potential for wind energy and particularly for use in water pumping. All oil products used in Zimbabwe, including diesel, petrol, and jet fuel are imported.

Although by no means solely responsible, the economic slowdown of the past few years has been partly attributed to poor performance in the energy sector. Significant deterioration of Zimbabwe's infrastructure has occurred both in the urban and rural areas, the consequence of inadequate levels of public expenditures for routine and periodic maintenance and the sector's inability to expand their network infrastructure to service demand. The Energy sector is characterized by ageing generation plants, overloaded transmission and distribution infrastructure resulting in poor performance, unreliability and significant system losses. The sector's resulting inability to supply consumers with adequate and reliable power has had serious impact on virtually all sectors of the economy as well as on the level and quality of basic services.

Institutional and Legal Framework

The laws that define Zimbabwe's energy sector are the Electricity Act of 2002 as amended in 2003 and 2007, the Rural Electrification Fund Act of 2002, the Zambezi River Authority Act of 1987, the Petroleum Act of 2006 (and amendments) and the Energy Regulatory Authority Act of 2011.

The power sector is overseen by the Ministry of Energy and Power Development (MoEPD). The Zimbabwe Energy Regulatory Authority (ZERA) reports to MoEPD and is mandated to regulate the energy sector in a fair, transparent, efficient and cost-effective manner for the benefit of the consumers and energy suppliers. ZERA's duties include promotion of competition in the sector, licensing, and tariff regulation to allow licensees to finance their activities and obtain reasonable earnings for their efficient operation. ZERA regulates fuel imports and trade, as well as any electricity undertaking which generates, transmit, distributes, or retails electricity for commercial purposes over 100 kW capacity.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Fuel and Power Supply

As it concerns fuel, the majority is imported by authorized suppliers through the Beira – Harare pipeline, the Zimbabwean section (from Mutare to Harare) of which is controlled by the National Oil Infrastructure Company of Zimbabwe, established in 2011. Fuel is then sold onto wholesalers and retailers in turn. A small portion of Zimbabwe's fuel is sourced from South Africa. As it concerns power, ZESA Holdings is the holding company for four subsidiaries: (i) Zimbabwe Power Company (ZPC), mandated to generate electricity; (iii) Zimbabwe Electricity Transmission and Distribution Company (ZETDC), responsible for the retail of electricity; (iii) ZESA Enterprises, a diversified business portfolio; and (iv) Powertel Communications, a data network operator. The Rural Electrification Fund (REF), a separate body, is responsible for grid extension in rural areas.

Electricity supplied by ZPC is mostly generated through one hydroelectric power plant (HPP) and four coal-fired power stations with a combined installed capacity of 2,490 MW of which 1,679 MW is available. The power stations include the Kariba South HPP and its recent extension (1050 MW), and four coal-fired thermal plants: Hwange (920 MW), Harare (135 MW), Munyati (120 MW), and Bulawayo (120 MW), and a combination 3 IPPs totaling (145 MW). ZETDC serves about 650,000 customers. The electricity transmission network includes: (i) a transmission system of 3,519 km (400kV, 330kV and 220kV lines and substations); and (ii) a sub-transmission system of 3,755 km (132kV, 88kV and 66kV lines and substations). The distribution network includes 33kV, 22kV, 11kV and 380/220V lines of a total length of 119,794 km and related substations.

Sector Challenges

The fuel sector challenges primarily center on forex availability, draining government reserves and leading to fuel shortages. In January 2019, the Government announced a tripling of fuel prices in local currency, which led to widespread protests. The power sector faces several challenges, chief among them being its current financial position. Both ZPC and ZETDC are unable to achieve cost recovery, even before financing costs are considered.

Specifically, the recorded shortfall for ZPC in 2016 was US$94 million, while that of ZETDC was US$212 million—excluding interest costs and debt burden. A key driver of the sector's financial viability is excessively high levels of debt against a backdrop of low equity funding levels. Average end-consumer tariffs in Zimbabwe have remained unchanged since 2011, at 9.86 USc/kWh. Given inflation, in real terms the tariff has decreased. ZETDC liabilities total over US$1.5 billion, while equity represents just 15.6 percent of total assets despite a reevaluation in 2014. Persistent growth

in receivables, which stood at US$1.2 billion in 2016, contributes to this debt. Approximately 45 percent of ZETDC's receivables are attributable to government and parastatal entities. As ZETDC's primary supplier, ZPC's position is also affected in turn: receivables from ZETDC grew to US$755 million in 2016, while total debt exceeded US$1.5 billion and at least 60 percent of loans are overdue. This resulting need to rely on short-term loans has limited the possibility of raising new debt (at high cost, requiring securitized repayment) with significant ramifications for quality of service. ZETDC is also in an arrears with respect to South Africa for emergency power imports, making it difficult to establish long term power purchase agreements at lower prices.

Ageing generation infrastructure and lack of maintenance have resulted in a decline in capacity. This has been further compounded by the prevailing regional drought in the past 3 to 5 years. All five of Zimbabwe's primary power plants were commissioned more than 30 years ago. Lack of regular maintenance has exacerbated the ageing process. As a result, available capacity has greatly decreased. Transmission and distribution (T&D) infrastructure, the average age of which is 35 years, is also failing. Because more than 75 percent of substations have old transformers, they have lost continuous reserve capacity, increasing the risk of power outages and preventing new connections. Additionally, inadequate reactive power compensation equipment reduces system capacity and affects system reliability and voltage compliance. T&D losses amounted to 18.9 percent in 2016 and, at 15.6 percent, distribution losses suggest a high level of unmetered consumption. As with inadequate tariffs, network losses negatively impact the sector's financial performance.

While the national access rate is slightly above the regional average, significant urban-rural disparity exists and the clear majority (~90 percent) of rural areas do not yet have access to electricity. ZETDC has a target of 50,000 new customer connections per year but only connected an average 17,500 new customers per year from 2014 to 2016.

Impact on the Sector

Fuel Supply

Of primary concern to the country's fuel supply was the Beira-Harare pipeline on which Zimbabwe relies for most fuel imports. While there was some damage to the terminal in Beira, primarily the jetty and control room, there was no damage to the pipeline itself, including the Zimbabwe section from Mutare to Harare. Nevertheless, the pipeline was shut down temporarily from 15 March as a precautionary measure and pumping was slated to resume in April.

Power Supply

ZPC has confirmed that there was no damage to power generation infrastructure resulting from the cyclone.

With respect T&D infrastructure, there was significant damage in the Manicaland and Masvingo provinces. The most affected districts were Chimanimani, Chipinge, Mutare, and Rusape. An assessment completed by ZETDC found that damage had occurred on 33.6 km of MV network, 88.9 km of 33kV network, 106.2km of 11kV network, and 40 secondary substations. Table 3.44 provides details on the extent of the damage.

As it concerns fuel, the temporary shutdown of the Beira-Harare pipeline has had significant impacts on fuel imports even though there was significant damage to the Zimbabwe section of the pipeline. Fuel imports continue by road in the meantime and the Government waived import duties on fuel for major industry players (e.g. mines). Concerns around possible fuel shortages have repeatedly caused long queues at fuel stations, though it remains unclear whether such shortages are the result of the pipeline shutdown or of the lack of foreign exchange that previously dogged the sector.

As it concerns power, the wind, flooding and landslides during and after the cyclone resulted in extensive damage to local infrastructure. The RINA was unable to determine the extent of disrupted customer connections and its impact on consumption. However, it is clear that damage to power infrastructure has had impacts on households, businesses, and public institutions alike who experienced loss of power supply

Table 3.42: Key Baseline Data for the Sector

Electricity access (2014) (of which urban; rural)	32.3% (83.4%; 9.8%)
Installed capacity (2018)	2,490 MW
Available capacity (%) (2016)	1,679 MW (67%)
Average cost of service (2015 ZESA est.)	US$ 0.124/kWh
HV/MV Transmission system length (2016)	7,274 km
Distribution network length (2016)	119,794 km
Average tariff (2018)	US$ 0.0897 / kWh
Transmission and Distribution losses (2016)	18.9%
Annual generation (2016)	7,057 GWh
Consumption growth (2013–2016)	–3.8%
Ratio of Residential vs non-residential customers (2016)	36% vs 64%
Per capita electricity consumption (2016)	509.8 kWh

from the grid. According to ZETDC, essential services that were affected include hospitals, mortuaries, clinics, emergency centers, communication centers, schools, sewerage treatment plants, and water pumping stations.

Recovery and Resilience Needs

Recovery needs center on the restoration of power supply in Manicaland and Masvingo provinces. The Government's strategy has focused restoring the power supply to institutions such as schools, clinics, water treatment plants, and irrigation schemes as a priority to avoid further downstream impacts. ZETDC has already begun rehabilitation work in earnest; significant damage has been addressed and power has been addressed in many areas. Repairs remain ongoing.

ZETDC has estimated the cost of repairs to be RTGS$14,508,354 (local currency) while the Bank's assessment has estimated the cost to be US$3,694,200 (forex). The resources available to ZETDC to meet this unforeseen remain unclear, however its precarious financial situation suggests that financing will need to come from Government or external sources. Excluding work completed, the estimated remaining need is estimated at US$3,229,800.

Environment

Background and Pre-disaster Context

This assessment is primarily focused on the three most affected districts of Chimanimani, Chipinge Rural and Chipinge Urban, although there are 12 districts considered to be affected by Cyclone Idai, and where available, data from other districts have been used.


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Table 3.43: Key Baseline Data for the Sector

District	33kv line km	11kv line km	MV km	Secondary Sub-stations
Chimanimani	59	42	20	20
Chipinge	12.6	21.2	8.6	11
Rusape	5	10	5	0
Nyanga	2	3	0	0
Gutu	3	1	0	1
Mashava	0	0	0	0
Chiredzi	6	0	0	0
Masvingo	0	2	0	1
Rutenga	0	0	0	0
Mutare	1.3	27	0	7
Total	**88.9**	**106.2**	**33.6**	**40**

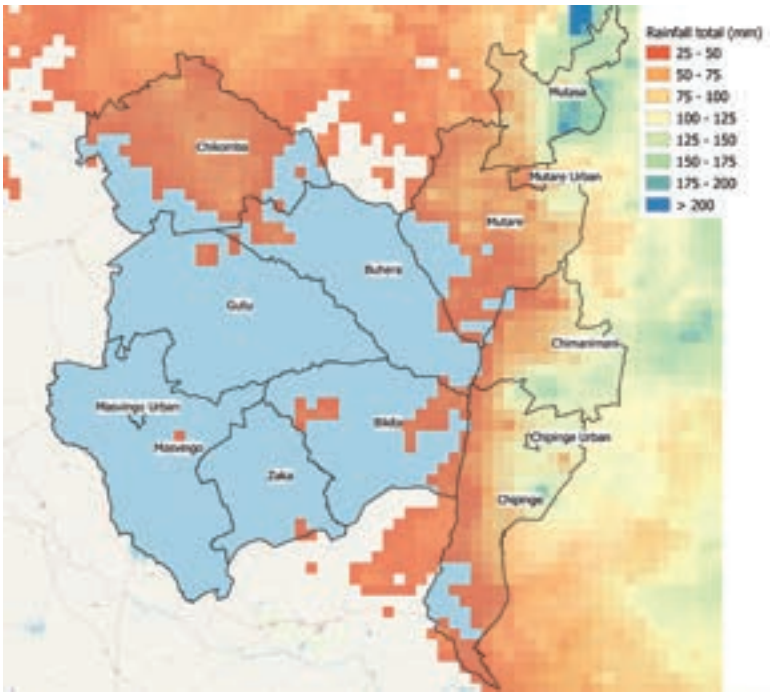
Table 3.44: Cost Estimates and Gaps – Recovery and Resilience Needs for the Sector

Districts	Transitional Phase (1–2 years)	Medium-term Recovery Phase (2–3 years)	Total Needs (US$)
Description of recovery intervention 1			
Chimanimani	1,699,000	339,800	2,038,800
Chipinge	383,000	76,600	459,600
Middle Sabi	226000	45,200	271,200
Rusape	175,000	35,000	210,000
Nyanga	51,000	10,200	61,200
Gutu	72,000	14,400	86,400
Mashava	0	0	0
Chiredzi	90,000	18,000	108,000
Masvingo	34,000	6,800	40,800
Rutenga	0	0	0
Mutare	348,500	69,700	418,200
Total			**3,694,200**

OCHA (2019) identified these three districts as the most impacted, based on the number of households affected. Map 4 shows the rainfall distribution for the event where rainfall totals less than 25mm have been excluded. Here, it can be seen that these three districts, along with Mutasa district in the North-East received the highest rainfall totals. Manicaland Province (2019) also described Chimanimani and Chipinge as the most affected areas, with Mutare, Buhera, Mutasa and Makoni less affected.

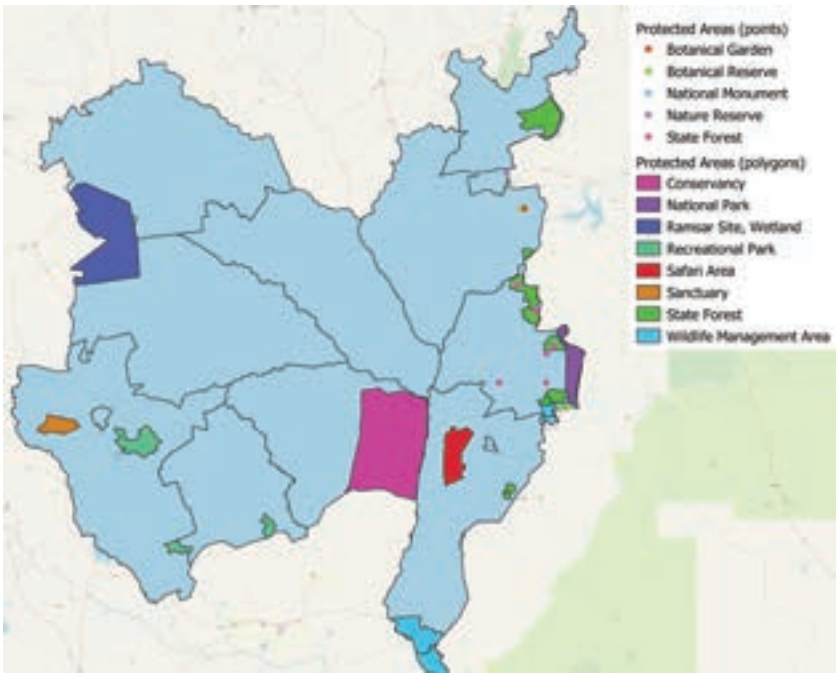
Forestry is a significant sector of the economy, providing livelihoods, a key source of fuel, and also tourism. Allied Timbers Limited is a national private company which developed from the Forestry Commission in 2003, with the purpose of promoting commercial activities in the forestry sector. Allied Timber constitutes around 60 percent of the forestry sector, and they control around 12,500 ha of forest. It has a number of plantations and processing sites in the three affected districts.

Map 3.4: Heavy Rainfall Over the Affected Districts



Note: Intensities less than 40 mm are excluded.Global Land Cover data from the European Space Agency were used for the three districts. Land-use across the region is a broad mixture of forests, grasslands, and mixed vegetation. 41.3 percent was recorded as predominantly forest, either in the form of open or closed deciduous or evergreen forest, and 21.3 percent was recorded as mosaic vegetation, consisting of grasslands, shrubs, forests, and crops. A further 27 percent was recorded as shrubland, and a further 3 percent as savanna.
Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Map 3.5: Protected Areas Across All *Affected Districts*



Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Map 3.6: Protected Areas within Affected Districts

Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Table 3.45: Key Baseline Data for the Sector

Number of protected areas	39
Area of protected forest (ha)	471,098 ha
Area of forest (natural and commercial) (ha)	1,172,365
Average soil loss rate	TBD

The other key forestry companies are Border Timbers and the Wattle Company. Nationally, Zimbabwe's forests are estimated to cover about 45 percent of the total land area, contributing an estimated 3 percent of the GDP (World Bank, 2019).

Across the affected districts, there are 39 protected areas, which include the Safari area of Chipinge, the State Forests of Tarka, Tandai, and Chirinda, the Save Conservancy, three national parks (Gonarezhou, Chimanimani and Nyanga), the Driefontein Grasslands, various wildlife management areas and botanical parks, and the Great Zimbabwe National Monument. Map 5 shows the location of these areas.

Within the three most affected districts, there are 25 such protected areas. Of these, six sites are categorized by IUCN (Chirinda State Forest (Category Ib), Gonarezhou National Park and Chimanimani National Park (both Category II), Haroni Forest and Rusitu Forest (Category IV) and Chipinge Safari Area (Category VI). The locations of these protected areas are shown in Map 6.

These natural resources also provide environmental and ecosystem services, in the form of soil retention, regulation and protection of water sources, disaster risk reduction, and generate income through attracting tourists. The forestry sector combined with the national protected areas are a source of income through tourism activities. The Chronicle (2018) reported that 2.4 million tourists visited Zimbabwe in 2018, and while Harare and Victoria Falls are key destinations, sites in the east of Zimbabwe attract visitors in significant numbers.

Impact on the Sector

The Cyclone affected 13 districts in Eastern Zimbabwe across three provinces. The two heaviest hit districts were the Chipinge Rural, Chipinge Urban, and Chimanimani Districts, all of which are situated in the Manicaland Province. Chipinge Urban District has an area of 28.6 km^2, and lies within the Chipinge Rural District, with a much larger area of 5220 km^2. As a result, the damages to these two districts are presented together. The region was hit by heavy rainfall, resulting in flooding, landslides, and strong winds.

The flooding and landslides caused significant damage and large movements of soil, which damaged housing and other infrastructure. Images 3.1 and 3.2 show the pre- and post-flood situation in Ngangu Township in Chimanimani District. New gullies and channels were formed, resulting in the loss of life, and the destruction of houses. There were multiple examples of such damage across the region.

In the forestry sector, Allied Timbers Limited reported that 251 hectares of plantation had been damaged

Image 3.1: Pre-disaster situation at location in Chimanimani District

Image 3.2: Post-disaster situation at location in Chimanimani District

Table 3.46: Areas of Forested Region Affected by Low, Medium and High Intensity Rainfall by District, Measured in Hectares

	Rainfall intensity and affected area (ha)		
District	Low	Medium	High
Bikita	47,597	2,068	0
Buhera	9,385	3,011	0
Chikomba	28,928	93,217	0
Chimanimani	50	26,559	182,431
Chipinge Rural	35,242	49,616	132,843
Chipinge Urban	0	0	1,125
Gutu	69,009	2,937	0
Masvingo	172,626	2,580	0
Masvingo Urban	1,206	0	0
Mutare	3,042	36,536	60,971
Mutare Urban	0	4,516	2,114
Mutasa	0	6,060	109,450
Zaka	75,176	14,069	0
Total	**442,261**	**241,169**	**488,934**

Fallen tree at Ngungunyana Estate, Mount Selinda, Chipinge District

Source: Allied Timbers Limited, 2019.

across the Chipinge and Chimanimani districts, causing US$2,079,825 of damage. Furthermore, 55 building were assessed as damaged, costing US$285,000. In addition, infrastructure damages included 26 toilets (US$130,000), 12 water sources (US$288,000), 216 km of road (US$623,000), 30 bridges (US$450,000), and

Image 3.3: Impact of Heavy Rainfall on Forested Areas

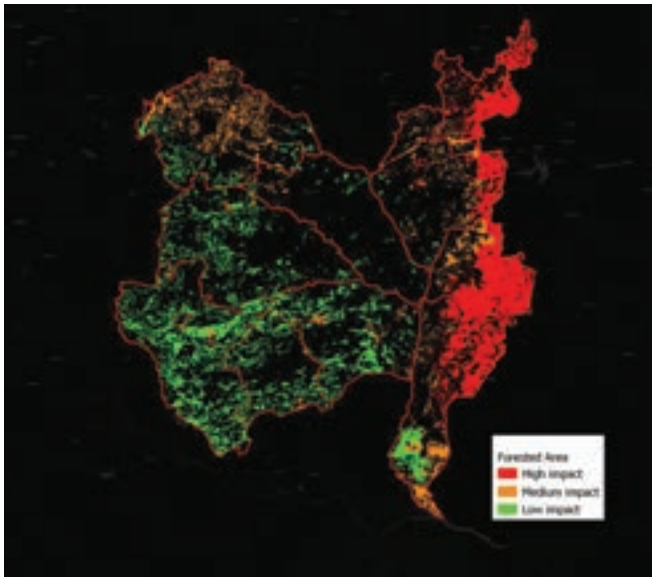
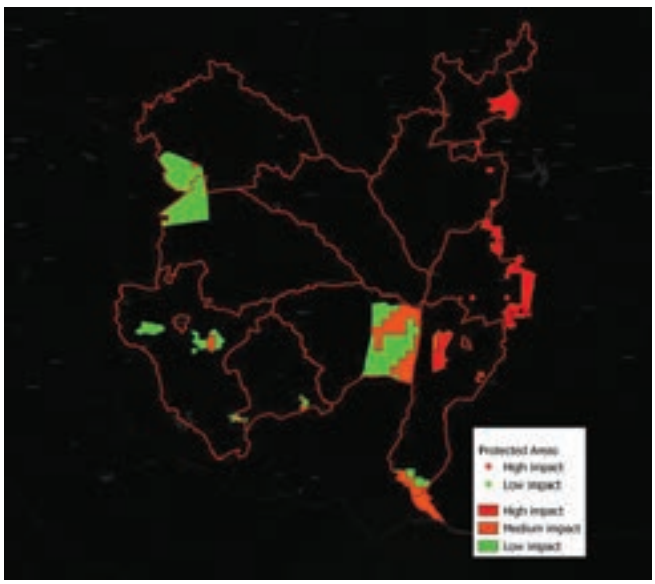


Image 3.4: Estimated Impacts on Protected Areas



296 culverts (US$281,000). This damage to 251 hectares represents around 2 percent of forest lands under their control. The total damage to Allied Timbers Limited, including damage to plantations and infrastructure is estimated to be US$4.747 million. Estate employees at the Chimanimani Estates continue to require food assistance and social welfare assistance is being employed. Figures for the number of employees requiring aid have not been made available. The photo below shows an example of a fallen tree, and the resulting damage to other infrastructure (in this case transportation).

Beyond commercial forest plantations, Zimbabwe is covered by forests. There are over 1.17 million hectares of predominantly forested areas across the 12 affected districts that were affected by heavy rainfall. These rainfall intensities were categorized into low, medium and high rainfall intensities, based on the ranges of 25 to 50 mm, 50 to 100 mm, and greater than 100 mm. Table 3.46 presents the forested areas affected by these three levels of rainfall to give an idea of the potential impact of the cyclone on this sector, and the services they provide. It is clear that while Chipinge Rural and Chimanimani districts are heavily impacted by high intensity rainfall, Mutare and Mutasa districts are hard-hit. Despite this indication of wide impacts, it is not readily feasible to attach costs to the damage to natural forests.

It has been difficult to estimate the damage to the protected areas across the region, and the damage may be difficult to quantify, especially in comparison to hard infrastructure such as roads. Given the numerous state forests and precious natural resources within the affected regions, it is expected that there has have been widespread damage to natural resources. Table 3.47 shows the area of protected areas across the 13 districts affected by varying levels of rainfall intensity. Image 3.4 shows an estimation of the impact of heavy rainfall on the protected areas, using the same criteria as before. Again, it is clear that protected areas in Chimanimani and Chipinge Rural districts are hard-hit, along with Mutasa district.

Beyond the forestry and protected areas, there were reports of impacts on the land management systems, with slope damage and the formation of gullies. In Manicaland, it was reported that the "the affected areas lie in an ecologically sensitive ecosystem which is characterized by rugged terrain, steep slopes, and deep unstable weathered soils whilst in the other affected provinces the loose soils, deforestation and high incidence of drought worsened the impact of the cyclone on communities". An initial broad estimate of US$ 4.5 million has

Table 3.47: Areas of Protected Areas Affected by Low, Medium and High Intensity Rainfall by District, Measured in Hectares

	Rainfall intensity and affected area (ha)		
District	Low	Medium	High
Bikita	94,282	69,946	0
Buhera	0	0	0
Chikomba	49,676	1,678	0
Chimanimani	0	2,248	56,468
Chipinge Rural	10,025	35,373	22,636
Chipinge Urban	0	0	0
Gutu	62,669	0	0
Masvingo	28,209	5,428	0
Masvingo Urban	0	0	0
Mutare	0	0	1,752
Mutare Urban	0	0	0
Mutasa	0	0	23,764
Zaka	4,962	1,981	0
Total	**249,823**	**116,654**	**104,620**

been stated by the Government of Zimbabwe (Republic of Zimbabwe, 2019).

The Environmental Management Services Department (2019) reported cases of landslides and erosion, especially along watercourses, and the creation of new channels and gullies. These landslides have been associated with waste management issues, in for example, Ngangu Township.

It has not been possible to estimate the overall change in the vegetation cover and land cover, although further remote sensing analysis may provide usual information in this regard. Information on soil losses from remote sensing may also become available, which would provide information on this valuable loss of assets.

Recovery and Resilience Needs

Across the region, the following needs have been identified in the Environmental sector.

- Environmental reconstruction and rehabilitation activities are needed for damaged areas where excessive erosion has occurred.
- Reorganizing and re-establishing dump-sites
- Silt traps and weirs have to be constructed in communal areas.
- Reconstruction of gabions to reinforce fragile soils
- River training is needed within the urban set up to protect the remaining houses which are standing on water courses, along with the diversion of streams and the construction of river buffer zones as protections.
- Replanting of affected wood lots.
- Rehabilitation of roads in tree / forest plantations and other infrastructure

Summary Table of Cost Estimates and Gaps – Recovery and Resilience Needs for Sector

The following table provides an estimate of the costs needed for recovery in the short and medium term in the sector. These costs are provisional and are primarily aimed at building back to the existing state. Building back better may require greater investments. However, building back better in the environmental sector is likely to have large benefits. Environmental and Natural resources are able to provide disaster risk mitigation through the provision of "Nature-Based Solutions". The World Bank has recently published on the benefits of integrating green and grey infrastructure to support the

Table 3.48: Areas Receiving Rainfall Greater than Fixed Thresholds, by District

	Area (ha) of land receiving rainfall in excess of set thresholds (mm)	
District	50mm	100mm
Chimanimani	229,792	102,510
Chipinge	251,429	59,700
Chipinge Urban	2,858	1,580
Mutare	111,920	7,831
Mutare Urban	4,597	0
Mutasa	229,321	127,130
Total	**829,918**	**298,752**

Sustainable Development Goals (Browder et al, 2019). Greater investment in this area is expected to have significant cross-sectoral impacts.

Three broad needs are identified from the table above:

- The restoration of commercial forest restoration and replanting
- Land rehabilitation measures to counteract soil and vegetation.
- The rehabilitation of gullies that have developed during the cyclone, using earthworks and construction measures.

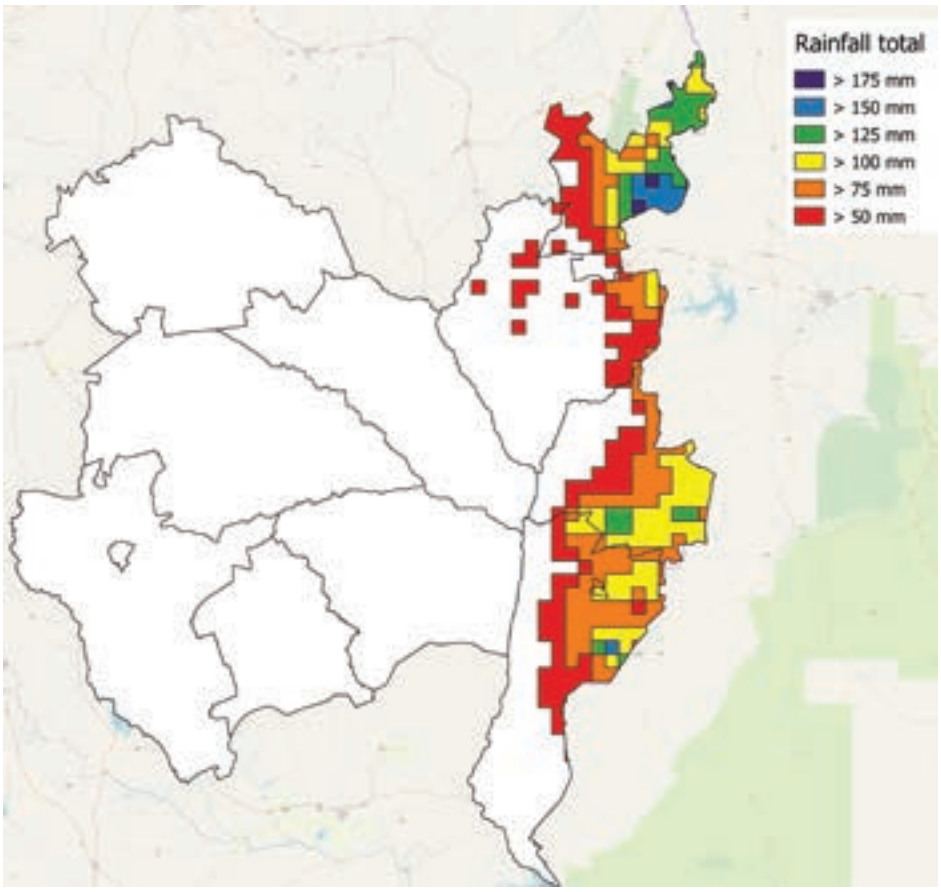
For the needs associated with the forestry sector, the estimates are based on estimates by the Allied Timber Limited.

For the costs associated with landscape rehabilitation, estimates will be undertaken based on the analysis of heavy rainfall as follows, combined with estimates for analog studies. First, the incidence of heavy rainfall over the catchment is used as a proxy for the damage to the catchments. It is estimated that 829,900 hectares received rainfall in excess of 50mm, and nearly 300,000 hectares received rainfall in excess of 100mm (table 3.48). Map 3.7 shows the areas to which these rainfall totals correspond.

This analysis results in a split between the districts that can be used for extrapolation.

The Water for Growth Program in Rwanda has developed catchment management plans for four major catchments in the country. They have developed a program of activities which includes afforestation, gully protection, and landscape improvement. They estimated

Map 3.7: Areas Receiving Rainfall Greater than Set Thresholds



Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Table 3.49: Ratio of Impacts Across Four Districts Based on Rainfall Intensity

Districts	Percentage (%)
Chimanimani	34.3
Chipinge	20.5
Mutare	2.6
Mutasa	42.6

Table 3.50: Typical Costs Per Investment

Activity or measure	Unit	Unit cost (US$)
Agroforestry + cut off drains	Hectare	330
Terraces – medium slope	Hectare	696.3
Terraces – steep slope with agroforestry	Hectare	2750
Re-Afforestation	Hectare	825
Buffer zone/river banks protection	Hectare	230.56
Gisunyu Gully Rehabilitation	Number	110,000

Source: Water for Growth Rwanda (2018b).

rehabilitation costs for catchments that range from US$1,138 to US$,1414 per hectare. These costs are derived from a combination of measures that derive that are presented for the Sebeya Catchment (Water for Growth Rwanda, 2018b).

In this assessment, a mid-range value of **US$ 1,700** will be used as an approximate cost per hectare for rehabilitation. This figure is based on a conservative mid-range value which accounts for added costs in Zimbabwe.

Considering the Upper Nyaborango catchment in Rwanda, with a total area of 334,800 hectares, Water for Growth Rwanda (2018a) estimated the area of works for short-term interventions to be 11090 hectares (or 0.033 percent) and for long-term interventions as 144,358 hectares (or 43 percent). In the table above, a set of assumptions that short-term needs across the affected areas.

Table 3.51 uses a mid-range value of $1700 per hectare, and assumes both 50mm and 100mm as proxy values of heavy rainfall. It shows that the rehabilitation costs across the area could range from $ 15.0 million to $ 141.1 million.

It will be assumed that of the areas receiving 100mm of rainfall, 5 percent will need rehabilitation in the short to medium term. These values are highlighted in above table. These costs will be spread evenly between the transitional phase and medium term-recovery.

For the costs associated with the rehabilitation of gullies, a government cost estimate of US$ 4 million for Chimanimani and Chipinge districts will be applied based on the approach below. However, the costs are

Table 3.51: Range of Costs Associated with Rehabilitating Land, Based on Assumptions of the Percentage of Land That Requires Rehabilitating, and Areas Receiving Rainfall above Fixed Thresholds.

	Cost ($US) of rehabilitating fixed percentages (%) of districts that received more than set thresholds of rainfall (mm)					
	50mm			100mm		
District	**3%**	**5%**	**10%**	**3%**	**5%**	**10%**
Chimanimani	11,538,560	19,532,357	39,064,716	5,147,328	8,713,346	17,426,691
Chipinge	12,625,005	21,371,482	42,742,965	2,997,719	5,074,509	10,149,017
Chipinge Urban	143,532	242,969	485,938	79,332	134,293	268,587
Mutare	5,619,843	9,513,214	19,026,429	393,225	665,647	1,331,294
Mutare Urban	230,818	390,727	781,456	0	0	0
Mutasa	11,514,905	19,492,317	38,984,632	6,383,597	10,806,088	21,612,176
Total (US$)	**41,672,664**	**70,543,068**	**141,086,134**	**15,001,201**	**25,393,882**	**50,787,765**

Table 3.52: Estimated Short and Medium-Term Needs

Districts	Transitional Phase (1–2 years)	Medium-term Recovery Phase (2–3 years)	Total Needs (USD)
Replanting and restoration of forestry sites			
Chipinge (including Chipinge Urban)	Repair to infrastructure, including buildings, water supplies, bridges, culverts US$ 0.05 million	Longer-term replanting and monitoring of forest sites US$ 0. 26 million	US$ 0.31 million
Chimanimani	Repair to infrastructure, including buildings, water supplies, bridges, culverts US$2.28 million	Longer-term replanting and monitoring of forest sites US$ 2.03 million	US$ 4.31 million
Mutare	Reconstruction of buildings at Mutare Facility: US$ 0.12 million		US$ 0.12 million
Rehabilitation of gullies and river protection			
Chipinge (including Chipinge Urban)	Rehabilitation of gullies, and creating of buffer zones: US$ 1.26 million	Reconstruction of river infrastructure to include silt traps and weirs: US$ 1.26 million	US$ 2.52 million
Chimanimani	Rehabilitation of gullies, creation of buffer zones: US$ 0.88 million	Reconstruction of river infrastructure to include silt traps and weirs: US$ 0.60 million	US$ 1.48 million
Mutare	Rehabilitation of gullies, and creating of buffer zones: US$ 0.12 million	Reconstruction of river infrastructure to include silt traps and weirs: US$ 0.08 million	US$ 0.20 million
Mutasa	Rehabilitation of gullies, creation of buffer zones: US$ 1.88 million	Reconstruction of river infrastructure to include silt traps and weirs: US$ 1.24 million	US$3.02 million
Landscape rehabilitation measures			
Chipinge (including Chipinge Urban)	Earthworks to stabilise slopes, rehabilitation of vegetation (including agro-forestry US$4.35 million	Reconstruction of dump facilities, construction of gabion walls, improved drainage US$4.35 million	US$8.7 million
Chimanimani	Earthworks to stabilise slopes, rehabilitation of vegetation (including agro-forestry US$2.6 million	Reconstruction of dump facilities, construction of gabion walls, improved drainage US$2.6 million	US$5.1 million
Mutare	Earthworks to stabilise slopes, rehabilitation of vegetation (including agro-forestry $0.35 million	Reconstruction of dump facilities, construction of gabion walls, improved drainage US$ 0.35 million	US$0.7 million
Mutasa	Earthworks to stabilise slopes, rehabilitation of vegetation (including agro-forestry US$4 million	Reconstruction of dump facilities, construction of gabion walls, improved drainage US$5.4 million	US$ 10.8 million
Grand Total			**US$37.3 million**

shared between the short and medium term in the ratio of 60:40.

The overall estimated needs are presented in table 3.52.

Displacement

Background and Pre-disaster Context

Regional Context: Disaster and Climate Change-related Displacement in Southern Africa

The impacts of disasters and climate change on migration and displacement in Southern Africa are both substantial in scale and diverse in nature (The Nansen Initiative, 2015). Between 2008 and 2013, the International Displacement Monitoring Centre (IDMC) noted that an estimated 1.5 million people were displaced by sudden-onset disasters in Southern Africa (IDMC, 2014). Flooding associated with tropical cyclones, and severe drought have especially contributed to both internal and cross-border displacement (The Nansen Initiative, 2015). Further, as is the case across the world, drivers of displacement are multi-causal in Southern Africa, and are linked to other factors such as poverty, unemployment, political unrest, economic instability and/or conflict too.

The table below shows but a few examples of displacement in the context of disaster and climate events in Southern Africa over several years. Notably they all affect Zimbabwe and include both internal and cross-border displacement.

In general, however, comprehensive data collection and analysis on displacement and migration in the context of disasters in Southern Africa is lacking due to the diverse drivers of human mobility and the unsystematic data collection and sharing.

Internal and Cross-border Displacement and Migration within and from Zimbabwe

Throughout the last two decades, Zimbabwe has experienced significant cross-border and internal displacement arising from a set of inter-related and compounding factors, including sharp economic decline, resettlement policies, climate-related events such as flooding and drought, civil unrest and the secondary effects of land reform. Zimbabwe is an especially pertinent case study that exemplifies the complex interactions between environmental change, as well as political and economic drivers. For instance, droughts during the 1997–2010 crisis period were less severe than those in earlier decades but had extreme effects on food security because they happened in a context of the rapidly deepening vulnerability produced by the broader political contestation and economic contraction (Polzer, 2009).

Cyclone Idai comes in the wake of an already fragile political and economic context much like the 2000s. Zimbabwe's political and economic crisis since the 2000s—compounded in rural areas by drought impacts for example in 2001–02, 2000–08 and 2010—led to significant displacement and emigration. It has been estimated that

Table 3.53: Select Climate-Related Events/environmental Shocks in Southern Africa with Displacement Scale and Impact

Year	Event	Countries Affected	People Displaced	Internal or Cross-border
1992	Drought	Regional, notably Zimbabwe	Unknown	Internal/cross-border
February 2000	Cyclone Eline	Mozambique, Zimbabwe, Botswana, Namibia, South Africa, Zambia	1,250,000	Internal/cross-border
February 2001	Flooding (Zambezi River)	Botswana, Malawi, Mozambique, South Africa, Swaziland, Zimbabwe	500,000	Internal/cross-border
2001–2002	Drought	Zimbabwe, Malawi	223,000	Internal/cross-border

Source: The Nansen Initiative, 2015.

Table 3.54: Poverty and Gender Data for Affected Districts

District	Percentage of Poor Household	Percentage of Extreme Poverty	Percentage of Females	Percentage of Men
Manicaland Province				
Buhera	84.5	40.8	53.6	46.4
Chimanimani	70.8	25.9	52	48
Chipinge	82.2	44.2	53.8	46.2
Mutare Rural	79.2	34.3	52.8	47.2
Mutare Urban	31.5	3.2	52	48
Mutasa	72.6	25.9	52.9	47.1
Makoni Urban & Rural	75.2	21.2	51	49
Nyanga	74.4	31.0	52.2	47.8
Masvingo Province				
Bikita	80.1	28.2	54.5	45.5
Gutu	67.8	21.9	53.5	46.5
Zaka	71.8	22.3	54.6	45.4
Masvingo	69.6	13.9	54.1	45.9
Chiredzi Urban	20.6	0.0	52.8	47.2
Chriedzi Rural	67.2	28.7	51.8	48.1

Sources: Zimbabwe Census (2012), PICES Survey (2017).

25 percent (3 million out of a population of 10–12 million) emigrated between 2000 and 2011 (Polzer, 2009), of whom 1.5–2 million are resident in South Africa, with up to another 1 million making regular movements between the two states (Solidarity Peace Trust, 2010).

Table of Key Baseline Data for the Sector

It's important to note that the most affected districts by Cyclone Idai suffer from high rates of poverty as well as extreme poverty, notably Buhera (40.8 percent), Chipinge (44.2 percent), while Chimanimani, the district facing the most dire displacement challenges, already has 70.8 percent of its households categorized as poor. As such, IDPs are located among host communities that, before the Cyclone, were facing severe developmental challenges that have now been exacerbated. Women, who constitute the majority in all districts, are also more vulnerable to various forms of exploitation and marginalization as the recovery process develops.

Furthermore, Manicaland Province is the most popular destination for labor migrants in Zimbabwe, hosting 19.3 percent of all labor migrants (Zimstat, 2014). The bulk of labor migrants in Manicaland Province are largely absorbed in the "private household" (consisting of domestic workers and communal farmers) and other informal sectors of employment. Most migrant workers are from Mozambique and are therefore an important source of remittances for Mozambican residents. Given the devastation in Mozambique, the loss of income from migrant workers in Manicaland affects both the migrant workers themselves, but also their dependents in Mozambique.

Impact on the Sector

In the current context, Cyclone Idai has resulted in an estimated 270,000 people affected, with over 59,000 individuals internally displaced, residing among host communities, camps and collective centers. Furthermore, Zimbabwe hosts over 20,000 refugees and

Table 3.55: Number of Affected Populations Due to Cyclone Idai as Percentage of District Population and Number of Displaced Populations Per Affected Population (Manicaland)

Affected District	District Population	Affected Population (affected population per district population)	IDP Population (IDPs per affected population)
Chipinge	323, 938	119,060 (36%)	23,920 **(20%)**
Chimanimani	135, 936	**131,650 (96%)**	14,016 (11%)
Buhera	238, 843	32,520 (14%)	4,469 (14%)
Mutare Rural	262, 124	28,645 (11%)	4,293 (15%)
Nyanga	126, 599	755 (.6%)	6 (1%)
Mutasa	168, 747	1865 (1%)	5091 (273%)
Mutare Urban	187, 621	405 (.2%)	111 (27%)
Makoni Urban & Rural	272, 340	7865 (3%)	1229 (16%)[66]

Source: IOM DTM, 11 April and 1 May 2019, Zimbabwe Census Data 2012.

asylum-seekers mainly in Tongogara Refugee Camp (UNHCR, 2019). It serves as a major transit camp for asylum-seekers mostly coming from Somalia and Ethiopia; most use the camp and Nyamapanda reception center in Zimbabwe as important transit points, to obtain services, generate income and plan for the next stage of their journey, usually on to South Africa. Cyclone Idai has destroyed a number of homes in the refugee camp and the water and sanitary systems were severely affected leading to a shortage of clean drinking water (UNHCR, 2019). As a consequence, the impact of Idai on the infrastructure of the refugee camp has increased vulnerability of refugees and asylum-seekers residing there.

Manicaland

In Manicaland, the Displacement Tracking Matrix (DTM) covered 8 affected districts—Chimanimani, Chipinge, Mutare Rural, Buhera, Nyanga, Mutasa, Mutare Urban, Makoni Urban and Rural.[63] Approximately 65,562 IDPs (13,073 households) were reported across the 8 affected districts. The largest number of Cyclone-affected IDPs have been identified in Chipinge (23,920 IDPs); a district which already has 82.2 percent of its households categorized as poor. The high number of IDPs in Chipinge can be explained by the fact that the district has the highest population. However, Chimanimani is the district that is worst affected by the cyclone in terms of the proportion of the affected population to district population (See Table 3.55)[8] These affected districts are also host to vulnerable and poor communities. In Chimanimani, 25.9 percent of the population suffers from extreme poverty, while Buhera has 40.8 percent extreme poor, Chipinge 44.2 percent and Mutare 34.3 percent. Other displacement-affected contexts have shown that social tensions are more likely to arise where higher rates of poverty exist, often related to perceived injustice from the exclusive distribution of aid to IDPs where poor hosts reside (World Bank, 2017). Therefore, these poverty figures signal the importance of responses addressing the needs of both host communities and

[8] These findings are based on the IOM's, Displacement Tracking Matrix (DTM), one of the most reliable mechanisms for tracking displaced populations across various regions. The methodological approach used in Zimbabwe (and verified by the WB) was as follows: The approach used is two-fold: firstly, IOM identified and assessed at the district-level where IDPs are located; secondly, IOM conducted this process at the ward-level to determine numbers of IDPs and priority needs. In terms of Chipinge and Chimanimani, the high number of IDPs in Chipinge can be explained by the fact that the district has the highest population. However, Chimanimani is the district that is worst affected by the cyclone comparing its affected population against the displaced population due to the cyclone.

IDPs. Early signs of tensions between hosts and IDPs are evident (Ipsos, 2019)

Notably, among the IDPs identified in Nyanga, Mutasa, Mutare Urban, Makoni Urban and Rural[64] only 20 percent of the IDPs were displaced due to Cyclone Idai. Therefore, an estimated 80 percent of the IDPs were displaced prior to Cyclone Idai and for other reasons unrelated to natural disasters,[65] Illustrating the multiple factors that contribute to displacement in Zimbabwe. The largest number of IDPs displaced as a result of Cyclone Idai are located in Makoni district (706 IDPs), while 5,061 IDPs in Mutasa were displaced due to reasons unrelated to natural disasters.

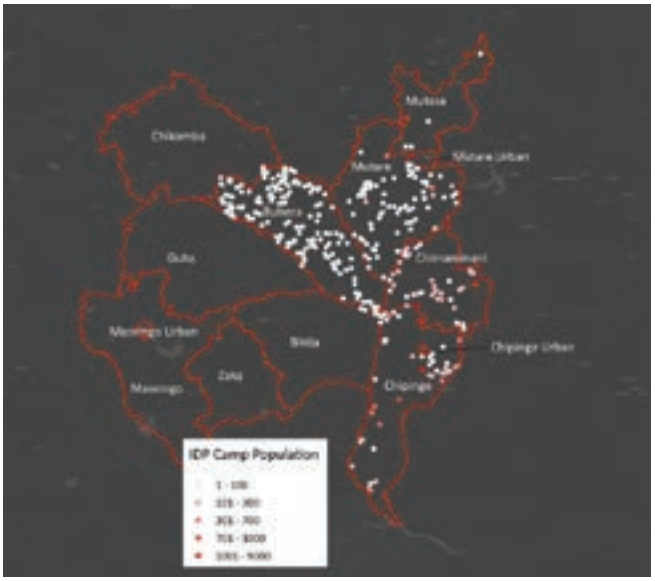
The majority of IDPs from Chipinge, are in Chimanimani (60 percent) while the majority (96 percent) across Chipinge, Buhera, Matare and Chimanimani are living among host communities. Four per cent of the remaining are living in camps and most camps among these districts are in Chimanimani. Most IDPs in both Buhera and Mutare are displaced within their districts of origin. All IDPs from Nyanga, Mutasa, Mutare and Makoni Urban and Rural are living among host communities.

Masvingo Province.

In Masvingo, DTM results show that there are approximately 9943 IDPs, across the 5 districts of Bikita, Gutu, Masivingo Rural, Zaka, Chiredzi Urban and Rural. The highest number of IDPs are located in Bikita (3,162). This higher number of IDPs is related to the fact that the district shares a border with Chipinge. Bikita has one of the highest rates of extreme poverty in the province, with 28.2 percent of the population living in extreme poverty.

The vast majority of IDPs (98 percent) are living among host communities while 2 percent are residing in camps. Most IDPs across all five districts have been displaced within their districts of origin.

Image 3.5: Geospatial Map of IDP Camp Populations



Source: Ipsos (2019) The above graph depicts the location and concentration of IDPs in affected areas.

Impact on Tongagora Refugee Camp

Zimbabwe is also host to refugees. The Tongagora refugee camp—which houses over 20,000 refugees and asylum-seekers (and are surrounded by approximately

Table 3.56: Number of Affected Populations Due to Cyclone Idai as Percentage of District Population and Number of Displaced Populations Per Affected Population (Masvingo)

Affected District	District Population	Affected Population (affected population per district population)	IDP Population (IDPs per affected population)
Bikita	196,330	**7,928 (4%)**	3,162 (40%)
Gutu	244,453	6,792 (3%)	2,770 (41%)
Masvingo Rural	211,768	2113 (0.1%)	**1165 (55%)**
Zaka	219,119	**9,370 (4%)**	2,762 (29%)
Chiredzi Urban and Rural	306207	7085 (2%)	84 (1%)

Source: IOM DTM, 22 April 2019 and Zimbabwe Census Data, 2012.

20,000 residents who live nearby) —have been affected by flooding. In Chipinge district, where Tongogara camp is located, over 2,000 refugee houses, mostly built with mud bricks, were completely or partially damaged, affecting some 5,300 people, while over 600 latrines have collapsed (UNHCR, 2019). Four out of five boreholes that supply the camp are out of commission due to power outages (OCHA, 2019). Only one solar powered borehole is supplying water to the camp. More than 600 latrines in the camp have been destroyed. A rapid assessment on the state of the refugee camp has been conducted by the UNHCR and has concluded that there is a danger of waterborne diseases as borehole water is feared to be contaminated by flood waters.

Recovery and Resilience Needs

Recovery Needs and Risks

The most pressing needs identified by the internally displaced themselves across all districts are food, shelter/housing and drinking water (IOM, 2019). Further, given damages to water and sanitation both in districts of origin and hosting districts, coupled with the recent rapid and significant number of population movements—water borne diseases and other diseases are more likely to spread. However, as the emergency stage passes, needs of IDPs and host communities will include access to social services, interim livelihoods, and in the long-term support for the voluntary return (which is highly contingent on their ability to restore their livelihoods in the district of origin). Further, challenges related to disputes over claims to land and housing will likely arise in the voluntary return process.

Key Protection, Social and Regional Risks

There are important protection and social risks that need to be considered as recovery is underway—these risks apply most especially to IDPs, particularly women and girls, people with disabilities and other vulnerable groups—but also to host communities.

SGBV and Health. Female IDPs face unique risks of GBV and sexual exploitation due to limited security in the IDP settlements and poor living conditions. Both displaced and host women face increased vulnerability to SGBV in current camps and collective centers. Further, poor lighting in the collective centers may expose women and children to the possibility of GBV. Loss of livelihoods and food rationing may create a risk of sexual exploitation and violence and may push affected persons to adopt harmful coping mechanisms to meet basic needs. Given the loss of livelihoods, idle populations in the camps and among host communities may lead to risky sexual unions that could further spread sexually transmitted infections (STIs).

Education. School closures due to their use as emergency shelter or because they are still damaged, will necessarily be disruptive to child education and alternative options will need to be explored in the interim. As of May 8, however, most schools in Chimanimani resumed operations after being closed due to damage, however there is still a lot of rehabilitation work needed at schools including in the construction of toilets (Ipsos, 2019).

Legal Documents. Loss or destruction of legal documents is an important risk and an especially detrimental for existing refugees and asylum-seekers. Loss of documents increases affected populations' vulnerability to exploitation, but also hinders their access to emergency services.

Community Cohesion. The presence of IDPs, particularly in overcrowded collection centres, places intense pressure on the infrastructure and services of the host communities in which they settle. As indicated in the pre-cyclone data, these host communities were already facing high poverty rates. As the effects of the cyclone persist, and if recovery takes longer than initially perceived—this could cause an increase in grievances among affected populations. At the same time, IDPs may receive a greater level of humanitarian assistance, causing disparities to occur with the host communities, also fuelling resentment. This is an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especially important risk in districts higher levels of extreme poverty.

Cross-border Displacement and Regional Risks. In many post-disaster contexts, onward movement beyond the national border in which a disaster has occurred often takes place in a staggered or phased manner (World Bank, 2016). Although not always the case, internal displacement is often the first step before cross-border displacement. In other words, IDPs and others will likely try to move beyond international borders to address their vulnerability if their situation doesn't improve. They are more likely to engage in cross-border movements as a coping mechanism in instances where they are 1) concerned by slow recovery, 2) perceive an inability to restore their livelihoods to at least pre-Cyclone levels in origin districts, and/or 3) where they have community linkages with populations in neighboring countries—all of these factors are present with regard to IDPs affected by Cyclone Idai. Although early social media analysis shows no strong indication of likely onward movement by IDPs, countries in the region should nevertheless be prepared for potential cross-border movements and future disaster-related movements. The sub-region shows a long history of recurrent natural disasters and as such preparedness for future occurrences is imperative. Notably in terms of the impact of cross-border displacement/migration, South Africa and Botswana are major destination countries hosting the most significant number of Zimbabwean asylum-seekers and migrants. South Africa currently hosts 48.1 percent of all Zimbabweans outside of the country (World Bank, 2018), however, South Africa's current immigration policy framework does not consider human mobility aspects of social unrest or humanitarian catastrophes in neighboring countries and does not have a designated institution or structure responsible for coordinating a response in case of quick onset mass migrant influx situations.

Recovery Strategy

Overall, in the affected districts, a strategy that focusses on emergency needs and medium-term drought recovery programming should necessarily overlap with longer-term development needs and priority interventions to address persistent development deficits affecting the most vulnerable populations. This includes those already affected by internal displacement, the vulnerable members of communities hosting them, as well as Cyclone Idai-related IDPs. For IDPs, efforts should focus on addressing basic needs (food, water and sanitation, and continued emergency shelter); access to social services (education and health), and support for early recovery, including psycho-social support. These efforts will likely need to be more substantial in districts like Chimanimani and Chipinge where the number and concentration of IDPs is high in addition to existing challenges to poor host community households. Attention should also be directed at addressing particular vulnerabilities, including reunification/protection of unaccompanied children, attention to the elderly, widows, people with disabilities and SGBV survivors. Specific targeting should be focused not only on the displaced but also host communities in terms of access to services, strains on infrastructure, as well as ensuring access to interim livelihoods and mechanisms to address social tensions, particularly between host and IDP communities.

Given the scale and concentration of IDPs as well as the existing poverty levels, the following districts are recommended for prioritization of assistance for the

Table 3.57: Cost Estimates and Gaps – Recovery and Resilience Needs for the Sector

Districts	Transitional Phase (1–2 years)	Total Needs (USD)
Support to broaden access to basic needs and social services to IDPs and host communities		
Chipinge	551,000	
Chimanimani	331,000	
Buhera	100,000	
Mutare	100,000	
Initiatives to support the prevention, monitoring and reporting of SGBV		
Chipinge	292,880	
Chimanimani	400,080	
Buhera	92,160	
Mutare	75,440	
Initiatives to support vulnerable groups including, separated/unaccompanied IDP children, the elderly, widows and people with disabilities		
Chipinge	1,539,150	
Chimanimani	2,339,150	
Buhera	551,150	
Mutare	2,839,150	
Development of short-term employment opportunities through community infrastructure rehabilitation, unconditional cash transfers, cash for work schemes, and other relevant activities		
Chipinge	2,300,000	
Chimanimani	1,680,000	
Buhera	964,000	
Mutare	1,414,000	
Initiatives to facilitate and support voluntary return (including mechanisms to resolve disputes over land and housing)		
Chipinge	1,199,820	
Chimanimani	1,781,420	
Buhera	447,380	
Mutare	370,050	
Initiatives to manage, monitor and report on social tensions in affected areas		
Chipinge	69,950	
Chimanimani	49,950	
Buhera	28,950	
Mutare	28,950	
Assessments and studies to monitor and ensure preparedness for cross-border movements		
All affected districts	**US$54,800**	US$
Grand Total		**US$19,600,430**

Food Security Damage Assessment

Damage to food security and livelihoods	No. of households	No. of people
Severely affected households – households that have lost almost everything including homesteads, potential harvests, food stocks, livestock, savings, production assets, and other essential household necessities and are expected to face significant challenges in recovering their livelihoods (numbers are from Chimanimani and Chipinge Districts only)	17,817 households	78,724 people
Moderately affected households – partially lost their homesteads and crop fields, and other essential household structures, such as homesteads, toilets, etc. (numbers are from Chimanimani and Chipinge Districts only)	22,607 households	113,040 people

Source: WFP 2019 Needs Verification Assessment Report.

transitional and recover phases—Chipinge, Chimanimani, Buhera and Mutare.

Social protection Sector Assessment

Cyclone IDAI has compounded the effects of an already severe poverty and food insecurity situation. The Rapid Impact Needs Assessment (RINA) estimate for recovery needs in the social protection sector is around USD $60 million. A total of 250,000 people (around 50,000 households) require assistance. The cyclone-affected areas were a combination of Region I (very productive, with abundant rain), and Region V (dry) regions. Region V was already dealing with a drought when the cyclone happened, and many of the crops and livestock that had survived the drought, succumbed to the cyclone (UNDP 2019).

Food insecurity has been exacerbated due to damage to fields and crops. 49,717 farming households in the affected districts lost their food, livelihoods and source of income. According to the Agricultural Extension (Agritex) department, highest crop losses were in maize (72.4%), followed by bananas (52.3%) and yams (24.5%). These crops are the community's main agricultural products with maize and yams forming staple crops while bananas are grown for the market (WFP 2019). The devastation of land and crops in affected has dire consequences for livelihoods, income-generation, business, and the socio-economic well-being of families. Households also lost their foodstuffs to the cyclone as these were washed away or damaged in homes.

People are resorting to negative coping mechanisms. UNDP's rapid socio-economic assessment findings shows an overall decline in the levels of consumption of the regular dietary components in the aftermath of the cyclone with all surveyed components falling by at least 30% (approximately). For instance, consumption of the main food component, maize, fell from over 97.9% to approximately 69%; and consumption of vegetables, at 91.5% before the cyclone, has now fallen to 41.5%. Meanwhile, the fish diet was the most affected, falling 81% from a high of 57.4% to a low of 10.6%. The table below also shows the prevalence of other negative coping strategies that people have resorted to since the cyclone, as per WFP's recent needs verification assessment.

Community livelihood sources were destroyed. Cyclone Idai damaged and destroyed irrigation systems,

Table 3.58: Prevalence of Consumption Coping Strategies among Affected Population of 250,000

Coping strategy	Prevalence
Reduction of number of meals eaten per day	100%
Reduction of portion sizes consumed	90%
Sharing of food among households	62%
Consumption of immature crops	48%
Some household members eating less than others	38%
Increased consumption of indigenous foods	29%

Source: WFP 2019 Needs Verification Assessment Report.

and canals, and also washed away pipes and weir dams. Income sources from activities such as Cross border petty trading in agro produce; informal trading in goods sourced from Mozambique; small businesses such as weaving, fishing; and casual labor from local estates were also affected.

Food markets are, however, functional. The multi-agency market assessment in all affected Districts conducted in May 2019 suggest that markets are functioning in the majority of wards. A main concern was the limited stocks carried by local retailers due to low demand as people did not have money to buy. 59% of traders highlighted low demand as the major constraint they faced. The infusion of additional cash would therefore help restore market functionality and also gives people flexibility in use.

Apart from food insecurity, Idai has also had a psychological impact on the affected households. Many families lost their family members with many children losing the caregivers and being separated from their parents. Assisted devices for people with disabilities have been washed away and cyclone-affected injuries have led to increased disability. National identity documents, including birth certificates, that provide access to social safety nets, education or other social services, have been washed away. Unaccompanied children will require family tracing and reunification or alternative care placement support. Children and young women are at increased risk of GBV, as a consequence of both negative coping mechanisms adopted by cyclone affected women and girls and the limited availability of gender-sensitive basic services. Exposure to transactional sex continues to be a real risk of women and girls in cyclone-affected areas. These vulnerabilities require a well-coordinated welfare and protection service delivery package.

Disaster Risk Management (DRM)

Pre-Cyclone Context and Baseline for the Sector

DRR Profile and Background

Zimbabwe is among countries in Southern Africa that experiences multiple natural hazards such as cyclones, droughts and heavy rain. Hydro-meteorological disasters have had devastating impacts on the poor and poverty stricken communities. Recurring floods and droughts have had significant economic implications, as about 80 percent of the population depends on rain-fed agriculture. In 2016 the El Nino induced drought affected over four million people, was followed by flooding in 2017[9]. In March the country was experiencing erratic rains and a deteriorating economic situation with an already fragile humanitarian situation and this was further compounded by the impact of Cyclone Idai.

DRM Legal, Policy and Institutional Arrangements

Disaster risk management activities in Zimbabwe are predominantly focused on response. The legislation approved during the last two decades sets forth the current legal basis for organizing, coordinating, and planning the response to natural disasters and emergencies occurring in Zimbabwe. The institutional framework for national DRM in Zimbabwe is guided by the Civil Protection Act of 1989. The Act defines mandates of Department of Civil Protection (DCP) in the Ministry

[9] Zimbabwe, https://www.gfdrr.org/en/zimbabwe.

Children in need of Psychosocial Support	90,000
People in need of duplicate civil registration	100,000
Number of separated and unaccompanied children	1,500
Number of moderately malnourished children	8,947
Number of severely malnourished children	4,120

of Local Government, Public Works and National Housing to coordinate disaster response in the country. However, DCP has a lean staff structure and inferior convening power with respect to other ministries making it difficult for the department to effectively coordinate disaster response.

DRM for hydrometeorological hazards such as flood and drought is also described by Zimbabwe National Water Authority Act and Meteorology Services Act, which define roles of Zimbabwe National Water Authority (ZINWA) and Meteorological Service Department (MSD) respectively.

However, for flood risk management, institutional capacity of ZINWA and MSD is not enough in terms of financial/human resources, technical expertise, facilities, and services.

Civil Protection Act of 1989; The Act establishes the Department of Civil Protection (DCP) in the Ministry of Local Government, Public Works and National Housing and the National Civil Protection Fund to finance activities in the event of a disaster. The Act provides only for civil protection and emergency management and since 2012 the GoZ has been working on a bill to supersede the Act and close gaps in disaster risk reduction, preparedness and risk financing. The draft **Disaster Risk Management Bill** although it has not been enacted in Parliament, however still seems short in addressing all aspects of DRM.

Department of Civil Protection (DCP); The DCP in the Ministry of Local Government, Public Works and National Housing is mandated to coordinate disaster risk management in the country through the Civil Protection Act of 1989. Despite its important mandate, DCP has a lean staff structure and inferior convening power with respect to other ministries making it difficult for the department to effectively coordinate DRM activities in the country. The DCP does not have an emergency operations center that can be activated in the event of a disaster. The department and its substructures have been affected by staff turnover and the government policy of not replacing departing staff, so they have insufficient resources to respond effectively to national disasters. The DCP has decentralized structures at the provincial, district, ward and village levels. At Provincial and District level, Provincial/ District Administrators have explicit DRM roles and coordinate disaster risk management activities at provincial level.

Currently, disaster response is divided among two coordination structures anchored in two different institutions:

1. **The National Civil Protection Committee**, mainly responsible for flood response and providing policy direction on the implementation of disaster risk management activities. This is a multi-stakeholder committee which comprises representatives from all line ministries, NGOs, and International Organizations including Director of DCP; Secretary for Health; Commissioner of Police; Commanders of the various branches of the Defense Forces; Secretary-General of the Zimbabwe Red Cross Society; Director of Prisons; Director of Civil Aviation; and a representative of fire brigades established by local authorities. The DCP plays a secretariat role to the National Civil Protection Committee.
2. **The National Food and Nutrition Council (NFNC)**, under the coordination of the Office of the President and Cabinet (OPC), oversees drought management and response. The NFNC works closely with the meteorological service department, which provides early warning information, and the ministry of agriculture, which is the implementing arm of drought management and response activities.

Zimbabwe National Water Authority Act; Zimbabwe National Water Authority Act provides for the functions of Zimbabwe National Water Authority (ZINWA). ZINWA is responsible for flood risk management, hydrological services and flood risk related infrastructure. In terms of flood risk related infrastructure ZINWA is only limited to mitigation and safety for features such as dams, while they have not implemented

any construction of dykes. The Hydrological Services Department (HSD) under ZINWA is responsible for early warning of floods, updates of hydrological information and informs the department of civil protection when there are flood risks levels observed. Monitoring is done for river and dam water levels. The department of hydrological services has an estimated $600k budget per year, 20 staff at the ZINWA headquarters and in excess of 150 staff at the catchments level.

There are 7500 reported dams across the country registered with ZINWA. It is estimated that the country has 10.5 billion m_3 of water in dam capacity. Dam level monitoring stations are estimated at 149 across the country. In the Save catchment, 18 dam level monitoring stations provides weekly updates. It is estimated that there are 327 river monitoring stations across the country monitoring river flows. Of the total river monitoring stations, 37 stations are installed with real time information systems which provide daily updates. In the affected Save catchment, it is estimated that there are 63 monitoring stations and only 4 stations have real time information systems installed along the Pungwe River.

Meteorology Services Act of 2003; The Meteorological Services Act provides for the functions of the Meteorological Services Department (MSD) and set up the meteorological services fund. The MSD fulfills its functions of forecasting and supporting the management of weather-based disasters, whilst the fund is set up only to finance the services of the department and does not serve as a contingency fund for emergencies. The MSD also produces medium-term forecasts to develop weather advisories for agriculture, disaster risk management, and water resources. The effectiveness of Zimbabwe's Meteorological Services Department and its satellite offices at the district level for early warning is largely constrained by inadequate funding, the failure to upgrade and manage equipment (especially at local stations), and staff turnover[10].

The Zimbabwe Red Cross Society (ZRCS); It was established by an act of Parliament, the Zimbabwe Red Cross Act Chapter 30, in 1981. In 1983, it was


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recognized by the International Committee of the Red Cross and became a member of the International Federation of Red Cross and Red Crescent Societies. ZRCS is a permanent member of civil protection committees, and it operates in all the provinces with 120 branches, many at ward level. However, the lack of a clear and comprehensive DRM policy and related Government DRM structure reduces the effectiveness of ZRCS.

National Climate Change Response Strategy;
Although the country doesn't have a DRM Policy, to advance DRM agenda, the government has taken steps to strengthen DRM through adopting the National Climate Change Response Strategy in 2014. This provides a framework that informs climate and DRM policies. In 2012 a draft National DRM Strategy aligned to the Hyogo Framework for Action was produced with three main objectives; a) enhance disaster prevention and mitigation capacity in Zimbabwe; b) strengthen national preparedness and response capacity for disaster risk

[10] Zimbabwe: Agriculture Sector Disaster Risk Assessment World Bank Group- MARCH 2019.

Legislation for Disaster Risk Management[a]

Legislation	Key Provisions
Civil Protection Act 10.06 (1989)	Legislates for the coordination of preparedness planning for emergencies and disasters and operation of civil protection services in times of disaster.
The **Draft** Disaster Risk Management (DRM) Bill (2011) (Yet to be enacted)	This bill, if approved, will update and supersede the Civil Protection Act. It provides more elaborate mechanisms for disaster risk reduction. However the draft bill should be further reviewed for adequacy and effectiveness.
Meteorological Services Act (1990)	This act establishes MSD functions include collecting and disseminating meteorological data, issuing weather and climate forecasts and advance warnings on weather conditions, and carrying out meteorological research and investigations.
Zimbabwe National Water Authority Act (ZIMWA)	This act establishes ZIMWA functions which include hydrology, hydrogeology, and measures to minimize droughts and floods impacts, in addition to water resources management.
Grain Marketing Act (1966)	This act provides guidelines to ensure that the GoZ has reserves of grain to be used during emergencies.
Policy and Strategies Related to Disaster Risk Management	
National Climate Policy (2016)	The policy seeks to reduce vulnerability to climate change and variability and strengthen adaptive capacity in key economic sectors such as health, water, agriculture, forestry, and biodiversity.
National Climate Change Response Strategy (NCCRS) (2015)	The NCCRS has specific provisions for dealing with climate change issues, understanding the extent of the threat, and putting in place specific actions to manage potential impacts.
Zimbabwe National Contingency Plan	Prioritizes the key hazards and informs the disaster preparedness processes of the government.
Disaster Risk Management Strategic Plan 2016–2020	Looks at the institutional capacity of the National Civil Protection Committee to mitigate, prepare for, respond to, and help the country recover from disasters.
National Policy and Programme for Drought Mitigation	This policy recognizes the effects of drought on rural communities and encourages strategies that aid communities in adapting to climate change.

[a] Zimbabwe: *Agriculture Sector Disaster Risk Assessment World Bank Group- MARCH 2019.*

management; c) enable affected communities to recover from disasters with strong linkages to sustainable development.

Institutional Framework for Disaster Risk Management

Functions of Federal government in DRM are shared among several Ministries. The Ministry of Local Government, Public Works and National Housing is taking coordination role through the Department of Civil Protection. The Ministry of Lands, Agriculture, Water, Climate and Rural Settlements is responsible for flood risk management and hydrological and meteorological services including flood forecasting and early warning through the Zimbabwe National Water Authority (ZINWA) and Meteorological Services Department (MSD).

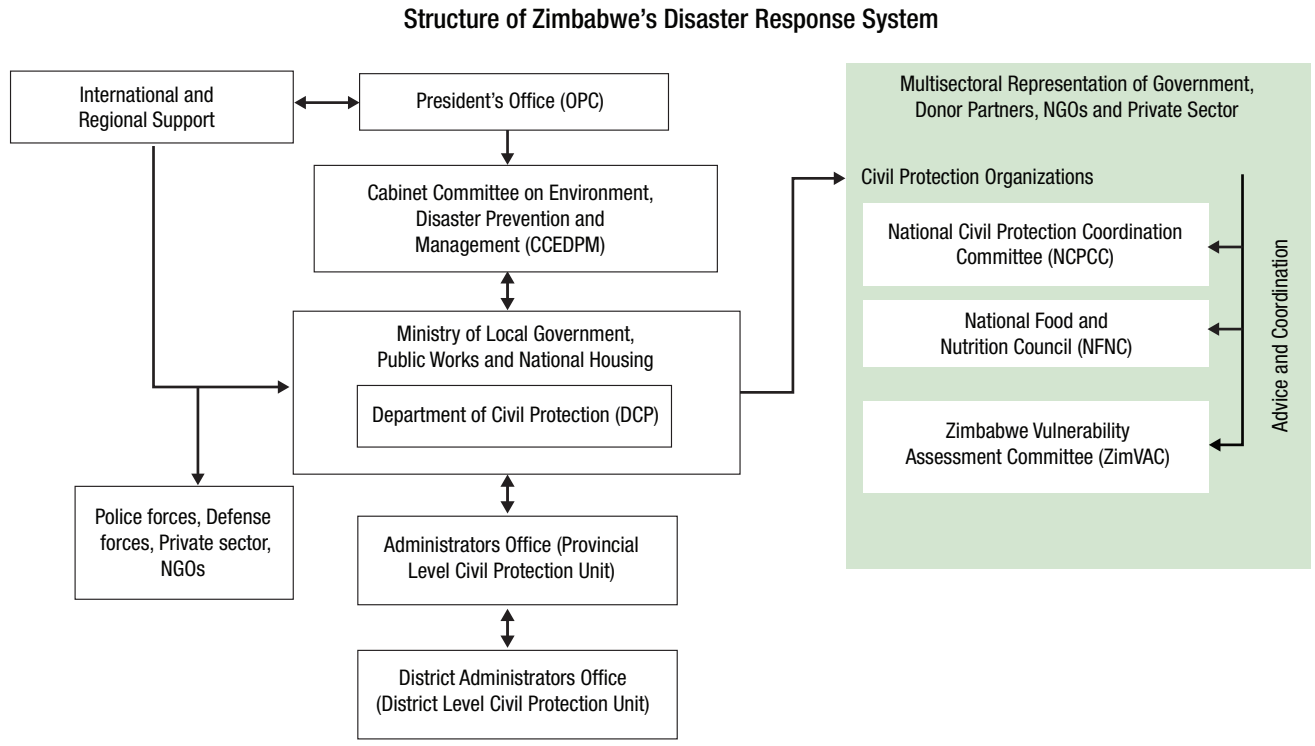
Status of DRM Financing

The national budget does not allocate direct support to DRM, however the Department of Civil Protection like other departments under the Ministry of Local Government, Public Works and National Housing gets its funding from Treasury. Additionally budgets in specific ministries allocations indirectly support DRM. During disasters such as the Cyclone Idai, donor communities both local and international complement government response initiatives. In terms of risk financing, the Government through Ministry of Finance and Economic development has been pursuing Africa Risk Capacity drought risk financing mechanism. However, the Government has not yet paid the premium due to the recurrent macro-economic challenges.

To finance disaster response, the government uses mostly ex-post financing options through budget

Ministry	DRM Related functions
Ministry of Local Government, Public Works and National Housing	Coordinate civil protection, response and early recovery; Formulation of DRM policies and strategies through the DCP;
Ministry of Lands, Agriculture, Water, Climate and Rural Settlements	Flood risk management and hydrological services including flood forecasting through Zimbabwe National Water Authority (ZINWA); Weather Forecasting and early warning through Meteorological Services Department (MSD); Spatial land planning; Climate change adaptation and mitigation
Ministry of Environment, Tourism & Hospitality Industry	Land degradation management, Forestry management,
Ministry of Health and Child Care	Coordinate emergency medical response; disease control and surveillance; monitor disease trends, quality of care and population health status
Ministry of Finance and Economic Development	Financing the DCP through budget allocation and contingency funds; Mobilize domestic and international financial resources for humanitarian and recovery.
Ministry of Information, Communication Technology and Cyber Security	Communication of early warning information through mobile and internet technology
Ministry of Labor and Social Welfare	To reduce poverty and enhance self-reliance through the provision of social protection services to vulnerable and disadvantaged groups in Zimbabwe, for example distribution of food relief, cash for work, cash transfer schemes.
Ministry of Media, Information and Broadcasting Services	Communication of early warning information through media; Coordinate the communication during emergency
Ministry of Defense and War Veterans Affairs	Provide search and rescue operations during emergency; Assist with logistics or transportation of relief aid to affected areas.
Ministry of Home Affairs and Culture	Manage internal security, law and order during disaster; vet refugees

Figure 3.8: Structure of Zimbabwe's Disaster Response System



reallocation and debt rescheduling arrangements and ex-ante financing through budget reserves and contingency funds. To channel resources to the affected population, the DCP requests funds from the Ministry of Finance and Economic Development (MoFED) contingency fund. The Ministry of Finance mentioned that a reserve of USD 35 million is available annually in the Treasury for extra-ordinary budget requests, including for disaster response[11]. When a disaster occurs at urban authority level, the urban council is responsible for disaster response. Local authorities' budgets are separate from central Government budget as they are composed of local revenue. When the magnitude exceeds the urban council's capacities, the urban council submits requests for assistance through the DCP.

The DCP's operational budget is very low and not sufficient to meet DRM obligations. The National Civil Protection Fund is an important instrument for disaster risk response financing, given the limited budget allocated to DCP. However it is generally considered insufficient. The absence of reserved funds at the provincial and district level places a lot of pressure on the Civil Protection Fund and is a huge setback to efforts to reduce disaster risks. Budget allocations may take long before being disbursed which limits the DCP's ability to respond to a disaster in a timely and adequate manner.

In addition to government financing, donors and development partners provide development assistance aimed at DRM activities. Humanitarian aid organizations, Zimbabwe's development partners, and NGOs can access funding for life-saving activities from pooled funds that can disburse resources quickly but have limited resources. However the Official Development Assistance to Zimbabwe has considerably depreciated over the years[12]. As far as disaster risk insurance is concerned, Zimbabwe signed an agreement with the African Risk Capacity (ARC), which is a specialized agency of the African Union that helps member states improve their capacities to plan, prepare and respond to extreme weather events and natural disasters. Another resource that has been used in Zimbabwe is the Central Emergency Response Fund (CERF) under the UN.

Flood Risk Management

Through ZINWA Act 5(c)(iii) is mandated to take appropriate measures to minimize the impacts of droughts, floods or other hazards. ZINWA is currently responsible for the hydrological monitoring (river and dam), forecasts, and issuance of flood bulletins (daily during the rainy season and weekly in the dry season).

Flood monitoring activities are conducted by ZINWA as below;

- Monitoring the flood hazard and update the Department of Civil Protection
- Monitoring of river flow and dam levels
- Dam safety monitoring
- Production and dissemination of flood bulletins nationally and internationally(daily during the rain season and weekly in the dry season).

The hydrological network for runoff data collection consists of 342 stations which are currently operational. The network used to have over 700 stations. Most of the stations were closed due to vandalism, washed away /damaged by floods, submerged by dams, siltation etc. Most of the stations collect river levels through automatic recorders. Also, 149 Major Dams are monitored bi-weekly and a State of Major Dams Report is produced. Dam level records are kept by ZINWA. Although a number of stations are operational, there are limited number of real time observation stations which are essential for flood forecasting and early warning.

The automatic river stations are not suitable for Flood monitoring purposes. Real or near real time stations are key to this function. Through World Hydrological Cycle Observing System (WHYCOS) project by WMO, a total of 13 stations (5 Phase I and 8 for Phase II) have been earmarked in the country under the SADC Project. All the stations under Phase I (B62,C57,B37,D75&E43) were installed but none is currently working mainly due

[11] Ministry of Finance and Economic Development.

[12] ODA and Poverty All Reources: http://www.devinit.org/wp-content/uploads/2014/02/Zimbabwe.pdf.

Map 3.8: Hydrological Stations Currently Operational in Zimbabw

Hydrological Stations Currently Operational in Zimbabwe

Catchment	Number of stations
Gwayi	29
Manyame	21
Mazowe	51
Mzingwane	55
Runde	74
Sanyati	49
Save	63
Total	**342**

Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

to vandalism. For Phase II only 4 stations (C68,C59,B59 &E74) were installed. All the stations are working. Phase III focused on Integrating 5 stations in the Zambezi Basin into Disaster Risk reduction. These are C68, C59, D75, A38 &C61. World Vision Echo Project focusing on installing 4 real time stations in Mbire& Muzarabani Districts. Other 3 real time stations installed in the Pungwe Basin.

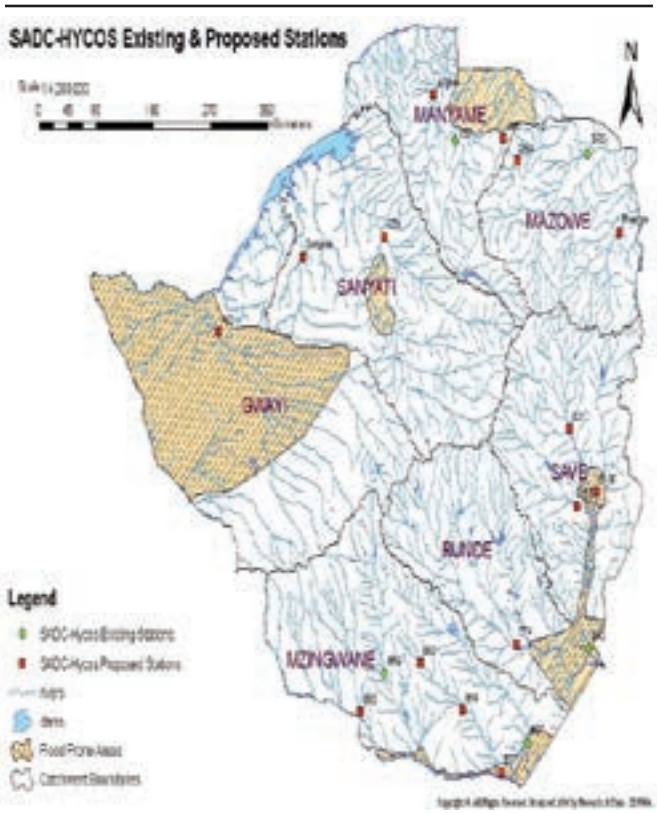
Flood monitoring and prediction using Earth Observation (EO) data and information was installed in SADC Member states including Zimbabwe through the Monitoring of the Environment and Security in Africa (MESA). Current products include rainfall and intensity-spatially, estimated discharge, and flood risk maps.

However, most of the products still require validation by ground observation data such as river discharge to enhance accuracy.

Flood Forecasting

The main objective of forecasting is to predict accurately the exceedence of critical flows/flood heights or thresholds in order to issue warnings to the public to take the necessary evasive action. Currently no flood forecasting model of repute is available.

Map 3.9: SADC-HYCOS Existing and Proposed Stations



Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

Map 3.10: Dams in Zimbabwe

Funk, C.C., Peterson, P.J., Landsfeld, M.F., Pedreros, D.H., Verdin, J.P., Rowland, J.D., Romero, B.E., Husak, G.J., Michaelsen, J.C., and Verdin, A.P., 2014, A quasi-global precipitation time series for drought monitoring: U.S. Geological Survey Data Series 832, 4 p. http://pubs.usgs.gov/ds/832/.

However there is a conceptual HBV(Hydrologiska Byråns Vattenbalansavdelning) hydrological rainfall-runoff model capable of making short-term forecasts which was used with relative success in the Manyame dam river system during the Cyclone Eline of 2000.

Challenges

Data scarcity is major challenge in coming up with a forecast especially in ungauged areas or zones. There are very few Real Time Stations. There is no flood forecasting model.

Earth Observation for Flood Forecasting,

Monitoring of the Environment and Security in Africa (MESA) is a follow-up initiative to the African Monitoring of the Environment for Sustainable Development (AMESD) programme. The initiative is focused on using Earth Observation (EO) data and information products for environment and sustainable development.

The objective of the Flood Service through MESA is to provide tools and products to assist flood monitoring and disaster management in SADC Member states through three main components, namely;

1. Predictions of floods
2. Detection/Monitoring of floods
3. Flood damage assessment.

The MESA station was installed in November 2016 and it comprised of three desktop computers, a satellite receiver and also 3 APC smart UPS's for uninterrupted power supply. The Flood service software was installed in February 2017.

Current products from the station include;

- Satellite rainfall and intensity-spatially on real time.
- Estimate discharge (hydrography) at different sub basins or stations based on the rainfall. However, the hydrographs are being validated with the actual measured flows at the stations.
- Flood risk (static) map based on elevation above channel base. To estimate the flooded areas currently you need river observations from the ground.
- Vegetation index

Challenges

Further development of the system is required to cover the flood extent module to depict areas in flood and likely to be flooded. The module will need to integrate flood risk and estimated discharge to predict the areas likely to be flooded.

The need of validation of the products being produced using the data from the ground measured from stations. Some of the hydrographs at particular river basins based on the satellite rainfall seem to be over estimating the flows whilst some are under estimating the flows.

The flood service was started in August 2015 despite the programme having started in 2013. This led to closure of the project despite the flood service not yet being fully operational as the flood extent module is still being developed.

Flood risk (static) map based on elevation above channel base. To estimate the flooded areas, observations from the ground is required.

Post-Cyclone Context and Impact on the Sector

Cyclone Idai Response

The declaration of State of Disaster by His Excellency the President invoked the reactivation of the Cabinet Committee on Environment, Disaster Prevention and Management (CCEDPM). The committee is tasked with the responsibility to integrate disaster risk reduction measures into all development initiatives and optimal readiness for emergencies and disasters. The Cabinet Committee of Ministers is backed by the Working Party which in turn is backed by the technical expertise of the National Civil Protection Committee while the Provincial Civil Protection Committee and District Civil Protection Committees of affected districts are tasked with coordination and management of this disaster until the end of the declaration period. Thereafter the usual sectoral arrangements are set to resume their portfolio responsibilities to achieve recovery and long term measures to bring normalcy to the affected communities.

Effects and Impact to the Sector (economic and social impact)

The back to back impact of the disaster episodes of the droughts followed by the cyclone have diminished the possibilities of the affected communities to bounce back. Before the cyclone, most of the communities were in IPC[13] 3 food insecurity phase due to the drought and therefore have been further pushed into emergency or catastrophe phases[14]. The agriculture production, which is their main source of livelihood, has not been able to regenerate and recover from the disasters. This has resulted in a vicious cycle of poverty. The droughts compounded by the cyclone and heavy rains has had a devastating effect on the preexisting water sources which had dried up, leading to their progressive destruction and water contamination. For instance, the flooding has compromised access to safe water, basic sanitation and hygiene practices in both rural and urban areas increasing the risk of water borne diseases when the country is currently facing an outbreak of cholera and typhoid.

In the absence of effective DRM institutions, the combination of climatic shocks such as drought, floods and cyclones, compounded by high inflation and poor economy has resulted in full-scale humanitarian crises. The deteriorating economy has weakened the capacity of government institutions to address consequences of disasters. In addition to government responsibility, DRM preparedness and response has predominantly been the purview of international actors and this has sustained the capacity challenges and dependency on non-state actors. The government lacks technical and operational disaster risk reduction capacities, with the DCP mandate limited to response and protection services.

The impact of the cyclone has aggravated an already dire situation with rundown service delivery and no meaningful infrastructure development taking place. This has had a negative impact on several sectors for example; health in view of the already prevailing water-bone and sanitation related diseases; employment on job creation and human development; weak education systems and low industrial production.

[13] Integrated Food Security Phase Classification scale.

[14] Flash Appeal January–June 2019.

Summary Table of Cost Estimates and Gaps - Recovery and Resilience Needs for Sector

	District	Total Damage (No. of units)	Unit Cost (USD)	Total Damage (USD)	Total Needs (No. of units)	Unit Cost (USD) + 20% Building Back Better Factor	Total Needs (USD)	Note
DRM Bill Update and Formalization	National	n/a	n/a	n/a	1	$500,000	$500,000	Process involves reviewing the current draft, public consultations and parliament debate and launch
DRM Policy & Strategy Formulation	National and Regional	n/a	n/a	n/a	1	$200,000	$200,000	Process involves developing policy, public consultations, launch and dissemination
Institutional Strengthening and capacity Development	National	n/a	n/a	n/a	1	$2,000,000	$2,000,000	
DRM Financing	National	n/a	n/a	n/a	1	$100,000	$100,000	Review and Recommendation for DRM financing options
Flood Risk Assessment and Hazard Mapping	National (Major River Basins)	n/a	n/a	n/a	1	$3,500,000	$3,500,000	Consultant required for targeted Lidar survey, GIS technology and mapping, dissemination and sensitization
Integrated Flood Risk Management Plan	National (Major River Basins)	n/a	n/a	n/a	1	$3,500,000	$3,500,000	Process involves developing plan, public consultations, launch and dissemination plus consultant
Flood Forecasting and Early Warning	National (Major River Basins)	No data hydrological monitoring stations but damages expected. ZINWA yet to initiate assessment	n/a	n/a	1	$80,000,000	$80,000,000	ZINWA and/or MSD includes capacity building CPU, ZINWA, MSD, real time river & dam hydrological observations monitoring stations, emergency operations center
Community Engagement	National (Major River Basins)	n/a	n/a	n/a	1	$700,000	$700,000	Public awareness and sensitization
Cyclone Forecasting and Warning	National	n/a	n/a	n/a	1	$1,200,000	$1,200,000	MSD includes, communication systems, capacity building
	Total			**#REF!**			**$91,700,000**	

4

THE WAY FORWARD: MEDIUM-TERM DISASTER RECOVERY AND RESILIENCE STRATEGY

Recovery Needs and Strategy for the Sector

Recovery Needs and Strategy

Enhancement of DRM provides significant benefits for other sectors due to cross-cutting nature. National DRM framework and flood disaster risk assessment are key areas for interventions. Community engagement with proper early warning system will enhance flood disaster resilience.

As flood is among frequent disasters in the country, institutional capacity for integrated flood risk management needs to be much enhanced.

a. **Strengthen National DRM Framework:** Apply integrated approach from response, recovery, reconstruction, to risk reduction and preparedness based on sound disaster risk assessment, and to mainstream DRM in all sectors, through formulation/revision and enactment of DRM Bill, development of DRM Policy and DRM Strategy in line with Sendai Framework for Disaster Risk Reduction.
b. **Institutional Strengthening and Capacity Development:** Enhancing capacity of DCP based on DRM, recovery and resilience mandate (emergency preparedness, response, risk reduction, recovery and resilience). This entails increasing capacities at the central level in terms of staff, technical capacity, and resources; reinforce

sub-national capacities for DRM by employing dedicated technical staff to cover DRM issues.

c. **Financing:** Strengthen DRM financing which is properly connected to disaster preparedness and contingency planning to ensure quick and adequate financing when a disaster occurs through reviewing DRM financing options and provision of recommendations.
d. **Community Engagement:** Strengthen community resilience, as key actors in DRM, through awareness raising and engagement in flood risk mapping and evacuation drill exercises.
e. **Flood Risk Assessment and Hazard Mapping:** Conduct field survey and data collection using satellite data and targeted Lidar survey, hydrological and hydraulic analysis, and identify flood prone areas' residence and assets, and produce food hazard and risk maps in consultation with stakeholders and engagement of vulnerable communities. Climate changes and urbanization will be considered for future flood risk.
f. **Integrated Flood Risk Management Plan**: Formulate flood risk management plans for major river basins which include structural and non-structural measures as well as institutional framework, emergency response, and community engagement.
g. **Cyclone and Flood Forecasting and Early Warning**: Enhance forecasting and early warning for cyclone and flood events through strengthened real time observation network, early warning system, and capacity development for ZINWA and MSD.

ENDNOTES

1. Revised 2019 Zimbabwe Flash Appeal.
2. Housing, energy, transport, agriculture and irrigation, water and sanitation, environment, health and nutrition, education, disaster risk management, and displacement. No damages are reported for Displacement, just needs.
3. The RINA presents a range of calculations, while the estimates used in the PAD are of the low- alue of the range, favouring conservative estimates.
4. The figures use the low range of the values, emphasizing a conservative estimate.
5. UN Flash Appeal, 5 April 2019.
6. Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement. First Round Crop and Livestock Assessment Report, March 2019.
7. OCHA. ZIMBABWE: Floods Flash Update No. 5, 23 March 2019.
8. Integrated Food Security Phase Classification or IPC is a scale (1 to 5, 5 being most food insecure) that integrates food security, nutrition and livelihood information into a statement about the severity of a crisis. IPC3 correspond to Acute Food and Livelihood Crisis, IPC4 Humanitarian Emergency, and IPC5 Famine/Humanitarian Catastrophe.
9. Accounting for 10 percent reduction in total area planted.
10. US$340 for maize.
11. UN Inter-Agency Rapid Assessment Update, 22/3/2019.
12. OCHA. ZIMBABWE: Floods Flash Update No. 5, 23 March 2019.
13. Umvumvumvu, Biriiri, Muusha, Silverstream, Machongwe, Charter, Pondo farm, Mhandarume, and Tanganda Bridge.
14. The Urban Councils Association of Zimbabwe through its member urban local authorities have donated road equipment to help rehabilitate damaged roads.
15. Examples include the Mukove and Chadzire bridges in Buhera, which were washed away by floods more than a decade ago.
16. https://www2.jpl.nasa.gov/srtm/.
17. http://chg.geog.ucsb.edu/data/chirps/.

18. https://www.openstreetmap.org.
19. https://www.globaldtm.info/.
20. https://www.rcmrd.org/.
21. https://www.protectedplanet.net/
22. World Bank. 2019. Zimbabwe: Agriculture Sector Disaster Risk Assessment.
23. UNDP. 2017. Zimbabwe Human Development Report 2017: Climate Change and Human Development: Towards Building a Climate Resilient Nation. UNDP. Harare.
24. FAO. 2017. National Gender Profile of Agriculture and Rural Livelihoods – Zimbabwe: Country Gender Assessment.
25. ZIMSTAT. 2015. 2014 Labour Force and Child Labour Force Survey. ZIMSTAT, Harare.
26. Reserve Bank of Zimbabwe (2017).
27. Comprehensive Agricultural Policy Framework April 2012.
28. FAO Zimbabwe. 2019. Zimbabwe at a glance.
29. UN-IFAD Zimbabwe must invest more in irrigation press briefing- Zimbabwe situation http://www.google.com/amp/s/www.zimbabwesituation.com/news/zim-must-invest-more-in-irrigation-un/amp/.
30. World Bank (2018b).
31. Cyclone Idai Global Rapid Post Disaster Damage Estimation (Grade) Second Assessment Report-31 March 2019.
32. FEWSNET: ZIMBABWE Food Security Outlook Update April 2019.
33. Manicaland Cyclone Idai Report, 10 April 2019
34. Inter-Agency Rapid-Assessment/Appraisal Update 22 March 2019.
35. Flash Appeal- Zimbabwe March 2019.
36. OCHA 29/2/2019; IPC 2/2019.
37. FEWSNET: ZIMBABWE Food Security Outlook Update April 2019.
38. Ibid.
39. ZINWA Water Act (Chapter 20;24) 2000.
40. Water Resources, Management Supply & Sanitation Report 1.
41. See Annex 2 for maps.
42. Zimbabwe Flash Appeal (March 2019).
43. Care Zimbabwe Assessment Report (27 March 2019).
44. Manicaland Province WASH Sector Rapid Response.
45. Manicaland Provincial Water Sanitation Sub-Committee.
46. Care Zimbabwe Assessment Report.
47. Data from ZINWA and Civil Protection Unit.
48. Data from the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement (MLAWCRR).
49. The index measures the amount of human capital that a child born today can expect to attain by age 18, given the risks of poor health and poor education that prevail in the country where s/he lives.
50. SADC is a regional organization comprised of 14-member countries.
51. World Health Organization.
52. There are 101 private health facilities and 87 mission facilities. Mission and private health facilities provide only primary and secondary care. Mission facilities often partly funded by the MOHCC through salary, administration and capital grants.
53. USAID (2010) Zimbabwe Health System Assessment.
54. According to MOHCC: As of 30 April 2019, in Chimanimani, out of the 15 facilities that were not damaged during the cyclone, 13 were functioning, one was partially functioning, and one was not functioning. Of the 12 that were partially damaged, nine were functioning, two were partially functioning and one was not functioning. One (1) facility in Chimanimani was reported to be fully damaged and was not functioning as of 30 April 2019.

    As of 30 April 2019, out of the 31 facilities that were reported as not damaged in Chipinge, 29 were fully functioning and two were partially functioning. Of the 15 facilities in Chipinge that were reported as partially damaged, 14 were fully functioning and one was partially functioning. There

was no facility that was reported to have been fully damaged and non-functional as at the time of the assessment in Chipinge.

55. There is one missing observations from Chimanimani for the estimated catchment populations. Thus, the information on estimated catchment populations is an underestimate.
56. The MoPSE uses 3 categories to classify its schools with P1 & S1 schools being urban middle to high income schools, P2 & S2 are urban low income and peri-urban schools and P3 & S3 are all rural low-income schools. P &S stand for Primary and Secondary respectively.
57. Statistics are based on the MoPSe draft 2018 EMIS report.
58. Zimbabwe Education Sector Analysis (2015) p. 71
59. Zimbabwe Education Public Expenditure Review (2016).
60. Education Infrastructure damaged by Cyclone Idai – Government Calculations.
61. MoPSE Cyclone Idai Report, March 2019
62. Care Zimbabwe Cyclone Assessment Report, March 2019.
63. Rural and Urban contributes to one district; the Zimbabwean Census 2012 only refers to Makoni Rural, however IOM data makes this distinction.
64. This constituted Round 3 of the IOM's baseline assessments.
65. The IOM conducted a baseline study (1 May 2019), which covered Nyanga, Mutasa, Makoni, Mutare Urban, Chiredzi Rural and Urban. Among these populations, most were displaced before the cyclone and due to "man-made disasters."
66. IDPs here reflect those also displaced due to other reasons other than Idai. However affected populations reflect those affected by Idai.