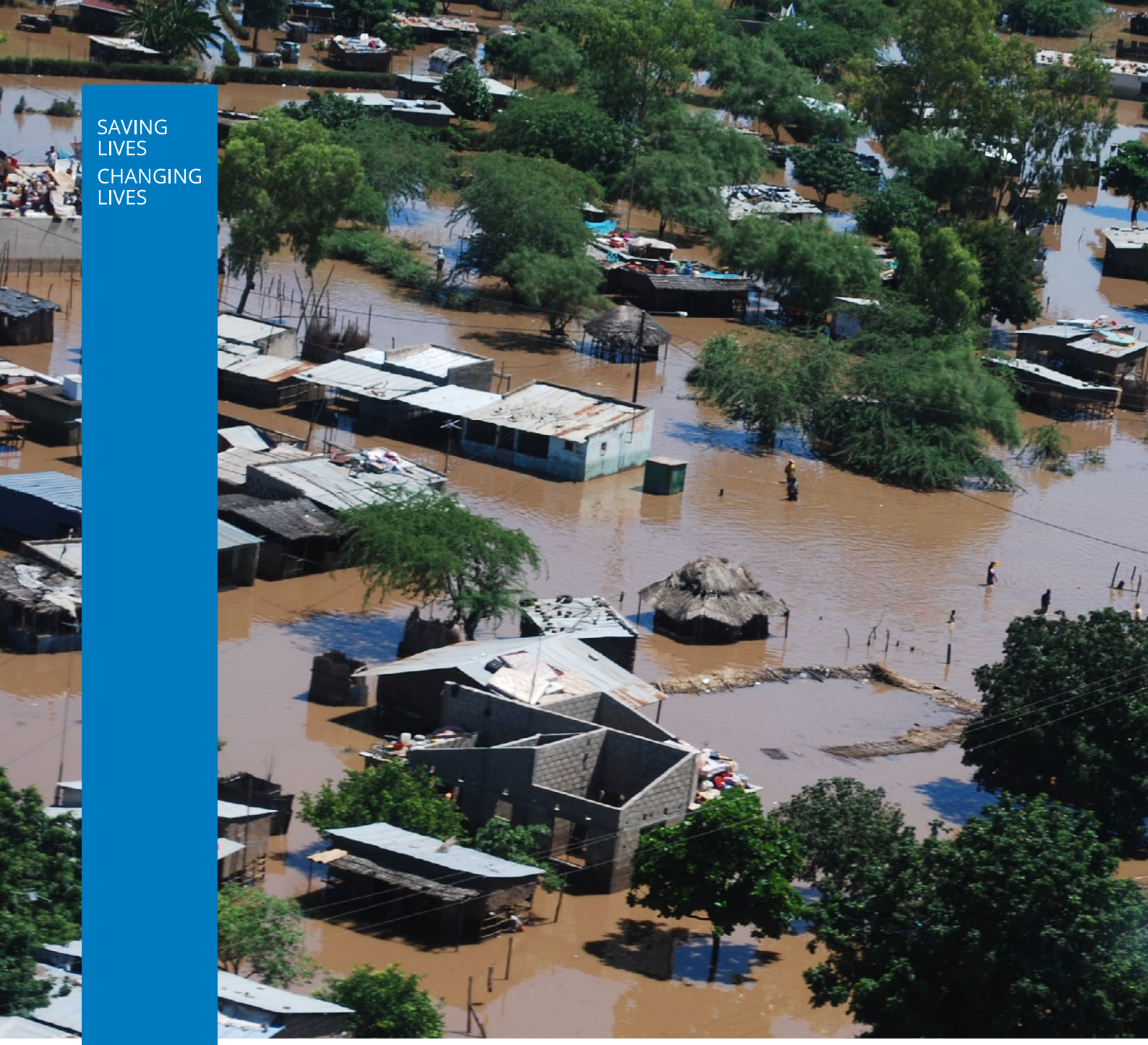
SAVING LIVES
CHANGING LIVES



Food security and livelihoods under a changing climate in Mozambique

PREPARING FOR THE FUTURE

WFP
World Food Programme

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Met Office

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Executive summary

Food security and the climate are closely linked in Mozambique. The key economic sectors in Mozambique include agriculture, forestry, fisheries, and livestock. Altogether, these sectors constitute a quarter of Gross Domestic Product (GDP). Agriculture is the major contributor to incomes and the economy. 70 percent of the population lives in rural areas and practices agriculture as a main livelihood. Crops are grown in largely rain-fed systems, which makes the sector highly vulnerable to natural hazards, which are principally drought and floods.

Mozambique's climate is characterized by relatively uniform temperatures across the country and a north-south rainfall gradient which results in higher more reliable rainfall amounts in the North, and lower more variable rainfall amounts in the South.

Mozambique experiences hot, wet summers and cooler, dry winters. Annual average temperatures are relatively uniform across the country. Conversely, rainfall distribution varies. Rainfall is mainly driven by the Inter Tropical Convergence Zone (ITCZ). The ITCZ movement up and down along the equator results in higher and more reliable rainfall amounts in the northern regions (around 1000-1500 mm per year) and lower and more variable rainfall amounts in the southern regions (less than 500 mm per year in some parts). The position and intensity of the ITCZ varies year-to-year as it is influenced by large-scale dynamics in the climate system, such as the El Niño Southern Oscillation (ENSO).

Historical climate analysis for the country shows that temperatures are already increasing and rainfall trends are dominated by year-to-year variability.

Analysis of observed climate trends shows that temperatures are already increasing, mostly concentrated within the rainfall season and more marked in the southern and central regions. There is no clear long-term trend for all-country annual rainfall, as rainfall is dominated by year-to-year variability in amounts and timings. However, small increases in the south and small decreases in the north have been observed. Accordingly, observed trends of vegetation shows decreases matching the rainfall trends.

WFP helicopter providing live-saving assistance following cyclone.

Livelihoods and agricultural production systems are already being affected by the changing and more variable climate.

Analysis of rainfall trends on a monthly basis shows that increases in seasonal rainfall occur within the wettest periods of the year. Decreases in rainfall are tied to decreases in the number of rainfall events rather than to decreases in rainfall amount (per rain day). Heavy rainfall events are becoming more frequent and concentrated in already wet periods. On the other hand, dry spells are longer and more variable. As a result, the growing season is becoming more unpredictable (in terms of start and end dates) and concentrated on fewer days (considering incidence of dry spells and heavy rainfall days). This makes it hard to plan and undertake agricultural practices, especially under rainfed conditions, as a principal livelihood.

One of the most direct humanitarian impacts of climate change is more frequent and intense extreme weather events exposing both governments and communities in Mozambique to increasing losses and damages.

Climate projections for the 2050s show strong agreement for an increase in temperature, but no strong trend for changes in rainfall.

Climate change projections for the 2050s for Mozambique indicate a substantial warming trend across the country. In contrast, rainfall projections are mixed, with most models projecting decreases in average annual rainfall and some models projecting small increases. Increased evaporation will negatively impact water availability. Extreme events, such as floods and droughts, will increase in frequency and intensity.

All scenarios of projected climate change will result in increased heat stress, reductions in water availability, and more frequent and intense extreme weather events, which could exacerbate food insecurity in the absence of adaptation.

Two scenarios of climate change that span the range of plausible future climates for Mozambique were studied. Both scenarios showed increases in heat stress, reductions in water availability, and continued variability, resulting in more frequent and intense extreme weather events, which are already drivers of food insecurity across the country. In the absence of adaptation, food insecurity will increase under all climate change scenarios considered, with the scale of increase dependent on the scenario.

Identified actions are multi-sectoral, working across different locations and time-scales, requiring the strengthening of adaptation plans and processes, including design, implementation, and monitoring. Building on this, some adaptation barriers identified include the lack of information on suited practices for the future, limited investments in new techniques and technologies, poor coordination and collaboration across stakeholders, and limited capacity to plan with long term horizons.

1. Introduction

Villagers come and greet a WFP Helicopter loaded with Supplementary Plumpy (Ready to Use Supplementary Food, RUSF) to be delivered to the village of Barada (Sofala province). The village is not accessible by land due to the severely damaged infrastructure.

This report presents the outcomes of a collaborative project between the UN World Food Programme (WFP) and the United Kingdom's (UK) Met Office (MO) to assess the impact of projected climate change on livelihoods and food security in Mozambique and to orient the next steps for adaptation planning.

The approach is based on a similar study undertaken in Sudan in 2016 (WFP and MO, 2016), under the Climate Adaptation Management and Innovation Initiative (C-ADAPT), which used an adaptation of the Consolidated Livelihood Exercise for Analysing Resilience (CLEAR) methodology (WFP, 2014); a framework for assessing climate risk and food security. This study for Mozambique incorporated a higher level of stakeholder consultation compared to previous studies; to draw on the expertise of stakeholders across multiple sectors, engage them in the study and facilitate discussion on future adaptation planning. Notably, this report builds on a study on the impacts of climate change in Mozambique by INGC (INGC, 2009) by providing analysis of more recently available global climate model simulations.

The key elements of the approach taken in this study were:

- **Questionnaire:** A questionnaire was shared with key experts and stakeholder groups. The purpose of this questionnaire was to assess understanding and use of information about long-term climate change in decision-making across Mozambique.
- **Assessment of current climate, food security and livelihoods:** The baseline relationship between climate, food security and
- **Climate analysis:** Two plausible scenarios of projected climate change were analysed, and the impact on livelihoods and food security were assessed in the context of the potential change from the present day.
- **Focus group discussions:** Sectoral specific focus group discussions with key stakeholders were held in country to draw on their expertise for use in the study and initiate discussion on adaptation options.
- **Multi-stakeholder workshop:** Key stakeholders were brought together to discuss the key vulnerabilities of the different livelihoods under the future climate scenarios and to identify adaptation options across different timescales for decision-making.
- **Co-produced summary report:** The findings from the study are presented in this co-produced summary report.

More detail about the methods and data used in this study can be found in Appendices A and B.