Mozambique Country Climate Risk Assessment Report

Irish Aid, Resilience and Economic Inclusion Team, Policy Unit

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Irish Aid
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List of Acronyms

AfDB	African Development Bank
AFOLU	Agriculture, Forestry and other Land Use
BRICS	Brazil, Russia, India, China and South Africa
CGCMC	Centre for the Management of Climate Change Knowledge
CIF	Climate Investment Funds
COFs	Climate Outlook Forums
CONDES	National Council for Sustainable Development
CSP	Country Strategy Programme
CT-CONDES	Technical Council of CONDES
CTGC	Technical Council for Disaster Management
DFID	The Department for International Development –United Kingdom
DJF	December, January and February
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ENRM	Environment and Natural Resource Management
ENSO	El Niño Southern Oscillation
ENSSB	National Basic Social Security Strategy
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FUNAB	National Environment Fund
GCF	Global Climate change Fund
GCM	General Circulation Models
GDP	Gross Domestic Product
GHGs	Green House Gases
GIIMC	Inter-Institutional Group for Climate Change
HDI	Human Development Index
IIED	International Institute for Environment and Development
INDC	Intended Nationally Determined Contribution
INFORM	Index for Risk Management
INGC	National Disaster Management Institute
IPCC	Inter-governmental Panel in Climate change
ITCZ	Inter-tropical Convergence Zone
JJA	June, July and August
LDCF	Least Developed Countries Fund
LUCF	Land use Change and Forestry
M&E	Monitoring and Evaluation
MAM	March, April & May
MEA	Multilateral Environmental Agreements-
MGCAS	Ministry of gender, Children and Social Action
MICOA	Ministry for the Coordination of Environmental Affairs
MPI	Multi-dimensional Poverty Index
NAMAs	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NAPA	The National Adaptation Programme of Action
NDC	Nationally Determined Contribution
ND-GAIN	The Notre Dame Global Adaptation Initiative
NGO	Non-Government Organisation
NIE	National Implementing Entity
NOAA	National Oceanic and Atmospheric Administration
ODA	Official Development Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PPCR	Pilot Program for Climate Resilience
SP	Social Protection
UNDP	United Nations Development Programme
UNFCCC	United nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WHO	World Health Organization
WRI	World Resource Institute's

Executive Summary

Mozambique is located on the eastern coast of southern Africa at 11-26° south of the equator, and has a tropical to sub-tropical climate which is moderated by the influence of mountainous topography in the north-west of the country. Mozambique is one of Africa's most vulnerable countries to climate change. It is exposed to a number of extreme weather events including droughts, floods and tropical cyclones. Mozambique's rapid economic expansion over the past decades has had only a moderate impact on poverty reduction, and the geographical distribution of poverty remains largely unchanged. Climate change adds an additional stress to the development context in Mozambique, and threatens to undermine achievements made to date.

Mean annual temperature has increased by 0.6°C since between 1960 and 2006, an average rate of 0.13°C per decade and the Mean annual rainfall over Mozambique has decreased between 1960 and 2006. Since the 1950s, the occurrence of extreme weather events, including drought, heavy rainfall events, hurricanes, and cyclones, has increased. Future projections indicate that mean annual temperature will increase and that the proportion of rainfall that falls in heavy events will also increase. With these projections, droughts and floods are likely to become more frequent, and cyclones more intense. Sea level rise in the region is projected to range from 0.18-0.59m by the 2090s; however, it is also projected that sea levels may increase beyond this range. With a 2,740km coastline, and more than 60% of its population living in low-lying areas, effective and efficient access and utilisation of weather and climate services for early warning is required.

Lack of effective adaptation mechanisms,a cumulative number of people could be forced to migrate away from the coast. In the worst case, the total annual damage costs are estimated to reach $103 million per year in the 2040s, with the forced migration being a large contributor to that cost. The cost of disaster response is already high, an economic analysis of climate change in Mozambique reveals that climate change may cause the GDP to fall between 4 and 14%, with significant declines in national welfare by 2050. In the worst-case scenario, climate change costs could reach USD7.6 billion dollars if no adaptation measures are implemented.

Mozambique has put in place policies and strategies to address climate change with sectoral instruments that are already aligned with the need to reduce vulnerability to climate change and promote low-carbon development. However, given the multi sectoral nature of climate change; coordination, coherency and consistency in relation to integrating climate change into development planning and budgeting is inadequate. It has been noted that there is a disconnection between policy and financing, thus affecting implementation. The country has attracted climate and development finance from bilateral, multilateral and recently inflows of foreign direct investment, but the cost of adaptation is still high.

Irish Aid's Country Strategy for Mozambique specifically addresses climate change as a key component of a comprehensive approach to addressing vulnerability in Mozambique. Climate change is taken care of under objectives focusing on strengthening resilience and improving household food security and nutrition. The Irish funding has been supporting phase II of the Environment Sector Programme Support of which climate change is one of

the priority components. Irish Aid support to climate change adaptation is through its bilateral aid and civil society support programmes.

Key recommendations to strengthen integration of climate change onto development planning include;

- Strengthen integration of climate change in development planning taking a multi sectoral approach to maximise on synergies interms of policy cohesion, financing and capacity. Strengthening the nexus between climate change, disaster risk reduction, humanitarian response and development to reducing vulnerability and building resilience and sustainable development
- Periodic national and subnational context specific vulnerability assessments should be undertaken in order to identify high risk locations and groups. Knowledge of such groups and locations will inform the adaptation plans to address priorities of those in greatest need, as well as inform climate risk management processes.
- There is need to design mechanisms of addressing climate change risks and disasters while focusing on inclusive and climate resilient economic models that can increase incomes for the poor. Mozambique being ranked as one of the poorest countries, climate change will make the economy worse under the BAU scenario, driving majority of the poor into further poverty.
- Adress climate induced disasters risks which are putting pressure on humanitarian assistance requirements. Disaster mapping and profiling, contigency planning and mitigation measures need to be strengthened to improve disaster resilience in the medium and long term.
- Climate risk management and strengthening of food systems approaches will be important across all development programmes to improve food security, nutrition, but also enhance economic development for the poor since over 80% of the Mozambican population depends on agriculture.
- Capacity building and strengthening of Government structures at national and sub national levels will be key to improve sustainable development, planning for uncertainties, managing risks and reducing vulnerabilities resulting from climate change and disaster impacts.
- Investment in generating and disseminating accurate, timely and reliable weather and climate information will be important to inform different sector adaptation and climate risk management plans and decisions regarding changes in climate.
- Gender analysis should be done across all climate change adaptation programmes to understand the different capacities and vulnerabilities and support decision makers to design adaptation options that are pro poor and gender transformative.

Overall, climate change impacts and disasters are affecting Mozambique's social and economic sectors, yet the country ranks as highly vulnerable, with low coping capacity and not ready to address the risks and shocks paused by climate change. Innovative and climate resilient programming models will be required to address adaptation and improve resilience of the country to climate change risks and shocks.

1.0. Country Context

Mozambique is located in the South Eastern coast of Africa and borders with Tanzania (north), Malawi, Zambia and Zimbabwe (west) and South Africa and Swaziland (south). The country has an area of 799 380 km2, of which 13 000 km2 are coastal and 786 380 km2 are terrestrial, with an eastern shoreline bathed by the Indian ocean extending to 2700 km[1]. According to the World population review 2017 report, Mozambique had an estimated population of 28,011,000 million people by 2015, which is significantly higher than the 2007 census figure of 21,397,000. Mozambique remains fairly sparsely populated with 29 people per square kilometer, which is 178th in the world. The north-central provinces of Nampula and Zambezia are the most populous regions of Mozambique and account for 45% of the total population. The annual growth rate as at 2015 is estimated at 2.91%[2]

Mozambique's Gross Domestic Product (GDP) dropped to 3.3% in 2016, down from 6.6% in 2015. Official figures highlight a substantial slowdown in growth for most sectors, including negative growth in hotel and restaurant services and utilities. Foreign direct investments declined by 20% indicating a decline in confidence in the economy. The Mozambican Metical appreciated by 10% against the U.S. dollar between October 2016 and February 2017 as reduced liquidity and an adjusting trade balance began to take effect[3].

Mozambique's rapid economic expansion over the past decades has had only a moderate impact on poverty reduction, and the geographical distribution of poverty remains largely unchanged. Climate change adds an additional stress to the development context in Mozambique, and threatens to undermine achievements made to date. The country is classified as Least Developed (LDC), and although its human development index has been improving in real terms, it is still ranked 181 out of 188 countries and territories in the 2015 Human Development report sharing the rank with South Sudan. Mozambique's 2015 HDI of 0.418 is below the average of 0.497 for countries in the low human development group and below the average of 0.523 for countries in Sub-Saharan Africa. The most recent survey data that were publically available for Mozambique's Multidimensional Poverty Index (MPI)[4] for 2013/2014 reported that 70.2 percent of the population are multi-dimensionally poor while an additional 14.8 percent live near multidimensional poverty. The MPI shows that income poverty only tells part of the story, because there are other forms of deprivation that the poor suffer and they affect their livelihoods.

[1] INDC, 2015
[2] https://esa.un.org/unpd/wpp/Download/Standard/Population/
[3] http://www.worldbank.org/en/country/mozambique/overview
[4] Identifies multiple overlapping deprivations suffered by households in 3 dimensions: education, health and living standards

According to the World Bank, the social economic indicators are also low for Mozambique with adult literacy rate at 56%, and average life expectancy at birth at 50.3 years. Mozambique faces other challenges such as increasing malnutrition and stunting. Malaria remains the most common cause of death, responsible for 35% of child mortality and 29% for the general population. HIV prevalence among adults shows a downward trend, stabilizing at a relatively high rate of 11.5%. The social progress index for access to improved sources of water and sanitation ranks Mozambique 128th and 119th, respectively, out of 135 countries. Indeed, Mozambique has one of the lowest levels of water consumption in the world despite being endowed with a variety of water sources. As a response to such challenges, the Mozambican authorities have considered the social sectors as top priorities and funding has been increasing for those sectors in general.

The Government of Mozambique (GoM) identifies the major environmental challenge as climatic shocks and seasonal variability, overharvesting of marine and timber resources, and uncontrolled fires[5]. Mozambique launched its National Climate Change adaptation and Mitigation Strategy (NCCAMS), covering the period 2013-2025 in November 2012 (MICOA, 2012). Recognising the risks that climate change poses to development targets in the country, the strategy outlines Mozambique's commitment to adaptation and mitigation, through low-carbon development and the green economy. The key objectives focus on making Mozambique resilient to the impacts of climate change, identifying and implementing opportunities for the reduction of greenhouse gas emissions and creating the institutional and human capacity, as well as exploring opportunities for access to technology.

2.0. Current and future climate scenarios for Mozambique[6]

Mozambique has a tropical to sub-tropical climate which is moderated by the influence of mountainous topography in the north-west of the country. Seasonal variations in temperature are around 5° between the coolest months (June, July and August) and the warmest months (December, January and February). Geographically, temperatures are warmer near to the coast, and in the southern, lowland regions compared with the inland regions of higher elevation. Average temperatures in these lowland parts of the country are around 25-27°C in the summer and 20-25°C in winter. The inland and higher altitude northern regions of Mozambique experience cooler average temperatures of 20-25°C in the summer, and 15-20°C in winter

2.1. Current Climate Trends

Temperature

Mean annual temperature has increased by 0.6°C since between 1960 and 2006, an average rate of 0.13°C per decade. This increase in temperature has been observed in the seasons December, January and February (DJF), March, April and May (MAM), and June, July and August (JJA) only, at a rate of 0.15-0.16°C per decade, but no discernible warming has been observed in the season of September, October and November (SON). Daily temperature observations show significantly increasing trends in the frequency of 'hot 'days and nights in all seasons. The average number of 'hot' days per year in Mozambique has increased by 25 (an additional 6.8% of days) between 1960 and 2003. The rate of increase is seen most strongly in MAM when the average number of hot MAM days has increased by 3.2 days per month (an additional 10.2% of MAM days) over this period. The average number of 'hot' nights per year have also increased by 31 (an additional 8.4%

[5] Wingqvist, O., G., 201. Environment and Climate Change Policy Brief – Mozambique
[6] Source; McSweeney et al, (2010), Christensen *et al.* (2007) and Daron, JD (2014). Regional Climate Messages

of nights) between 1960 and 2003. The rate of increase is seen most strongly in DJF when the average number of hot DJF nights has increased by 3.6 days per month (an additional 11.6% of DJF nights) over this period. The frequency of cold days[7] and nights have decreased significantly since 1960 in all seasons except SON.

Precipitation

The Mean annual rainfall over Mozambique has decreased at an average rate of 2.5mm per month (3.1%) per decade between 1960 and 2006. This annual decrease is largely due to decreases in DJF rainfall, which has decreased by 6.3mm per month (3.4%) per decade. Daily precipitation observations indicate that despite observed decreases in total rainfall, the proportion of rainfall falling in heavy[8] events has increased at an average rate of 2.6% and 5-day annual rainfall maxima have increased by 8.4 mm per decade, with largest increases in the wet season, DJF.

Summary of Historic Weather and Climate

- Temperatures have increased by 0.6°C from 1960-2006, at an average of 0.13° per decade.
- From 1960-2006, mean annual rainfall decreased at an average of 2.5 mm per decade, largely due to decrease in precipitation during the rainy season.
- From 1960-2005, rainy seasons commenced later, and dry spells lasted longer.
- Since the 1950s, the occurrence of extreme weather events, including drought, heavy rainfall events, hurricanes, and cyclones, has increased.

USAID, 2012

2.2. Future Climate projections

Temperature

The mean annual temperature is projected to increase by 1.0 to 2.8°C by the 2060s, and 1.4 to 4.6°C by the 2090s. Under a single emissions scenario, the projected changes from different models span a range of up to 1.8°C. The projected rate of warming is more rapid in the interior regions of Mozambique than those areas closer to the coast. All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate. Annually, projections indicate that 'hot' days will occur on 17-35% of days by the 2060s, and 20-53% of days by the 2090s.

All projections indicate decreases in the frequency of days and nights that are considered 'cold' in current climate. These events are expected to become exceedingly rare, and do not occur at all under the highest emissions scenario (A2) by the 2090s.

Precipitation

Projections of mean rainfall do not indicate substantial changes in annual rainfall. The range of projections from different models is large and straddles both negative and positive changes (-15 to +20mm per month, or -15% to +34%). Seasonally, the projections show a more coherent picture, with the projections tending towards decreases in dry season rainfall (JJA and SON), offset

[7] Cold' days or 'cold' nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season

[8] A 'Heavy' event is defined as a daily rainfall total which exceeds the threshold that is exceeded on 5% of rainy days in current the climate of that region and season

partially by increases in wet season rainfall (DJF). The increases in DJF rainfall are largest in the north of Mozambique.

Overall, the models consistently project increases in the proportion of rainfall that falls in heavy events in the annual average under the higher emissions scenarios, of up to 15% by the 2090s.The proportion of total rainfall that falls in heavy events is projected to increase in DJF in projections from all models and all scenarios, by up to 18%.

Summary of Projected Weather and Climate

- Mean annual temperatures in Mozambique are likely to rise by 1.0-2.8°C by the 2060s and 1.4-4.6°C by the 2090s, from 1970-99 observed mean temperatures.
- Precipitation is anticipated to increase in most parts of the country, particularly during the rainy season.
- Droughts and floods may become more frequent, and cyclones more intense.
- Sea level rise in the region is projected to range from 0.18-0.59m by the 2090s; however, sea levels may increase beyond this range.

USAID, 2012

Other Regional Climate Change Information[9]

Tropical cyclones are poorly captured by GCMs and thus potential changes in intensity and tracks of tropical cyclones in the future are very uncertain. While evidence indicates that tropical cyclones are likely to become, on the whole, more intense under a warmer climate as a result of higher sea-surface temperatures, there is great uncertainty in changes in frequency, and changes to storm tracks and their interactions with other features of climate variability (such as the El Niño Southern Oscillation) which introduces uncertainty at the regional scale (Christensen et al., 2007).

The uncertainty in potential changes in tropical cyclones contributes to uncertainties in future wet seasonal rainfall. Potential increases in tropical cyclone activity, which may not be captured in the GCM projections, may add to the projected increases in wet season rainfall in the region. Model simulations show wide disagreements in projected changes in the amplitude of future El Niño events. Mozambique's climate can be strongly influenced by ENSO, thus contributing to uncertainty in climate projections for this region.

2.3. Green House Gas (GHG) Emissions for Mozambique

According to the WRI CAIT[10] climate data explorer for Mozambique for the years 1990-2013, latest emission values excluding Land Use Change and Forestry (LUCF) were 27.46% with per capita GHG emissions of 1.04 tCO_2 per capita emissions presenting 50.53% absolute Change from earliest to latest value (1990-2013). Total emissions values including LUCF were at 66.72% with per capita emissions of 2.52 tCO_2e and 21.26% as absolute change from earliest to latest value. The highest emission contributions are from LUCF, agriculture and energy respectively.

According the INDC 2015, Mozambique estimates, on a preliminary basis, to reduce a total of about 76,5 MtCO2eq in the period from 2020 to 2030, with 23,0 MtCO2eq by 2024 and 53,4 MtCO2eq from 2025 to 2030. These reductions are estimates with a significant level of uncertainty and will be updated with the results from the Biennial Update Report (BUR) which will be available

[9] Source; McSweeney et al, (2010), Christensen et al. (2007) and Daron, JD (2014). Regional Climate Messages

[10] http://cait.wri.org/profile/Mozambique

in early 2018. Mozambique's INDC highlights that the implementation of any proposed reduction is conditional on the provision of financial, technological and capacity building from the international community.[11]

2.4. Mozambique's climate and weather information generation and management

The National Institute of Meteorology (INAM) is the national meteorological and hydrological agency, and has the primary responsibility for the generation of weather and climate information. INAM is a public Institute, under the Minister of Transport and Communication that among other activities, provides climate monitoring and forecasting through the Research Department. In the beginning of the rainy season, INAM prepares a seasonal forecast using the Climate Predictability Tool (CPT).This forecast is discussed in a regional forum called Southern Africa Regional Climate Outlook Forum (SARCOF) and a regional statement is produced. After the downscale, the forecast is sent to the stakeholders for the preparation of the Sectorial Outlook.[12]

The above process is followed by a pre-meeting for inter sectorial outlook harmonization and interpretation, and then is issued a unique document composed by a brief Climate outlook for the season that is finally presented in a public session of the national Climate Outlook Forum (NCOF). NCOF is a dialogue framework whose main purpose is to bring together the producers of the climate information and the users. The Seasonal forecast is updated on a monthly basis for the periods NDJ, DJF, JFM and FMA and it is disseminated through the Internet, email and media to different stakeholders. INAM also issues Alerts/Warnings of possible occurrence of events like heavy rains and Cyclones. The information is systematically updated to the public and to INGC through CENOE, who is in charge of communicating to the people what to do to save life and properties[13].

Under the climate investment funds (CIF), Mozambique is implementing a project on climate resilience: Transforming Hydro meteorological Services, which seeks to strengthen hydrological and meteorological information services in Mozambique to deliver reliable climate information for the country's development and local communities. Despite being crippled by some of Africa's most variable hydrological and meteorological (hydro-met) conditions, the Government of Mozambique has adopted an ambitious project to transform its hydro-met services for resilient and adaptive development. Currently, only 25% of manned meteorological and rainfall stations report regularly, while 36% of river monitoring stations report regularly. Overall, only a third of the hydro-met monitoring network is functioning, indicating the urgency for substantial transformation. The CIF funded project, estimated to cost $22.5 million, will enable improvements to Mozambique's hydro-met services and will enable increased productivity in agriculture, fishery/maritime, infrastructure planning, and health sectors[14].

Hydrometeorology services support resilient growth across a range of sectors, so accurate record of hydro-met data has strong economic and environmental implications. These include developing the country's hydropower potential, agriculture production; for example farmers who know when it will rain can avoid having their fertilizer washed away, transport authorities can design roads for flash floods and municipalities can build drainage systems. Coastal communities can save lives and

[11] Government of Mozambique INDC, 2015
[12] KULIMA, 2012.
[13] Gulele, 2015
[14] https://www.climateinvestmentfunds.org/country/mozambique

livelihoods against storm surge (World Bank 2015). Investment in human capacity as well as station network systems is key to achieve this.

Key Challenges

As in many developing countries, the poor weather station network in Mozambique is a challenge exacerbated by many years of neglect during the country's civil war. There is limited geographic coverage of hydro-meteorological network, leading to lack of climate information products to timely respond to specific demands of end-users. The limited coverage of station data over the country (especially in Gaza and Tete provinces), which have an average station density of 1 station every 29,000km^2 (as compared with 1 station every 1000km^2 in South Africa) although there is obviously not an even spread (the majority are along the coast of Mozambique) - this data is used for downscaling projections of future climate, only 27 of the 32 stations had sufficient temperature and rainfall data for statistical downscaling to be applied.

Access and utilisation of weather and climate information is also affected by technical barriers to translate and disseminate climate information in a clear and understandable language to all users. In addition, stations where there are substantial amounts of missing data in the time series cannot have trend analyses done. Data quality is poor sometimes and so much time has to be spent cleaning the data before any analysis can be done. This affects usage of data for planning and decision making (Duvane, 2014).

> Hydrometeorology services are inadequate in 80% of African countries. They are under-funded, have weak capacity, and their infrastructure has deteriorated. A recent WMO survey illustrated that 54% of surface and 71% of upper air weather stations in Africa did not report data. So they can't generate local data or use information from regional and global weather centers, and, most importantly, they cannot deliver useful services to the population. Investing in hydrometeorology has high returns, with benefit cost ratios averaging between 5 and 7 to one.
>
> Saghir, 2015

While INAM's own network includes both manned and automated weather stations, most of its automated stations were found to be not functioning or to be delivering insufficient levels of information. Two Doppler radars were installed in the mid-2000s, but neither is fully operational. As a result, many important types of observation--such as upper air, marine, and lightning detection--are not effectively performed. In sum, the agency lacked any meaningful ICT based early warning services capability related to the prediction of floods and tropical cyclones and their impact (KULIMA, 2012).

INAM provides daily weather forecasts (twice a day) to the public and INGC. Next to this forecasts, seasonal outlooks (especially before the rainy season) on expected precipitation and cyclone activity are communicated to INGC and other departments. The regional seasonal outlook is downscaled for Mozambique by INAM and an interpretation is provided to the different users. However, the forecasts sometimes lack monthly updates and do not include forecasts for cyclones, temperatures; and do not focus on health sector outlooks.

3.0. Climate Change Hazards, Impacts and Vulnerability

Mozambique is one of Africa's most vulnerable countries to climate change. It is exposed to a number of extreme weather events including droughts, floods and tropical cyclones. In 2000, the country was hit by four cyclones, the most recent being tropical cyclone Dineo in 2017, which destroyed lives, property and infrastructure. Mozambique has a long coastline of about 2700 km, with more than 60% of its population of 22 million living in coastal areas, exposing large numbers of people to sea-level rise and climate extremes. The country's economy is largely dependent on agriculture, and for most of its people, fishing and rain-fed farming forms an important part of their livelihood. Destruction to crops from extreme weather and falls in agricultural productivity and drought threaten the health and economic stability of many Mozambicans.

Impacts of Tropical Cyclone Dineo, 2017

- In Inhambane province, 70 health units were affected and 1,687 classrooms partially destroyed affecting 160,000 students;
- 949 people were hosted in three transit centers during the cyclone in Maxixe city, Inhambane province;
- One death was reported in Gaza province specifically in Chibuto district;
- Approximately 29,173 ha of several crops were lost in Inhambane province;
- There was a need of about 128 tons of diverse seeds including cereals, pulses, vegetables and tubers.
- Preliminary estimation of the financial requirements to restore from the damages was estimated at about US$ 13.3 million.

UN OCHA, 2017

According to the World Bank 2010 report on the Economics of Adaptation to Climate Change, Coastal areas are particularly vulnerable to sea-level rise and increased intensity and frequency of storm surges associated with climate change. Without adaptation to climate change, a cumulative number of 916,000 people could be forced to migrate away from the coast (or 2.3% of the 2040 population). In the worst case, the total annual damage costs are estimated to reach $103 million per year in the 2040s, with the forced migration being a large contributor to that cost. High value and vulnerable locations, such as cities and ports, should be given adaptation priority.

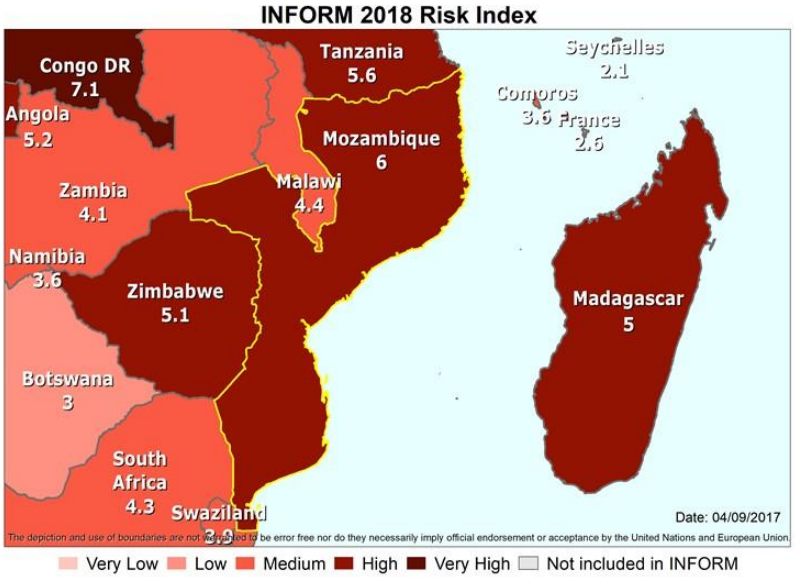
Mozambique regularly experiences extreme weather events. Droughts occur every three to four years, in a country where most people depend on agriculture for their livelihoods. Many regional river basins converge in Mozambique, and flooding is a perennial threat, especially when coupled with tropical cyclones. The country urgently needs a coordinated approach to tackling climate change and disasters. In January 2015, heavy rains resulted in severe flooding in the north and central areas of the country, causing deaths and substantial economic damage including to critical infrastructure. These heavy rains in the region also had a strong negative impact in the energy supply for large areas in the north of the country and several regions remain isolated as of early 2015 due to the collapse of roads and bridges (GCCA, 2017)

According to the INDC, 2015, floods from 2000 to 2015 affected about 4, 629, 000 people, 1, 204 deaths and caused damage in 1, 176, 000 houses. Damage also occurred in water storage and flood protection infrastructures, mainly in dykes of Licungo in Nante and Limpopo in Chókwe, Guijá and Xai-Xai, and in railways and ports. The cost of these events was estimated at 1, 356 million USD. The damage in roads from 2011 to 2015 include 130 aqueducts, 119 bridges and 41 drifts destroyed or affected, 15, 512 km of impassable roads, and the amount of destruction was

estimated at about 13, 316, 443, 530 MT, corresponding to 333 million USD. Saltwater intrusion represents a problem in the Umbeluzi, Incomati, Limpopo, Save, Púngoe, Buzi and Zambeze rivers where the irrigation is developed. According to climate projections these impacts will be exacerbated considering the expected increase in temperature of 1.5 to 3.0ºC between 2046 and 2065 and the sea level rise of 15 cm, 30 cm and 45 cm as a consequence of thermic expansion and of 15 cm, 110 cm and 415 cm from ice melting in 2030, 2060 and 2100, respectively[15]. The Mozambique's INDC has quoted studies from the World Bank which have indicated a loss of 0.6 to 1.2 million USD per year until 2030.

3.1. Mozambique's Vulnerability ranking

According to **the Index for Risk Management (INFORM)[16]** statistics for 2018, out of 191 countries, Mozambique ranks as high risk and is scored as the 19th most at risk country, the 44th in terms of hazard and exposure, the 13th in terms of vulnerability and the 25th in terms of lack of coping capacity. The IN FORM model[17] adopts the three aspects of vulnerability reflected in the UNISDR definition. The aspects of physical exposure and physical vulnerability are integrated in the hazard & exposure dimension, the aspect of fragility of the socio-economic system becomes INFORM's vulnerability dimension while lack of resilience to cope and recover is treated under the lack of coping capacity dimension. According to the report, the major hazards and exposure events ranked between high and medium include; Droughts, Floods, Conflict risk, natural hazards, cyclones and Tsunamis respectively. In terms of vulnerability, social economic vulnerability, development, increased inequality, vulnerable groups and aid dependency are highlighted. Lack of coping capacity is marked for physical and general infrastructure, communication, Governance and access to health. INFORM is a global, open-source risk assessment for humanitarian crises and disasters. It can support decisions about prevention, preparedness and response.



According to **the ND-GAIN Index 2016[18],** Mozambique ranks 160th out of 178 countries and categorised as high risk. The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It aims to help governments, businesses and communities better prioritize investments for a more efficient response to the immediate global challenges ahead. In terms of vulnerability and readiness assessment, Mozambique was ranked as highly vulnerability and low readiness which calls for a great need for investment and innovations to improve readiness and a great urgency for action. Mozambique is the 35th most vulnerable country and the 24th least ready country. Vulnerability

[15] KULIMA, 2012.
[16] http://www.inform-index.org/Countries/Country-profiles
[17] INFORM is a collaborative project of the Inter-Agency Standing Committee (IASC) and the European Commission
[18] http://gain.nd.edu/our-work/country-index/

measures the exposure, sensitivity, and ability to cope with climate related hazards as well as accounting for the overall status of food, water, environment, health and infrastructure within a country. From the statistics for 1996 - 2016, there is a high negative trend in terms of vulnerability in relation to food and food import dependency, projected changes in cereal yields and reduced agriculture capacity. Readiness targets those portions of the economy, governance and society that affect the speed and efficiency of adaptation. Regarding future climate chang e, the Climate Risk Index may serve as a red flag for already existing vulnerability that may further increase in regions where extreme events will become more frequent or more severe due to climate change.[19] According the ND GAIN readiness statistics, Mozambique has recorded worst scores in social readiness especially in the education and innovation.

The Global Climate Risk Index 2017 analyses to what extent countries have been affected by the impacts of weather-related loss events (storms, floods, heat waves etc.). According to the most recent data available from 1996–2015, the countries affected most in 2015 were Mozambique, Dominica as well as Malawi. According to the Climate Risk Index, less developed countries are generally more affected than industrialised countries. Regarding future climate change, the Climate Risk Index may serve as a red flag for already existing vulnerability that may further increase in regions where extreme events will become more frequent or more severe due to climate change. While some vulnerable developing countries are frequently hit by extreme events, there are also some others where such disasters are a rare occurrence.

Natural Disasters in Mozambique

- Floods (every year)
- Tropical Cyclones (every 3 to 4 years)
- Drought (every 3 to 4 years)
- Epidemics
- Windstorms
- Sea level rise
- Erosion

Duvane, 2014

On the continent of Africa four countries are ranking among the 10 countries worldwide most affected in 2015 – **Mozambique (1st),** Malawi (3rd), Ghana and Madagascar (joint 8th position). Heavy rainfalls due to the intensified monsoon in South Eastern Africa which started in December 2014 and continued throughout January and beyond had disastrous consequences for infrastructure, agriculture and food security. **Mozambique (1st),** Malawi (3rd) and Madagascar (8th) were the countries hardest hit by the floods resulting from the torrential rainfalls. In Mozambique the number of affected people was greater than 325,000 and 163 people were killed. The floods also fostered the outbreak of diseases, e.g. cholera in some regions.

Nevertheless, African countries rank comparatively low in the long-term index featuring the period from 1996 to 2015. Madagascar (19th), **Mozambique (22nd)** and Djibouti (37th) are **the only African states ranked among the 50 most affected countries.** Mozambique therefore ranks poorly in Africa as well as on the global scale

Climate induced disasters are likely to increase in Mozambique thus increasing pressure on humanitarian assistance requirements which are already high. If disaster resilience is not strengthened in the medium and long term it will affect over all ODA. Climate change and disasters will continue increasing the humanitarian crisis requiring response, which will divert normal ODA to manage the humanitarian crisis. Strengthening of the humanization and development nexus will be key in building the resilience of the vulnerable communities and reducing dependency on food aid.

[19] German Watch, 2016

3.2. Climate change Impacts and Vulnerability

Mozambique's Socio-Economic Statistics

Population 2015[20]: 28,011,000

Total Fertility Rate 2015[21]; 5.16 children/woman

GDP per capita, PPP[22] (international $) 2016: 1,217.1

HDI 2015[23]: 181 out of 188 countries and territories

Gender Inequality Index 2015; 139 of 159 countries[24]

Vulnerability Rank 2015; 153 out of 178 countries[25]

Climate Risk Index (CRI)[26] 2015[27]; 22 out of 187 countries

3.2.1. Climate change Impacts on Agriculture, Food Security and Nutrition

Agriculture which is considered as the largest sector of Mozambique's economy has great influence on the people's lives in the country. The agricultural sector contributed up to 29 percent of GDP in 2013 and is the key source of overall growth. Approximately 80 percent of households are involved in the agriculture, livestock, fisheries or forestry (UNDAF, 2017-2020) and of these 83% are women. Rural roads, storage, market access, and new agro-investments all remain significant challenges, and only 15% of arable land is currently under cultivation. The agricultural sector provides employment for over 70 percent of the workforce. Nearly all agricultural activity (99.7 percent) is small-scale and 95 percent of agricultural production is rain fed, making the sector highly vulnerable to rain fall variability.

Agriculture in Mozambique is mainly rain-fed and small-scale, with average farm size estimated at 1.2 hectares (ha) [9]. Roughly 72% of the farmers in the country work on farms that do not exceed 2 ha, using limited amounts of purchased inputs and practicing slash-and-burn extensively. Small-scale farms are concentrated in the province of Zambezia in the central region, which also has the largest land area under agriculture (approximately 1 million ha). A small minority of farmers (0.4%) cultivate big plots of land (more than 10 ha); mainly in the southern region (Maputo province). The major food crops produced in Mozambique include rice, maize, sorghum, and cassava; these crops cover over a third of the total cultivated land area. Maize production is most common in

[20] UN World Population Prospects, 2017. https://esa.un.org/unpd/wpp/Download/Standard/Population/

[21] http://data.worldbank.org/indicator/SP.DYN.TFRT.IN

[22] World Bank Data – GDP per capita, PPP http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=MZ

[23] UNDP 2016; Human development Index report for 2015

[24] http://hdr.undp.org/en/composite/GII

[25] ND GAIN country index - http://index.gain.org/country/Ethiopia accessed 11/07/2017

[26] The CRI indicates a level of exposure & vulnerability to extreme events, which countries should understand as warnings in order to be prepared for more frequent and/or more severe events in the future

[27] https://germanwatch.org/en/12978

Tete province, while cassava is mostly grown in Nampula province. Irrigated farming is largely carried out along the river valleys in the Southern region. Mozambique has some of the lowest cereal yields in southern Africa, barely reaching a third of their potential (FAO, 2012). Low agricultural productivity and growth is linked with small farm size and limited investment in infrastructure and technologies for production efficiency, among others

Livestock production is also small scale and plays an important role in people's livelihoods, food security and nutrition. The most common livestock types include cattle and goats, reared largely in Tete and Gaza provinces. Approximately 2.3 million households raise poultry. In the northern parts of the country, livestock production is challenged by animal disease incidence, such as African Animal Tripanosomiasis (AAT), which causes anaemia, weight loss, emaciation and sometimes death of cattle. In terms of future projections, cattle and poultry numbers are expected to be less under climate change compared to the scenario without climate change. On the other hand, goat and sheep numbers are expected to be higher under the climate change scenario compared to the scenario without climate change. The fisheries sub-sector also plays a crucial role in Mozambique's economy, supporting the livelihoods of about 380,000 small-scale, artisanal fishers.

The agriculture sector in Mozambique has high potential to contribute to poverty reduction and food insecurity alleviation. However, this has been significantly impaired by the absence of an agenda focused on equity in agricultural development and economic growth, as well as by the impact of climate hazards, which bring about annual losses of about US$ 790 million. Mozambique ranks among the most susceptible and vulnerable countries in the world to weather variability, climate hazards and climate change. To cope with these threats, farmers have been taking up various low-input and cost-effective CSA measures, such as: small livestock rearing, crop residue management/mulching, intercropping, and manure/ animal waste.[28]

Mozambique's general agriculture policy has been to transform the sector, shifting production away from mainly subsistence activities and promoting access to international markets. Yet, so far many households are still dominated by small (less than 10 hectares) and medium farms (10-50 hectares). Aside from small-scale subsistence farming, most cash crops are produced by large farm enterprises, and, in order to enhance the infrastructure, the government is increasing attention to irrigation. (FAO, 2016). Advanced irrigation techniques can reduce some of these production risks, and at the same time improve agricultural productivity. However, this will require substantial investment and policy implementation to achieve the intended results. Prioritising climate risk management and mainstreaming climate change in agriculture programmes will be important for Mozambique.

Food Security and Nutrition

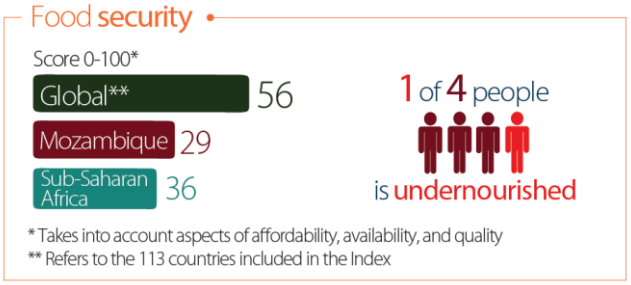
According to the State of Food Insecurity in the World report 2015, Mozambique achieved the MDG 1c target of halving the proportion of people suffering from hunger and undernourishment by 2015 (FAO, 2015). The prevalence of undernourishment declined from 56% in 1990/92 to 24% in 2014/16. However, the Global Food Security Index places the country at the lower end of the rank (108 out of 113 countries), with particularly low scores on food quality, safety, and affordability.[29] In 2011, stunting and underweight incidence among children below 5 years of age

[28] Climate-Smart Agriculture in Mozambique. CSA Country Profiles for Africa Series. International Center for Tropical Agriculture (CIAT); World Bank. Washington, D.C. 25 p.
[29] Global Food Security Index. http://foodsecurityindex.eiu.com/Country

was estimated at 6% and 16% respectively. High levels of rural poverty, low household purchasing power, and limited access to markets, high post-harvest losses and weather-related hazards (droughts and cyclone-induced floods) continue to put significant pressure on food and nutrition security and of the population.

Food security and nutrition are still challenged by a combination of weather events, low agricultural productivity and limited nutrition related knowledge, leading to a 42.6% chronic malnutrition rate in children under five years of age.

More than 50% of households are considered food insecure, and 24% of the households are chronically food insecure (UNDAF, 2017-2020).There are also non-climate stresses affecting agriculture and food security which include slash and burn practices, excessive use of land, overgrazing, bush fires, industrial forestry, and increasing demands for food due to rapid population growth. Drought and increases in temperature pose a risk to Mozambique's crop yields and reduce grazing areas for livestock. Drought-induced crop shortages and failures can result in chronic food shortage and represent the most frequent risk to food security, agricultural production, and livelihoods. Flooding, heavy rains, and droughts can contribute to losses in crop yields which may exacerbate the high chronic malnutrition level (44 percent) in Mozambique. Sea level rise also poses a threat to food production as it can lead to saline intrusion of agricultural lands along the coast (USAID, 2012)



Source; CIAT and World Bank, 2017

Despite the satisfactory economic growth experienced by the country during the last decade, progress towards reducing chronic malnutrition has been slow. The distribution of under-fives suffering from chronic malnutrition follows a north-south geographical tendency. The provinces with the highest percentages of under-fives suffering from chronic malnutrition are Cabo Delgado, with 56%, followed by Nampula province, with 51%. Zambezia, Niassa, Tete and Manica have intermediate rates, around 45%. The provinces with the lowest rates (less than 40%) are Inhambane, Gaza, Maputo province and Maputo City. Chronic malnutrition contributes to child mortality, undermining efforts to achieve the SDGs (KULIMA, 2012).

Mozambique 2017 statistics at a glance

- **2.1 million** people are food insecure
- **1.5 million** People affected by drought
- **795,000** Children affected by drought
- **246,000** Children Under five affected by drought
- **369,042** children were screened for acute malnutrition
- **23,631** children screened for severely acute malnutrition (SAM)

(UNICEF, 2017; WFP, 2017; FEWSNET, 2017)

Whereas the quality of diet in Mozambique, in terms of nutrients and diversity of food, has improved over recent years. It has been noted that food Security and Nutrition (SAN) situation generally deteriorates in response to prolonged droughts, floods or cyclones that result in poor crop yields or due to increases in food prices. According to MISAU (2012), the average percentage of people dying in hospitals from severe malnutrition during the last 5 years (2007-2011) is around 11%, slightly higher than the recommended <10% by World Health Organisation (WHO).

3.2.2. Climate change impacts on Environment and natural resources

The environment matters greatly to people living in poverty, and the poor are most affected by environmental degradation and climate change due to their vulnerability, high dependence on natural resources, and low capability to cope with external shocks, such as floods and droughts. Climate change is likely to worsen both the country's poverty reduction efforts and its drive for economic development, as well as severely impact the environment (Wingqvist, 2011). Environmental degradation is costly and totals nearly USD370 million annually – which is over 6% of Mozambique's GDP. Costs of water and (particularly indoor) air pollution make up about 70% of the total costs and have a strong impact on Mozambique's human capital. Investments in water, sanitation and reduction of indoor air pollution can have strong positive socio-economic impacts.

Water Resources

Mozambique is likely to face increased droughts and floods that will have consequences for the nation's water resources. Every year it is estimated that the country loses 1.1 percent of its GDP due to the impacts of droughts and floods on economic resources and activity. Mozambique is particularly vulnerable to the flooding of water sources, as it is situated downstream of nine major river systems which are already affected by climate variability; climate change is likely to exacerbate this vulnerability. From 2000 to 2001 and in 2007, Mozambique experienced severe flooding in many river basins and dams mainly due to torrential rains in the country and the region. Non-climate stresses exacerbating flooding in Mozambique include poor dam management in the country and the region, particularly upstream. Water resources in Mozambique are affected by pollution from mining, industrial, agricultural, and household waste. There are areas in the regions classified as semi-arid and arid (Gaza, Inhambane, and Maputo), where rain, even when above average is inadequate and results in critical water shortages leading to limited agriculture productivity. 50 percent of the water in Mozambique's rivers originates from outside the country. In 2000, Mozambique experienced its worst floods in 50 years, killing about 800 people and displacing 540,000. Mozambique's GDP growth is cut by an average of 5.5 percent when a major water shock occurs. (World Bank, 2010; USAID, 2012)

Rising sea levels will increase coastal erosion, causing land loss and displacement of human populations, the loss of coastal wetlands, and accelerate negative impacts on fisheries and coastal protection efforts. Intensified storm surges will accelerate saline intrusion into freshwater systems and aquifers in low lying areas, jeopardizing the food and water security of Mozambique's poorest and most vulnerable.

Energy

Wood fuel is the most important source of domestic energy and 85% of total household energy requirements derive from wood fuels. Only 7 percent of Mozambicans have access to electricity. Despite the associated health and environmental impacts, 78% of households use wood fuel as a main energy source, with average consumption estimated at 70 kilograms per week (UNEP, 2013). Logging for wood fuels is a significant driver for deforestation and leads to soil erosion and increased risk of flooding and drought. Deforestation will also increase the amount of effort (especially from women and children) needed to find energy sources for household needs. (Wingqvist, 2011)

Electricity production in Mozambique is almost entirely based on hydro power. Impacts of climate change on energy supplies are expected to be only modestly negative. This is because the plans for new energy generation plants have largely already taken into account changing patterns of temperature and precipitation. The most significant impact would be from increased evapotranspiration (and hence less water available for electricity) from the reservoirs. The potential energy deficit due to climate change relative to the baseline's generation potential, from 2005–50, is of approximately 110,000 GWh (World Bank, 2010). However, Parkinson 2013[30] recommends use of renewable energy from the sun and organic waste, for increasing production and added value as a climate change response. The technical considerations and barriers must be assessed before deciding on feasibility, particularly relating to biogas. The by-products of biogas can also be used for improving soil fertility, which is a serious constraint.

Coastal and Marine

More than 60% of Mozambique's population lives near the coast and fisheries are of critical importance to the food security as about 50% of Mozambicans' animal protein comes from fish, 85% of the country's fish catch is made by small-scale fishermen indicating the importance of healthy oceans and fish stocks for vulnerable communities. Coastal zones have already begun to, and will likely continue to, experience rises in sea level. Projected sea level rise is anticipated to increase the vulnerability to erosion and flooding of ecosystems and land. In freshwater ecosystems, saline intrusion due to sea level rise can lead to losses in fish populations. At the same time, storms can destroy fishing equipment and damage aquaculture operations. Given that fisheries contribute an estimated 4 percent of GDP, represent 28 percent of foreign exports, employ 95,000 people—with three to four times this number in support services – and provide 50 percent of all animal protein for the nation's diet, it is crucial to address climate change threats to fisheries. Over 13 million people (60 percent of Mozambique's population) living within 50 km of the coastal zone and 1,433,994 people (6.5 percent of Mozambique's population) living less than 5 m above sea level will be vulnerable to the effects of rising sea levels. Transport infrastructure, homes, and buildings in coastal zones can be impacted by sea level rise and erosion, while water quality can be affected by salt water intrusion (USAID, 2012; UNDAF 2017-2020).

Forests

Forests comprise about 40 percent of Mozambique's land cover, with Miombo and Mopane forest the country's most extensive forest types. It is estimated that the forestry sector supplies 80 percent of the country's energy, contributes 4 percent to GDP, and sustains the livelihoods of about 11.9 million people. Forests serve as a source of timber for exports, medicinal and edible plants, bush meat, goods for subsistence and cultural purposes, and as habitats for wildlife. Along Mozambique's coastline, mangrove forests host a variety of rare species of flora, fauna, and animals. These critical resources are threatened by both climate and non-climate stresses (World Bank, 2010; USAID, 2012).

Droughts, decreases in annual rainfall, warmer temperatures, and increased heavy rainfall events can affect forest resources and biodiversity, worsening degradation of forest resources and loss of species biodiversity caused by non-climate stresses such as soil and land erosion. Warmer temperatures and droughts can also increase forests' vulnerability to forest fires, which affect 40 percent of the country every year, with up to 74 percent of the northwest and central parts of

[30] Climate Learning for African Agriculture: Working Paper No.6

Mozambique burnt annually. Fires destroy natural vegetation and biodiversity and threaten the welfare of communities (USAID, 2012).

The Government of Mozambique recognises that fires contribute for GHG emissions and to the reduction of sinks for GHGs. The Government aims to reduce its direct emissions resulting from uncontrolled fires and soil degradation and therefore improve the conservation of forests, biomass and other terrestrial deterrent of greenhouse gases.

There are also non-climate stresses affecting forests including illegal exploitation; large scale land-clearing for agriculture; and greater demand for timber, fuel wood, and wildlife products.Urgent attention towards managing and regulating the harvesting of forest resources, combined with the strengthening of alternative income generation from sources other than charcoal, is vital to climate change adaptation. The development of community forest management plans and the introduction of by-laws serve as a strong basis to maintain the ecological stability of the forests (Parkinson, 2013)

In the rural areas of Africa, women and men are highly dependent on biomass, such as wood, agricultural crops, wastes and forest resources for their energy and livelihoods. However, in the face of climate change, the ability of women and men to obtain these indispensable resources is reduced. It is important to note that the declining biodiversity does not solely impact the material welfare and livelihoods of people; it also cripples access to security, resiliency, social relations, health, and freedom of choices and actions.

(UN Women Watch, 2009)

Mozambique has made sustainable management of natural resources a key component of its Five Year Development Plan (2015-2019). The United Nations Development Assistance Framework (UNDAF) 2017-2020 underscores that more than 82% of all jobs depend on natural resources. However, the country remains vulnerable to natural disasters such as the floods, windstorms and severe droughts that caused food insecurity, water shortages and income losses to more than 2 million people in 2015. In 2016, the government created a National Sustainable Development Fund to finance natural resource management and environmental protection initiatives. It also passed a law banning the export of logs, which had been one of the leading causes of deforestation. Also in 2016, the International Conservation Caucus Foundation recognised the President of Mozambique for efforts to combat wildlife trafficking, and the parliament approved the natural resources protection law, which criminalises environmental abuses. If the policies and regulations are implemented, natural resource degradation could be reduced.

3.2.3. Climate Change Impacts on Health

Mozambique's National Communication to the UNFCCC and the National Adaptation Programme of Action recognise that climate change will bring about health impacts. Similarly, INGC published a report in 2009 investigating the effects of climate change on disaster risk in the country, highlighting growing risk on health. Increased temperatures, droughts, and floods can result in direct and indirect impacts on health. The spread of malaria is of particular concern, with rising temperatures and increased flooding due to a rise in heavy rainfall events. Warmer temperatures and stagnant water following flooding increase mosquito breeding and the rate of mosquito development, which in turn can increase the spread of malaria. Non-climatic factors such as low socio-economic status, high population density, poor access to safe water, decrease in

hygiene and lack of proper sanitation contribute to the risk and transmission of cholera. The 2015 government MDG report shows that malaria continues to be the first cause of death amongst children (42%). The government is distributing free mosquito nets and providing free in-house spraying to curb the problem.

A study by USAID, 2017 notes that as temperatures continue to rise, and given the strong statistical link between the increased number of days above 25°C, malaria incidence is expected to increase in previously unsuitable regions such those in the higher elevation regions of northern Tete and western Niassa Provinces near the border with Malawi. Malaria risks are likely to remain consistent across the rest of the country. Since no strongly significant rainfall changes are projected for the next 20 years, precipitation variability will continue to contribute to malaria incidence through this time period, which will translate into continued malaria risks. The increased variability in precipitation, as well as the complicated relationship between malaria and temperature, means that malaria transmission will likely be more variable and unpredictable in the future.

> Mozambique is among the ten nations in the world most affected by malaria, causing between 44,000 to 67,000 deaths annually in all age groups. Approximately 682,000 pregnant woman and 2.8 million children under age five are at risk from malaria
>
> (INGC, 2009).

The projected warm and dry climate suggests that climate change may increase the spread of cholera in Mozambique. Cholera outbreak was recorded in Tete, Nampula, Zambézia, Sofala, Niassa and Cabo Delgado provinces, with a cumulative of 8,351 cases and 64 deaths since 25 December 2014. (Mozambique UNRCO Situation Report 6, April 2015). Cholera outbreaks show a strong relationship to climate variability, which is likely to be exacerbated by climate change. As models show that the tendency for precipitation to fall in higher intensity events may increase, and intense precipitation events can overrun poorly placed latrines, an increase in prevalence of cholera and other endemic diseases is likely. Drier conditions can also lead to increased use of low quality and contaminated water, leading to an increase of diarrhoea and cholera. Urban and rural populations in Mozambique are both vulnerable to malaria and cholera due to low access to improved safe water supply and sanitation facilities (KULIMA, 2012).

With 11.5 percent of the population affected by the HIV/AIDS epidemic, with 13.1% incidence amongst women and 9.2% amongst men additional strain is placed on the health of the population. People affected may be unable to work effectively or earn as much income to care for their families. Farming families, for example, may find it more challenging to cope with climate change impacts such as drought or flooding when they are affected by HIV/AIDS.

3.2.4. Economic Impacts of Climate change

An economic analysis of climate change in Mozambique reveals that climate change may cause the GDP to fall between 4 and 14%, with significant declines in national welfare by 2050. In the worst-case scenario, climate change costs could reach USD7.6 billion dollars, which is equivalent to an annual payment of a bit more than USD400 million, if no adaptation measures are implemented. The above projections notwithstanding, real GDP growth dropped in 2016 to an estimated 15-year low of 4.3% from 6.6% in 2015. Since 2014, the two main drivers of growth have contracted, with foreign Direct Investment (FDI) shrinking to pre-2011 levels due to a stalled gas project development and investors' apprehension regarding the business climate, and to high debt levels forcing fiscal tightening. Traditional export earnings also dropped due to depressed global demand,

and the El Niño drought affected agricultural production while the economy faced logistical constraints related to internal military conflict. Climate change is likely to make the economic outlook worse, amidst other factors (World Bank, 2010; Santos, et al, 2017).

The Africa Economic Outlook 2017 notes that in the aftermath of the USD 1.4 billion hidden debt disclosure in 2016, Mozambique became Africa's most indebted country, classified by the International Monetary Fund (IMF) to be in debt distress. With potentially large revenues from liquefied natural gas (LNG) projects still in the future, in the short term the country faces a liquidity crisis to balance its external accounts and finance its fiscal deficits. Economic growth in 2016 was driven by the manufacturing and agriculture sectors, the primary sector represented 26.2% of GDP in 2016. Agriculture accounts for nearly one fifth of GDP and though the bedrock of Mozambique's continuous growth, it is mostly low-productivity subsistence farming, needing new technology and investment.

The results from the integrated models of coastal systems (DIVA) in the World bank's 2010 report show that in the 2040s, if there is no adaptation, Mozambique could lose up to 4,850 km2 of land from today (or up to 0.6 percent of national land area) and a cumulative total of 916,000 people could be forced to migrate away from the coast (or 2.3 percent of the 2040s population). In the worst case, the total annual damage costs are estimated to reach $103 million per year in the 2040s, with the forced migration being a large contributor to that cost. These damages and costs are mainly concentrated in Zambezia, Nampula, Sofala, and Maputo provinces, reflecting their low lying topography and relatively high population.

The economic cost of the disasters that occurred in Mozambique between 1980 and 2003 was 1,704 million USD. However, this value underestimates the losses and impacts on the poor populations that live mostly in the coastal zones (60%) and derive their basic subsistence from fisheries and rain fed agriculture. This population, the coastal resources and infrastructures are exposed to tropical cyclones and to sea level rise (World Bank, 2010). Based on the same study, the climate scenarios indicate the reduction of the national welfare. Overall, disaster costs to the national economy have been estimated at $1.74 billion during 1980–2003, but this largely underestimates losses and impacts on the poor. Economic impacts of drought seem to be most significant in Zambezi Province, where production losses could range between $12 and $170 million for maize alone, depending on the severity of the drought. The major losses are those associated with infrastructures, mainly roads due to floods, although agriculture is also severely affected by drought (INDC, 2015)

Overall, climate change impacts and disasters are affecting Mozambique's economy across all sectors, and the country is ranked as highly vulnerable, with low coping capacity and not ready to address the risks and shocks paused by climate change. Innovative and climate resilient economic models will be required to address adaptation and improve the economy of the country.

3.2.5. Climate Change, Gender Inequality and Poverty

Climate change impacts and disasters are not gender neutral. Existing gender inequality will be heightened by climate-related hazards. Men and women are differently affected by climate change and climate variability which intertwine with socio economic, institutional, cultural and political drivers. Women play a vital role in food security in most African countries, and more women than men are engaged in the production, distribution and utilization of food. Agriculture is therefore central to women's livelihoods, with climate change impacts on agricultural production, women are especially vulnerable.

A climate change and gender case study in Mozambique found out that successive droughts have increased men's migration to South Africa and other places in search for jobs. As a consequence, women's role in productive work has increased considerably in the recent years. Women have also taken on more responsibility to look after the social and economic needs of their household, thus increasing stress on their lives. Although out-migration of men is a historical phenomenon it has increased greatly in the last eight years and the pattern of migration has increased. (Ribeiro and Chaúque, 2010)

Whereas Mozambique has made strides to address gender equality and has 39.6 percent of women parliamentary seats thus hailed as one of the leading nations in women's empowerment. According to the HDI report 2016, Mozambique has a gender inequality index (GII) value of 0.574, ranking it 139 out of 159 countries in the 2015 index. Progress on gender equality, women and girls' rights and empowerment in Mozambique has been slow and inconsistent. Early marriage is widespread affecting 48% of women aged 20-24 who are married before they are 18. The overwhelming majority of adolescent mothers were married in their teens. Furthermore, premature marriage and early pregnancy are associated with a significantly lower likelihood of finishing primary school and starting secondary school, higher maternal mortality and chronic under-nutrition and for every 100,000 live births, 489 women die from pregnancy related causes; and the adolescent birth rate is 139.7 births per 1,000 women of ages 15-19.

Most Vulnerable groups in Mozambique

- Subsistence farmers,
- Female headed households
- The physically handicapped
- Women
- Youth
- Children
- The elderly,
- The chronically ill - including those living with HIV/AIDS
- Orphaned or abandoned children

(World Bank, 2010; Parkinson, 2013)

Some 58% of women live below the poverty line in Mozambique (54% for men) and women are generally poorly integrated in the labor market and the formal economy. Moreover, the majority of the employed women are involved in unskilled activities. The illiteracy rate among women stands at 64.1% (against 34% for men) with a more pronounced difference in rural areas. Mozambique has one of the highest rates of maternal mortality worldwide and HIV prevalence among women stands at 13.1% compared to 9.2% for men in the 15-49 age group. Young women are three times more likely to be infected by the virus than young boys (UNDAF 2017-2020).
The poverty data published in 2016 shows that despite modest improvements in multidimensional poverty, poverty incidence remains high at 46.1%. Since the last census in 2009, overall poverty had fallen 4.8 percentage points, but rapid population growth had resulted in an additional 1 million poor people, with a poverty increase in certain rural areas.

Inequality has grown both between urban and rural areas, and amongst regions. From a base of approximately 12 million in 1996, the number of persons in poverty had declined to close to 9.7 million in 2002, but increased to 11.1 million at the end of 2008. The reduction in poverty rates between 2008 and 2014 was insufficient to reduce the absolute number of persons living in poverty. Hence, while the Mozambican population increased by more than 50% between 1996 and 2014, the number of persons living in poverty in the country remained approximately the same. (Santos et al, 2017; World Bank, 2010; Ribeiro and Chaúque, 2010). Climate change impacts on different sectors will continue pushing the vulnerable people deeper into poverty as the inequality gap increases.

Climate change is an additional stressor to gender inequality, poverty and vulnerability. Women and girls in Mozambique are struggling more than ever to cope with droughts aggravated by powerful El Niño phenomenon. According to a new CARE study[31], in Inhambane up to 80 percent of the families are forced to reduce their meals to only one or two daily rations. Tens of thousands of children are expected to be acutely malnourished. The situation is particularly hard for teenage girls who lack the experience and knowledge to come up with strategies to protect themselves and their children from hunger. According to CARE's assessment, younger girls and adolescents are pulled out of school to help their parents fetch water, and they spend up to six hours per day in search of water, three times as much as prior to drought times

Drought impacts – findings by the "hope runs dry" study in Mozambique

- New trend of women migrating and leaving behind children in the care of grandparents
- Many men who traditionally migrate in search of seasonal work on farms and mines in South Africa were unable to return or send remittances to cover household expenses
- 70% of men and women have stated that their migration is due to lack of food, drought conditions or lack of water
- Existing and new strategies to cope with the drought have high environmental and social costs (seasonal migration, harvesting of wood and production of charcoal).
- Women and girls have reduced access to water for consumption and personal hygiene

CARE, 2016

The sheer desperation to provide for their families causes some women to resort to survival sex or other forms of exploitative behavior in return for money and food. CARE's research also suggests an increase in child marriage, with families aiming to reduce the number of dependents in the family or cover expenses through the payment of a bride price. Ever since food has become painfully scarce in Mozambique, many girls are increasingly exposed to sexual and gender-based violence. Girls as young as 11 or 12 years have been lured away from water collection points by older men in exchange for food stocks or money. Some of the girls discovered later that they are pregnant and are consequently stigmatized by the community and family. However, communities who participate in programs introducing new cultivation practices, better seeds and alternative income activities were far better prepared to manage lean months than those without knowledge. Sufficient funding for adaption and resilience programs is required to address poverty and vulnerability especially among women and girls.

Supporting a pathway toward gender-responsive implementation, Mozambique embarked on a process to create a synergistic gender and climate change plan of action in 2010. The Council of Ministers approved a Gender, Environment and Climate Change National Strategy, which is

[31] CARE, 2016. Hope dries up? Women and Girls coping with Drought and Climate Change in Mozambique

specific to the environment sector and aims at developing and integrating the gender perspective throughout the sector, to improve the quality of life in particular for women and communities, through mitigation and adaptation to climate change and the sustainable use of natural resources. The strategy focuses on empowerment of women and communities to ensure gender equity in decision-making processes, plans, policies, strategies and programs budgets, and training and capacity building for access to, control and effective management of natural resources for the mitigation of and adaptation to climate change[32].

For adaptation efforts to be effective and sustainable, gender considerations should be taken into account in all sectors. Women, girls, men and boys experience the impacts of climate change differently and have different needs, opportunities and capacities to respond. If gender is not integrated in adaptation and mitigation actions, gender inequalities will be exacerbated, increasing vulnerabilities especially for women and girls. Gender analysis should be promoted to understand the differentiated underlying causes of vulnerability to climate change for men and women, and designing adaptation options that are gender transformative.

4.0. Climate change policy Framework

Mozambique's First National Communication to the UNFCCC was submitted in 2006. As a Least Developed Country (LDC) in the UNFCCC, Mozambique published a National Adaptation Programme of Action (NAPA) in 2007, and in 2012, published its National Climate Change Strategy 2013-2025. This strategy widened the government's approach to climate change in proposing actions that combine measures of adaptation and mitigation with the development of a low-carbon economy. In September 2015, Mozambique submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC[33].

Mozambique also has some sectoral instruments that are already aligned with the need to reduce vulnerability to CC and promote low-carbon development, including the PARP; the Strategic Plan for the Agricultural Development (PEDSA); the Strategy for Basic Social Action; the Tourism Strategy; the National Water Resources Strategy; the Master Plan for Disaster Management; the Policy for Disaster Management; the Strategy for the Intervention in Informal Settlements in Mozambique and respective Action Plan; the Strategy for Gender, Environment and Climate Change; the Energy Strategy; the Strategy for Reducing Emissions Resulting from Deforestation and Forest Degradation (REDD+). These instruments explicitly recognize that extreme weather events are one of the greatest threats to development and integration is required. Mitigation is beginning to be recognized as an opportunity, with references to it in the Energy Strategy (carbon tax and promoting the use of indigenous energy resources for clean and renewable energy), the Biofuels Policy and in strategies in preparation such as REDD+.

4.1. Key Climate change relevant policies and priority sectors

Policy Name	Policy Priorities
Government's Five-year Plan (*Plano Quinquenal do*	**The plan focuses on inclusive growth and has established five priorities** - Consolidation of national unity, peace and sovereignty - Development of human and social capital - Promotion of employment, productivity and competitiveness - Development of economic and social infrastructure

[32] Mozambique submission on decision 23/CP.18; https://unfccc.int/files/documentation/submissions_from_parties/application/pdf/cop_gender_mozambique_02092013.pdf

[33] Irish Aid, 2015. Climate Action report for Mozambique

Governo) 2015 - 2019	- Sustainable and transparent management of natural resources and the environmentand **The three pillars include**; -Guarantee of democratic rule of law, good governance and decentralization - Promotion of a balanced and sustainable macroeconomic framework - Strengthening international cooperation
Intended nationally Determined Contribution (INDC), 2015	Mozambique's INDC aligns with its National Climate Change Adaptation and Mitigation Strategy (NCCAMS). Therefore, Mozambique's INDC covers both mitigation and adaptation activities that Mozambique intends on implementing between 2020 and 2030. **Mitigation:** Mozambique estimates, on a preliminary basis, a total reduction of about 76,5 MtCO2eq in the period from 2020 to 2030, with 23,0 MtCO2eq by 2024 and 53,4 MtCO2eq from 2025 to 2030. These reductions are estimates with a significant level of uncertainty and will be updated with the results from the Biennial Update Report (BUR) which will be available in early 2018. **Adaptation:** The National Climate Change Adaptation and Mitigation Strategy (NCCAMS) identifies adaptation and the reduction of the climate risk as a national priority and presents eight strategic actions aimed at creating resilience and reducing the climate risk in the communities, ecosystems and national economy. The eight strategic actions are aimed at; reducing climate risk, water resources, agriculture, fisheries and food security and nutrition (SAN), social protection, health, biodiversity, forests and infrastructure.
The Poverty Reduction Action Plan (PARP) 2011-2014	This is a medium-term strategy of the Government of Mozambique (GoM) for putting into operation the five-year government program "Programa Quinquenal do Governo para 2010-2014". The 2011–2014 National Poverty Plan identifies climate issues as one of the obstacles for the country's economic development and includes measures to reduce disaster risks and to adapt to climate change. These are to: Promote a strategy to reduce emissions from deforestation and forest degradation, to control wildfires and to promote reforestation; Promote conservation agriculture and diversification of income sources in areas prone to natural, Establish, train and equip local risk management committees in areas prone to natural disaster or vulnerable to climate change; Make the natural resource management committees operational; Promote a programme for reforestation and reducing emissions from deforestation and forest degradation and establishing carbon stocks (REDD+).
2012 National Climate Change Strategy 2013-2025	The National Climate Change Strategy aims to reduce vulnerability to climate change and improve the living conditions of the Mozambican people. It proposes climate change adaptation and disaster risk reduction measures and also focuses on mitigation by targeting low carbon development. Overall, the strategy is structured around three core themes: (i) adaptation and climate risk management; (ii) mitigation and low carbon development (iii) cross cutting issues. These include institutional and legal reform for climate change, research on climate change, and training and technology transfer. Covering the period 2013-2025, the implementation of the ENMC is planned in three phases. The first phase (2013-2015) focuses on improving the response of local communities to climate change, reducing poverty, planning adaptation measures, as well as identifying opportunities for the development of low-carbon economy in local communities. The Strategy also proposes the establishment of a Centre of Knowledge on Climate Change (CGC) within the Ministry of Science and Technology. The primary objective of the centre should be to collect, manage and disseminate scientific knowledge on climate change.
2010's Government's Five-year Plan 2010–2014	The Five-Year Government Plan (PQG – Plano Quinquenal do Governo), launched in 2010. Mitigation and adaptation to climate change are considered strategic objectives of the Plan, guiding governmental policies from 2010–2014. Again, climate change is approached in association with economic development and poverty reduction issues. Details on how to achieve this strategic objective are not presented in detail, but the Five-Year Plan points out a list of general measures to improve environmental protection and address climate change, such as the promotion of environmental management addressing forest fires, soil erosion and recovery of arid areas, all applying climate change adaptation technologies.
Gender, Environment and	In 2010 the government adopted the Strategy and Action Plan on Gender, Environment and Climate Change. The plan aims to improve women's and poor communities' participation in

Climate Change National Strategy, 2010	climate change mitigation and adaptation interventions, but also foster their engagement in environment management.
National Adaptation Programme of Action (NAPA) (2008)	High priority activities for adaptation identified in the NAPA, include: early warning systems, strengthening capacity in the agricultural sector to adapt to climate change, reduction of impacts from climate change in the coastal zones, and management of water resources; Strengthening of capacities of agricultural producers to cope with climate change; Reduction of climate change impacts in coastal zones; and Management of water resources under climate change.
Initial National Communication (2003):	Provides an inventory of greenhouse gas emissions, vulnerability and adaptation assessments, a mitigation and abatement analysis, plans for education and public awareness, and potential adaptation and mitigation projects
National Policy on Disaster Management 1999	Principles embodied within the policy include community involvement, disaster risk reduction based on vulnerability assessment (of the most vulnerable people and places), free emergency assistance to the most vulnerable members of the population (including those in poor states of health and nutrition), and the setting up of an appropriate coordination structure (led by the National Disaster Management Institute, INGC, under guidance from the Coordinating Council for Disaster Management) and supporting civil society involvement.
The 1995 National Environmental Policy	Aims to promote sustainable development in Mozambique, translated into the integrating environmental issues in socio-economic planning. Under this broad scope, the Policy proposes the adoption of sectoral policies in a wide range of areas. In associating deforestation with expansion of activities within the energy sector, the document draws attention to the importance of adopting an energy policy that promotes the use of renewable energy and discourages the use of fossil fuels and biomass. In addition, it suggests the adoption of a forest management plan for areas close to urban spaces to increase supply of wood-based fuels.

4.1.1. NDC Implementation progress

The Mozambique Government ratified the Paris Agreement in 2017, and the process of reviewing the INDC started, The Government of Mozambique is working with Word Bank and is also being supported by the NDC Partnership and UNEP to define the specific action for all different goals proposed in the INDC.

According to the INDC, 2015, implementation will consider participating in the Second Phase of the Technology Needs Assessment Project (TNA), covering energy and waste, agriculture and coastal zones, including infrastructure. This process will result in a Technological Action Plan identifying the needs, including the financial and capacity building needs in those sectors. This information is relevant to identify the necessary means to implement the proposed actions. This exercise will be concluded by the end of 2017. Another relevant source of information to be considered will be the ongoing process for making the National Climate Change Network operational which includes the assessment of the existing institutional and technical capacities and their needs for the implementation of the National Climate Change Adaptation and Mitigation Strategy (NCCAMS) to formulate and implement the Capacity Building Plan, as included in the NCCAMS

4.1.2. Progress on National Adaption Plan (NAP)

Mozambique submitted the road map for the NAP to the UNFCCC and UNDP is supporting the process**.** To assist the country to adapt to climate change, the Mozambique Ministry of Land, Environment and Rural Development (MITADER) was supported by UNDP to conduct training,

connecting stakeholders from across the nation, with the aim to build a roadmap for a National Adaptation Plan. The training was supported by the joint United Nations Development Programme–UN Environment National Adaptation Plan Global Support Programme (NAP-GSP), in collaboration with UNDP Mozambique, with additional financing from GIZ. Mozambique has initiated the NAP process, an initiative which will contribute to a greater and deeper mainstreaming of climate change issues in the planning processes at all levels, in the medium and long-terms. The NAP road map was launched and the consultation process with national stakeholders and awareness of the NAP process started. The Government, working with UNDP and DANIDA submitted a proposal of $3m to GCF to access the readiness funds.

4.2. Institutional Coordination for climate change in Mozambique

The Ministry for the Coordination of Environmental Affairs (MICOA) was the lead environmental management and coordination body, and the national focal point for the United Nations Framework Convention on Climate Change (UNFCCC). MICOA was responsible for coordinating NAPA projects, and formed a multidisciplinary advisory group on adaptation, made up of technicians from the National Directorates of Agriculture, Energy, Health and Environmental Management, Meteorology, Hydrography and Navigation, National Disaster Management Institute (INGC), Mozambique Red Cross, and the Environmental Working Group. MICOA was also responsible for CC coordination, in light of its responsibility for coordinating the implementation of Agenda 21, and its role as the UNFCCC focal point. Within MICOA, there is a set of supporting entities with mandates related to CC, in particular National Environment Fund (FUNAB) and Designated National Entity (DNA) are responsible for Clean Development mechanism (CDM) projects. MICOA is also responsible for assisting the National Council for Sustainable Development (CONDES) and its Secretariat (which deals with the political coordination of sustainable development), and Technical Council of CONDES (CT-CONDES), which technically advises CONDES.

It should be noted that in January 2015, both the Ministry of Planning and Development and MICOA ceased to exist: the former was merged with the Ministry of Finance, while MICOA – being criticized for corruption and poor performance – was merged into a Ministry of Lands, Environment and Rural Development (MITADER). It is yet unclear how climate change responsibilities will be reshaped and redistributed.

Under the National Climate Change Adaptation and Mitigation Strategy (NCCAMS), the Climate Change Unit (CCU) is established within the CONDES's Secretariat. This unit is technically advised by Inter-Institutional Group for Climate Change (GIIMC) and the Centre for the Management of Climate Change Knowledge (CGCMC). The CCU is responsible for coordinating and facilitating inter-institutional connections on CC, preparing annual programmes and work plans, monitoring the implementation of NCCAMS, and giving technical advice on projects and programmes financed by CC funds and the Multilateral Environmental Agreements (MEA). Since CC is a relatively new, complex and cross-sectoral issue, CT-CONDES meets at least twice a year with the Technical Council for Disaster Management (CTGC), the National Council for Food security and Nutrition (SAN) and other relevant stakeholders, to submit, present and discuss activity reports, and define annual plans of action, based on contributions from FUNAB, GIIMC and CGCMC, which will be approved by CONDES

The implementation of the first phase of the climate change strategy has necessitated an integrated and coordinated action plan with actors from the public and private sector, civil society and community-based organizations (CBOs). Financial coordination is carried out by the National

Environment Fund (FUNAB) with funds from the state budget and Multilateral Environmental Agreements, bilateral accords and other resources mobilized by the private sector and civil society.

Cross-sectoral issues, including the participation of actors from the community to the national level, are coordinated by the Climate Change Unit (*Unidade de Mudanças Climáticas - UMC*), located in the Climate Change Department of the Ministry of Land, Environment and Rural Development (MITADER). The Knowledge Management Centre for Climate Change (*Centro de Gestão do Conhecimento em Mudanças Climáticas - CGCMC*) plays a key role in disseminating research findings and coordinating training to meet the needs identified by all relevant stakeholders

Other ministries also have different coordinating roles; INGC coordinates work on disaster risk planning and management and other aspects of coordination fall under mandates of MICOA and other ministries and agencies. More specialized agencies also have coordinating functions. For example, the National Meteorological Institute (INAM) and the National Water Department (DNA) are in charge of the development and maintenance of the hydro-meteorological station network and have the responsibility for collecting and disseminating this information[34].

Government of Mozambique has taken steps to integrate climate change into sub national plans. Ministry guidelines adopted in 2015 require that cross-cutting themes, including climate change adaptation and food and nutrition security, be mainstreamed into all new district development plans (DDPs). These plans also are now to cover 10 years rather than 5. From its offices in Xai Xai, the provincial capital, the Provincial Directorate of Economy and Finance (PDEF) is taking the lead in assisting its districts in updating their DDPs. A PDEF team is providing technical assistance to targeted district governments to develop a suitable methodology to ensure the mainstreaming of climate change adaptation and food and nutrition security in their DDPs. This assistance extends to ensuring that district government capacities are adequately reinforced to enable plan actualization.

The Mozambique Ministry of Economy and Finance is working with United Nations Capital Development Fund (UNCDF) who are providing technical support and financing from the Belgian Government to strengthen decentralized local governance and local development finance, focusing first on the Gaza Province in southern Mozambique. The Local Climate Adaptive Living Facility (LoCAL) of the UN Capital Development Fund serves as a mechanism to integrate climate change adaption into local governments' planning and budgeting systems, increase awareness of and response to climate change at the local level, and increase the amount of finance available to local governments for climate change adaption. The central component of the LoCAL development initiative is the Performance Based Grant System for climate resilience (PBCRGS). Through the PBGS, funds are allocated to district governments to be invested for socially driven climate resilient investments that further enhance community resilience. Capital grants within LoCAL are trickled down via the National Financial Management System (e-SISTAFE) to reinforce district government fiscal capacity for investments in public infrastructure, equipment and services. The PBCRGS and its associated package of technical and capacity building support is also a tool for integrating CCA into local government planning and budgeting systems as well as to enhance community resilient to food insecurity at the district level.[35]

4.3. Policy and Institutional Gaps for Climate Change Mainstreaming

[34] There are currently 800 rainfall measurement (pluviometric) and 100 river monitoring (hydrometric) stations that are used to generate such information.
[35] http://www.local-uncdf.org/

Legislation and policy making in the field of environment and climate change is commendable in Mozambique and GoM appears to be aware of the importance of natural resources, and included aspects of environmental and climate change challenges in the PARP. However, implementation and monitoring is weak and uncoordinated. The PARP points out the need to improve coordination, coherency and consistency of policies and strategies to be able to reach its objectives. Given the multi sectoral nature of climate change, coordination, coherency and consistency are very key in relation to integrating climate change into development planning and budgeting.[36]

It has been noted that there is a disconnection between policy and financing. A study of environmental institutions and public expenditure concludes that the link between policy statements and budget allocations in Mozambique is weak. Although environment was well integrated in the PARPA II, the actual budget allocation to environment was a mere 0.9% of GDP, which is considerably lower than the World Bank's recommended spending on the environment for developing countries (between 1.4% and 2.5%).[37]

Environment and climate change is currently coordinated by the MITADER but implementation at sectoral level is still weak. Many sector ministries have established their own environmental units but these are not adequately coordinated and there are weak institutional links between MITADER and the sector ministries. Climate change, especially lacks a champion and the division of responsibilities and mandates between different organisations is ineffective. Few sector ministries are working with climate change issues. MICOA was suspended for non-performance, it is yet to be seen how the new arrangements will improve coordination and implementation of climate action. The National Council for Sustainable Development (CONDES), mandated to promote cross-sectorial dialogue and monitor implementation of policies related to environmental management, has failed to position itself and is hardly noticed (Wingqvist, 2011.

The GoM's policy documents that were developed in the early 2000s did not incorporate climate change, yet they are important in giving direction to national development. The Agenda 2025 identifies vulnerability to natural disasters such as flooding, drought and cyclones; as threats to human capital, hence to efforts to fight poverty, however, it lacks a clear indication of the impacts of climate change on the development of the country. Policy review in Mozambique should take into account integration of climate change and disaster risk reduction, given the country's high vulnerability ranking.

Climate change will have impacts across all sectors in Mozambique and so ensuring that appropriate adaptation plans are integrated across the economy will be a responsibility that must be shared by all line ministries and agencies. Currently, responsibilities are not well defined and legal and regulatory provisions for addressing climate change are fragmented across a range of different legal and regulatory instruments and institutional mandates.[38]

5.0 Climate change financing for Mozambique

Mozambique still remains as one of the poorest countries in the world and is highly dependent on foreign aid. Development assistance accounted for 14.9 percent of GDP in 2011. However, among all Sub-Sahara African countries, Mozambique was third (in 2014) in terms of the climate finance that had been approved ($130 million; South Africa was first with as much as 500 million USD).

[36] Wingqvist, O., G., 2011. Environment and Climate Change Policy Brief – Mozambique

[37] Cabral and Dulcídio, 2008. *Environmental Institutions, Public Expenditure and the Role for Development Partners. Mozambique Case Study.* ODI, February 2008.

[38] The Government of Mozambique, 2011. Mozambique strategic program for climate resilience

The country has attracted strong donor support for reconstruction and development over the last two decades and continues to obtain high volumes of external aid. However, more recently it has started to attract impressive inflows of foreign direct investment, particularly (though not exclusively) in the natural resource/extractive industries sector. Domestic resource collection has increased dramatically which has reduced the significance of Overseas Development Assistance (ODA) from 44% of the state budget in 2010 to 24% in 2015 (UNDAF 2017-2020; MoFA, 2015)

There are several sources of climate finance for Mozambique, which include the following;

The EU's **Global Climate Change Alliance (GCCA**) runs a support project to the Government of Mozambique for the mainstreaming of climate change into policies and strategies and to adapt to climate change impact. This project ran from June 2011 until December 2015 with a budget of €47 million (of which €15.2 million from the GCCA, €31.5 million from DANIDA, and €0.3 million from the Government of Mozambique).

In 2014, a new phase of the GCCA, **the GCCA+,** an EU flagship initiative supporting climate resilience began in line with the European Commission's new Multiannual Financial Framework (2014-2020)[39]. The new GCCA+ flagship programme is to address the actual and foreseen climate change needs in achievement of the UN's Sustainable Development Goals (in particular goal 13 related to climate change) and the implementation of the UN Framework Convention on Climate Change (UNFCCC) Paris COP21 outcomes. The GCCA+ flagship is funded under the EU thematic programme Global Public Goods and Challenges 2014-2020 with an initial envelope of more than €330 million. Compared to the previous programme, GCCA+ will embrace new features, including support to Mainstreaming climate change into poverty reduction and development efforts; Increasing resilience to climate related stresses and shocks; and (3) Supporting formulation and implementation of concrete and integrated sectoral based climate change adaptation and mitigation strategies, including National Adaptation Planning (NAPs) and INDC processes.

Mozambique also receives funds from the UNFCCC Clean Development Mechanism (CDM) implemented by UNDP and UNEP. Under this fund, Mozambique receives capacity development support on climate change as well as financial support for (mitigation) activities. The amount of funds has not been accessed.

Mozambique is part of the group of countries which are implementing the Pilot Programme for Climate Resilience (PPCR), which encompasses support for the institutional and policies' reform, for the funding of pilot projects (roads, agriculture, early warning systems, coastal cities and irrigation) and for knowledge management. In addition to the PPCR, the World Bank is also funding actions in water resource sectors and conservation areas. The country is also implementing other projects supported by the Least Developed Countries Fund (LDCF), the PASA, the African Development Bank, the JICA, the USAID and the Portuguese Carbon Fund, among others.[40]

The PPCR consists of pilot projects designed to pilot and demonstrate ways to mainstream climate risk and resilience into core development policies and planning. The government prepared a Strategic Program for Climate Resilience (SPCR), with the assistance of the World Bank, the African Development Bank (AfDB) and the International Finance Cooperation (IFC), with additional support from the Climate Investment Funds (CIF). The SPCR consists of three pillars:

[39] http://www.gcca.eu/sites/default/files/gcca_concept_note.pdf
[40] INDC, 2015

i) institutional and policy reform; (ii) pilot investments in different sectors (hydro-meteorology, rural roads, agriculture, private sector and urban); (iii) knowledge management[41]

5.1. Ireland's Contribution to Climate finance

Globally, Ireland has made significant advances in delivery of climate finance in recent years. In 2015, Ireland mobilised €36million in climate finance, an increase from €33.67m in 2014 and €34.15m in 2013. This included support for multilateral climate change funds including the Least Developed Countries Fund (LDCF) as well as the Least Developed Countries Expert Group (LEG) via the UNFCCC Trust Fund for Supplementary Activities. Ireland will continue to support climate mitigation and adaptation in developing countries in line with our commitments under the UNFCCC. Ireland's public climate finance will be predominantly provided through bilateral grants to Key Partner Countries through Irish Aid, Ireland's overseas development assistance programme, together with direct grant contributions to various multilateral institutions or funds, such as the GEF, GCF and LDCF. Ireland is currently exploring ways to mobilise private climate finance to support mitigation and adaptation in developing countries.

5.2. Irish Aid Contribution to Climate Finance in Mozambique

In 2016, Ireland provided a total of € 3,480,866 to Mozambique in climate finance through its bilateral aid programme. In addition, Ireland provided € 639,244 in 2016 in climate finance to projects in Mozambique through its civil society programme. Climate relevant expenditure provided by Irish Aid to civil society organizations in 2016 was Rio marked and accounted for systematically for the first time, in cooperation with the project partners themselves. Projects funded directly by Irish Aid under the bilateral aid programme include Prosan- programme for food security and nutrition; preparedness and disaster risk reduction; building a competitive horticulture cluster and revitalizing the coconut sector; and, responding to nutrition emergency in drought affected provinces. Civil Society partners Concern, Child Fund, Serve and Help age are helping to build resilience to climate change through a wide range of projects including providing that extreme poor farm families and vulnerable groups have increased access to, control of and returns from productive livelihood and social support mechanisms; reducing vulnerability and improvement of livelihood security for poor children, young people, women and men in targeted communities; and providing that older men & women benefit from more accessible social protection programmes.

The summary of climate expenditure for 2014-2016

	2016		2015		2014	
	Bilateral €	Civil Society	Bilateral	Civil Society	Bilateral	Civil Society
Climate Finance Adaptation (UNFCCC)	3,261,366	599,594	€550,000	€400,000	€1,487,500	€700,000
Climate Finance Mitigation (UNFCCC)	0	0	0	0	0	0

[41] https://www.climateinvestmentfunds.org/country/mozambique

Climate Finance Cross-cutting (UNFCCC)	219,500	39,650	€732,187	€500,000	€800,000	€40,000
Biodiversity (UNCBD	339,000	419,653	0	0		0
Desertification (UNCDD)	1,860,273	39,650	0	0		0
Disaster Risk Reduction (DRR)	245,224	N/A	€150,000	0	€1,087,500	0
Total Climate Finance	**3,480,866**	**639,244**	**€1,282,187**	€900,000	**€2,287,500**	**€740,000**
Annual Totals	**€4,119,810**		**€2,182,187**		**€3,027,500**	

6.0. Donor Coordination in Mozambique

The EU (EC and member states) represents the largest source of Official Development Assistance (ODA) to Mozambique (approximately 75% of total ODA). Among the biggest donors to Mozambique are the World Bank (IDA), the USA, the EC, the UK, the Netherlands, Sweden and Norway. The Multi-Annual Programming for the 11th European Development Fund (EDF 11, 2014–2020) has improved the possibilities for the EU to put in practice the principles concerning the division of labour. However, full EU joint programming is not yet in place.

Mozambique's aid dependency is gradually reducing, even if at the moment external assistance continues to account for over 30% of the budget. However, the GoM has noted on several occasions its commitment to reduce aid dependency. Notwithstanding an ongoing engagement with new donors, such as Brazil, China, India, South Korea, and Vietnam, and a complex relationship with South Africa, Mozambique remains dependent on traditional donors to finance much of its budget. Since 2001, general budget support has risen from US$29.5 million to US$440 million, currently about 14% of the government's budget. To this must be added significant on and off budget sector support, which means that about half of government expenditures are aid supported[42]. While this new partnership with the emerging economies will bring Mozambique new economic opportunities, it is important to bring them to the dialogue of donor harmonisation[43].

A complex architecture of Programme Aid Partners, who include Ireland and which is known as the G19 provide general budget support, with a number of observers also participating in its dialogue structures. The G19 works with the government of Mozambique through a system of joint monitoring and review, at both general and sector level, augmented by political level dialogue. This is governed by a Memorandum of Understanding, brokered during Ireland's presidency of the G19, signed by the government of Mozambique and the Programme Aid Partners.

An active donor working group on environment and climate change exists, aiming at harmonizing support to Government on environmental issues in general and encompassing climate change portfolios. Out of this large group, a smaller group of donors comprising Agence Française de Développment (AFD), DANIDA, DFID, UNDP, World Bank and African Development Bank

[42] Irish Aid, 2012
[43] Ministry of Foreign Affairs of Finland, 2014

proposed coordination arrangements among the different projects funded in the country, especially the PPCR programme[44].

Mozambique is also a pilot country for the United Nations "Delivering as One" Initiative. The United Nations Development Assistance Framework for Mozambique (UNDAF) 2017 – 2020 has been developed and is aligned with national and international development instruments, notably the Government's Five Year Programme, 2015-19 and the Sustainable Development Goals (Agenda 2015-2030). This new framework combines the efforts of 21 UN agencies active in the country to provide coherent, effective and efficient support to address key development challenges, complementing the considerable support of bilateral and other multilateral partners. This UNDAF represents exclusively the entirety of the UN's activities in Mozambique, including those for humanitarian assistance, and is therefore the UN's One Programme for Mozambique. The UNDAF has been developed jointly among UN agencies and with Government institutions and partners in line with the principle of "Delivering as One" and Global Partnership for Effective Cooperation. The framework is based on a situation analysis of the main development issues in the country, reflection on UN's comparative advantages and lessons learnt from the implementation of the previous UNDAFs. The UNDAF budget for environment and climate change is estimated at $105,172,544 for the period 2017-2020[45].

7.0. Ireland's Approach to Climate Change Adaptation

One World One Future (OWOF); Ireland's Policy for International Development, 2013 has a vision of contributing to a sustainable and just world, where people are empowered to overcome poverty and hunger and fully realise their rights and potential. Amongst the key changes that we will make will be the reorientation of our efforts towards developing countries that are experiencing greater degrees of hunger, fragility and instability, because of conflict, disaster or the harmful effects of climate change. Climate change is one of the six priority areas. And the key decision is to put climate change at the centre by working hard to ensure that our efforts are more firmly geared towards addressing this challenge, including promoting a balance between the social, economic and environmental aspects of development.

In addressing environment and climate change, Ireland recognises that in all countries, economic and social progress is dependent more than ever before on the health of the environment. Environmental hazards such as pollution, severe weather events and climate change threaten livelihoods and development, and could drive millions more into extreme poverty. Climate change is projected to reduce crop yields for subsistence farmers in many African countries making them more vulnerable to food shortages. Two of the three goals in OWOF focus on reduced hunger, stronger resilience and sustainable development and inclusive growth speak to climate change commitments, including; working more strategically to advance economic growth which benefits poor people and is environmentally sustainable while supporting

> A resilience approach is a way of working that helps to build resilience in order to protect the assets – property, knowledge, well-being, security and social cohesion of poor people and countries in the face of a range of shocks and stresses. Adopting a resilience approach helps to shine a spotlight on the root causes of poverty, inequality and exclusion from the perspective of communities
>
> (Irish Aid, 2016)

[44] The Government of Mozambique, 2011. Mozambique strategic program for climate resilience

[45] UNDAF, 2017-2020

efforts that respond effectively to climate change. The top priority for the Government of Ireland is to reduce hunger and vulnerability, and build people's resilience to natural and other disasters. Under climate change and development, there is focus on achieving a balance between the economic, social and environmental aspects of development. Our approach follows on from Our Sustainable Future, a Framework for Sustainable Development for Ireland, the Government's policy framework for green and sustainable national prosperity. Our efforts will be aimed at ensuring that developing countries, especially our Key Partner Countries, can develop in a way that is resource-efficient, climate-resilient (protecting themselves from the risks of climate change) and low in carbon emissions.

Priority areas for action under climate change and development[46]

What we will do

- We will support developing countries and vulnerable communities to formulate national responses to environmental degradation and climate change as a matter of priority. In this, we will continue to focus primarily on improving people's resilience to climate change.
- We will build on the synergy between our priority areas for action and will appraise our programmes against the economic, social and environmental aspects of development, recognising their interlinkages and ensuring that these remain balanced at all times.
- Our efforts to support sustainable natural resource management (for example, maintaining land and soil fertility) will be continued. We will support developing countries to conserve and sustainably use their biodiversity, securing local ecosystems that are vital in all development efforts.
- We know that climate change impacts disproportionately on women, and we are committed to working to address this by supporting efforts to promote gender equality.
- We will support developing countries to maximise the potential of green development, including approaches to carbon sequestration (the storage of carbon that would otherwise be released into the atmosphere) for the reduction of poverty. Opportunities for engaging Irish expertise in the area of green technology and in off-setting emissions will be explored.
- We will support developing countries in their transition from the inefficient use of traditional energy supplies towards the use of modern energy sources such as solar energy and energy-efficient cook stoves.
- We will increase our focus on disaster risk reduction in development programmes - bridging the gap between our emergency interventions and our development efforts and supporting efforts to increase resilience to the adverse impacts of climate change.
- The international community has committed to provide $100 billion per annum by 2020 for climate action in developing countries within the ongoing climate change negotiations. Ireland will maintain its engagement with the UN Framework Convention on Climate Change and Kyoto Protocol global processes, and strive to meet the obligations arising from these.

The Climate Change and Development Learning Platform

Irish Aid in partnership with International Institute for Environment and Development (IIED) host an organised Climate Change and Development Learning Platform which focuses on research and capacity building. The initiative provides evidence and capacity for key partner countries to mainstream climate change into Irish Aid country programmes as well as publishing guidance notes and briefs on priority Irish Aid focus areas. The platform also links country level experiences to

[46] Extract from One World One Future; Ireland's Policy for International Development

international policy frameworks. Details of the climate change work in Ethiopia can be accessed on https://www.climatelearningplatform.org/key-partner-countries/Mozambique

7.1. Irish Aid Mozambique's climate change programming

Irish Aid's Country Strategy for Mozambique specifically addresses climate change as a key component of a comprehensive approach to addressing vulnerability in Mozambique. Climate change is taken care of under objectives focusing on strengthening resilience and improving household food security and nutrition. The goal of the Country Strategy Paper focuses on inclusive poverty reduction with a greater focus on the most vulnerable. Climate change is increasing vulnerability especially for the very poor, therefore addressing climate change tackles underlying causes of poverty and vulnerability.

Social protection and Climate Change

The Government of Mozambique has been working towards establishing a social protection floor and organizing it at different levels. In 2007 the Social Protection Law was adopted which has set the legal and institutional framework with broad social components (social, health, education and social inclusion), followed with new regulatory framework in 2009 and more precise definition of the components was included in 2010 National Strategy for Basic Social Security (ENSBB). The ENSBB has been expanded into a comprehensive social safety net programme that formed the Strategic Operational Plan for Basic Social Security programmes in 2011. This process has been accompanied with scaling up spending significantly; it has risen from around US$ 13 million in 2008 to US$ 57 million under the 2013 budget. Furthermore, a budget allocation of around 0.8 percent of GDP is envisaged by the Government for the 2014–16 budget (FAO, 2016)

Case study research; Prospective assessment of how to link social protection and climate resilience objectives and interventions to benefit poor climate vulnerable households[47]

Irish Aid funding for social protection has grown steadily over the last decade. In Key Partner countries, social protection budgets grew from €7.2 million in 2006 to €20.3 million in 2016. Significant funding for social protection instruments is also provided through civil society partners and humanitarian programmes. In the latter, specific funding for food transfers is typically in the region of €6 million annually and in some years significantly higher. With a move towards an increasing use of unconditional cash transfers in humanitarian responses it can be expected that the SP expenditure in humanitarian responses is likely to be maintained or may increase. Many of the multilateral organisations, supported by Ireland, such as the World Bank (IDA), EU and WFP are also significant funders of social protection instruments. Irish Aid is continuously working toward strengthening the nexus between social protection and climate change risks and shocks to reduce the vulnerability of communities and build their resilience.

Irish Aid Mozambique and IIED, under the climate change development and Learning Platform commissioned a study to explore the linkages between social protection and climate change in Mozambique. The assessment sought to identify and assess, in a logical and analytical way, the

[47] https://www.climatelearningplatform.org/2016-mozambique-report-assessment-how-link-social-protection-and-climate-resilience-objectives-andn

options for linking Social Protection (SP) provision and support to climate change adaptation for the benefit of the poorest people in Mozambique. The endpoint of the assessment was to identify ways to strengthen and link SP provision and support to climate adaptation.

Findings of the Study

- There are significant overlaps and interaction of poverty and climate vulnerability. SP programmes are active in some high climate risk areas due to a focus on poverty rather than on climate risks. SP coverage is limited particularly within, but also between districts. There is therefore substantive geographic evidence to support potential linkages between SP provision and local adaptation processes.
- Climate risk management is not currently integrated into SP programming. Currently local adaptation planning does not focus on the needs of the poorest nor does it seek to align with SP provision. Better methodologies and technical capacity building are needed to integrate climate risk management into SP provision and to facilitate links between SP and climate adaptation.
- The national policy framework provides an enabling environment for SP and climate adaptation links. Current inter-institutional coordination is insufficient at all levels. Building upon the higher level political will, better incentives for coordination and inter-institutional links are necessary.
- The current performance of the SP system is limited by capacity constraints, financial and administrative, and the absence of key management system. Significant investments in the SP system will be required to increase the level of benefits it provides, expand coverage and improve the process for public works priority selection, and the monitoring of outcomes among other design and operational considerations.

The assessment concluded that there are opportunities to foster a SP system in Mozambique better adapted to the climate risks the system and its beneficiaries face now and in the future. The opportunities can be taken through integration climate risk management into the system, and by better coordination of SP and climate adaptation interventions to benefit the same populations in regions of the country where high poverty incidence and high climate risks coincide. Irish Aid Mozambique will explore opportunities, niches and approaches for further work on establishing links among SP and climate adaptation. (Anderson, Sitole, & Varela, 2016).

As a result of the study, Irish Aid Mozambique is designing a project linking social protection and climate adaptation to address poverty and climate risks**.** The PRIORIZE Initiative links social protection and climate adaptation at the district level to better address the poverty effects of climate risks. It works as a catalyst of actions by local authorities and services. It is both innovative, bottom-up and district government-led, and complementary to how Government and other stakeholders are reforming the social protection system through top-down, central ministry lead measures.

Climate change, Agriculture, Livelihoods and Nutrition

Irish Aid Mozambique is implementing a host of programmes to improve food security, livelihoods and nutrition for the vulnerable people. Key ones that have/are being implemented include;

The PROSAN - programme on food security and nutrition (2012-2017) includes two main pillars: economic empowerment and social empowerment. The economic pillar tackles household food and nutrition insecurity while strengthening resilience to natural disasters and climate change. Low agricultural production, the dependence on farm and natural resource based incomes and limited climate change adaptive capacity are addressed in an effort to reduce the poverty and vulnerability of targeted communities. The social pillar, focuses on increasing the efficacy of the economic pillar, addresses gender and power inequality. Addressing the underlying causes of vulnerability is therefore a fundamental component of PROSAN's framework, distinguishing its methodology from typical food security and adaptation initiatives.

Building a competitive horticulture cluster & revitalising the coconut sector (2013-2017) aims to stimulate growth of the agricultural economy and enhance long-term resilience of the poorest households by improving productivity of horticulture and in particular, coconut trees through re-planting and intercropping. This is expected to lead to increased productivity due to improved soil fertility while also building the capacity of the Provincial Directorate of Agriculture (DPA). Climate change is recognised within the project with an early objective to increase capacity for mitigation and adaptation at the local level.

Municipal development programme (PRODEM) for North and North-Central Mozambique (2015-2018); The overall objective of PRODEM is to contribute to urban poverty reduction and sustainable development of the municipalities, through improvements in municipal governments' administration and service delivery, resilience to climate change impact, social accountability and citizen participation. The main sub-objectives include 'Responsible municipal governance: municipalities with improved urban management, enhanced climate change resiliency, better provision of key services and citizens aware of their rights and duties enabled to hold municipal governments accountable'. This pillar entails a specific component on urban management for improved climate resilience. The aim for PRODEM is to cover up to 26 municipalities

The Agriculture and Natural Resources programme (ARENA) aims to address the main problems identified for Niassa which include low productivity, undiversified agriculture with low economic profit, access to land and threatened natural resources. The aim is to improve outcomes in application of sustainable and climate adaptive agricultural techniques. ARENA promotes good natural resource and environmental management as a means to tackle poverty reduction and economic growth. ARENA also promotes natural resource management through enhanced agroforestry techniques.

Irish Aid also supports a provincial multiannual plan for the agriculture sector, in Inhambane. Inhambane is prone to cyclical floods and droughts, which have become more frequent and intense over recent years. A high percentage of the provincial population is dependent on subsistence agriculture and natural resource extraction. The Provincial Directorate of Agriculture (DPA) of Inhambane has 4 priorities of which the third is natural resource management with an objective to promote the sustainable use of land, forestry and wildlife. The plan specifies increased capacity at the local level for mitigation and adaptation to climate change.

Climate change, Water and Sanitation

Irish Aid is implementing a multiannual provincial support to water and sanitation in Inhambane province. Irish Aid works with the Directorate of Public Works and Housing's (DPOPH) whose first priority is to ensure sustainable water resources management, in combination with the availability of water and sanitation for socioeconomic activities. The programme's main objective is to increase the coverage of safe drinking water in rural districts, vulnerable to climate change and natural disasters. Activities specified under this priority include the construction of cisterns for rain water harvesting in drought prone communities and support to the construction and rehabilitation of boreholes for safe drinking water (built with solar panel pumps).

Climate change and Governance

Under governance, Irish Aid supports a Municipal Development Programme (PRODEM) for North and North-Central Mozambique (2015-2018). The overall objective of PRODEM is to contribute to urban poverty reduction and sustainable development of the municipalities, through improvements in municipal governments' administration and service delivery, resilience to climate change impact, social accountability and citizen participation.

The main sub-objectives include "Responsible municipal governance: municipalities with improved urban management, enhanced climate change resiliency, better provision of key services and citizens aware of their rights and duties enabled to hold municipal governments accountable". This pillar entails a specific component on urban management for improved climate resilience. The aim for PRODEM is to cover up to 26 municipalities.

8.0. Summary of Climate change implications for country development programming

- There is a likelihood of increase in intensity and frequency of disasters (droughts, floods, cyclones, sea level rise etc) due to rainfall variability and the increase in temperature. Mozambique is ranked as high risk in terms of hazard and exposure, with high vulnerability and low coping capacity as well as being least ready to address climate and disaster impacts. This requires innovative approaches to manage risks. Integrating climate change in development planning will be very important as well as strengthening the nexus between climate change, disaster risk reduction, humanitarian response and development to reducing vulnerability and building resilience and sustainable development

- In order to identify high risk locations and groups, it is important that periodic national and context specific vulnerability assessment be undertaken. Knowledge of such groups and

locations will inform the adaptation plans to address priorities of those in greatest need, as well as inform climate risk management processes.

- There is need to focus on addressing climate risks while promoting inclusive and climate resilient economic models that can increase incomes for the poor. An economic analysis of climate change in Mozambique reveals that climate change costs could reach USD7.6 billion dollars if no adaptation measures are implemented. Mozambique being ranked as one of the poorest countries, climate change will make the economy worse under the BAU scenario, driving majority of the poor into further poverty.
- Humanitarian response should take into consideration long term mitigation actions to reduce impacts than just reacting to emergencies. The number of people in need of humanitarian assistance in Mozambique is increasing with the frequency and intensity of disasters in recent years.
- Resilience programming will be important to manage risks, focus on long term programming and financing while strengthening viable and innovative models for economic growth and development. If disaster resilience is not strengthened in the medium and long term it will affect over all ODA thus development efforts in the country. Emphasis should be put on building resilience of the country, systems, households and individuals to cope with climate and disaster risks and shocks.

- Decrease in agriculture production and productivity with serious negative impacts on food security and nutrition is highly likely. Climate risk management and strengthening of food systems approaches will be important across all development programmes to improve food security, nutrition, but also enhance economic development for the poor since over 70% of the Mozambican population depends on agriculture. There is also need to strengthen agricultural research to understand the agro ecological zoning and shift in crop suitability as well as viable technologies and innovations to improve production

- Investments in human capital will contribute both to the adaptation and the development agenda. Capacity building and strengthening of Government structures at national and sub national levels will be key to improve sustainable development, planning for uncertainties, managing risks and reducing vulnerabilities resulting from climate change and disaster impacts.

- Investment in generating and disseminating accurate, timely and reliable weather and climate information will be important to inform different sector adaptation and climate risk management plans and decisions regarding changes in climate.

- Strengthening integration of climate change, disaster risk reduction and social protection mechanisms into development programmes will be important to make sure that the impacts of climate change and disasters is reduced on the very poor and vulnerable households.

- Adaptive social protection has the potential to reduce vulnerability of the poor to the impacts of climate change, and climate change adaptation can also buffer the poor and vulnerable from climate risks and shocks and protect their assets and livelohood resources.

- Gender inequality and poverty will be exercebated by climate change impacts in Mozambique. Unsustaibable coping mechanisms like migration, reducing meals and degradation of natural resources will continue to impact the poor and vulnerable if long term adaptation and mitagation actions are not implemented. Gender analysis should be done across all climate change adaptation programmes and decision makers should design adaptation options that are pro poor and gender transformative.

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