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Climate Change Profile: MOZAMBIQUE

This profile is part of a set that was developed in a cooperation between:
the Netherlands Ministry of Foreign Affairs (MFA), Ms K. Warner and
Mr P. van de Logt (IGG)
Aidenvironment, Ms M. van Schaik
the Dutch Sustainability Unit (DSU), Ms G.L. Buit



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For more information or additional advice: climatehelpdesk@minbuza.nl

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To	Mr P. van de Logt (Netherlands Ministry of Foreign Affairs/IGG) Embassies of the Kingdom of the Netherlands
From	the Dutch Sustainability Unit of the Netherlands Commission for Environmental Assessment
Technical secretary	Ms G.L. Buit
Quality Control	Mr S.G. Nootboom
Experts consulted	Ms K. Warner (Netherlands Ministry of Foreign Affairs) Ms M. van Schaik (Aidenvironment)
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Contact:

W: www.dsu.eia.nl

T: 030-2347653

E: dsu@eia.nl

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Climate Change Profile: Mozambique

Mozambique is one of Africa's most vulnerable countries to climate change. Poverty, weak institutional development and frequent extreme weather events make Mozambique especially vulnerable. Climate-related hazards such as droughts, floods and cyclones are occurring with increasing frequency, which is having a cumulative and devastating impact on a population that is insufficiently prepared. Central Mozambique is projected to experience recurrent agricultural losses as a result of droughts, floods, and uncontrolled bush fires. The densely populated coastal lowlands will be increasingly affected by severe erosion, saltwater intrusion, loss of vital infrastructure and the spread of diseases such as malaria, cholera, and influenza. Changing rainfall patterns will lead to a decrease of soil water recharge, impacting ground water resources and the water table in wells. Reduction of Mozambique's trans-boundary river flows will decrease the availability of surface water.

Overall ranking

Mozambique ranks 149 out of 180 countries in the ND-GAIN index¹ (2014), a slight improvement from its rank of 152 in 2013. It ranks 31st on vulnerability and is the 38th least ready country – meaning that it is vulnerable to, yet unready to address climate change effects. *Vulnerability* measures the exposure, sensitivity, and ability to cope with climate related hazards by accounting for the overall status of food, water, environment, health, and infrastructure within a country. *Readiness* targets those portions of the economy, governance and society that affect the speed and efficiency of adaptation.

Biophysical vulnerability

Current climate. Mozambique has a tropical to subtropical climate, with some semi-arid regions in the southwest of the country. The east consists of lowlands while the west is more mountainous. Mozambique has a coastline of 2,700 kilometres². Average **temperatures** are highest along the coast as well as in the south of the country (20–26 °C) and lower in high inland regions³. There are seasonal temperature variations, with a cool dry season from April to September (coolest months are June – August) and a hot humid season from October to March (warmest months are December – February)^{4,5}.

Rainfall is highest in the north (1,000 mm/year) and lowest in the southeast (500 mm/year), but also varies according to topographic features – with most rainfall in higher areas and along the coast (800–1,200 mm). The driest area of the country is the southern inland area, where some locations receive only 300 mm of rainfall per year⁶. Rainfall mainly occurs during the hot season, from November to April – with the majority falling between December and February.

¹ GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with readiness to improve resilience. <http://index.gain.org/country/mozambique>

² Climate Service Center (2015): *Climate Fact Sheet: Mozambique*. Updated version 2015.

³ World Bank (2011): *Vulnerability, Risk Reduction, and Adaptation to Climate Change: Mozambique*. http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdr climate_change_country_profile_for_MOZ.pdf

⁴ Adaptation Partnership (2012): Review of Current and Planned Adaptation Action: Southern Africa. Chapter 7 Mozambique. http://www.preventionweb.net/files/25730_mozambique.pdf

⁵ McSweeney, C.; New, M.; Lizcano, G. (2010): UNDP Climate Change Country Profiles: Mozambique. http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP_reports/Mozambique/Mozambique_hires.report.pdf

⁶ Climate Service Center (2013); World Bank (2011)

The north receives 150–300 mm of rainfall per month during this season, while the south receives 50–150 mm per month⁷.

Mozambique is frequently affected by tropical **cyclones** which mainly occur during the hot, humid season⁸. In January 2012, for example, cyclone Leon–Eline affected 4.5 million of its population.

Current trends. An increase in mean annual **temperature** has been observed in Mozambique (reports range from +0.3 °C for 1900–2010 to +0.6 °C for 1960–2006). This increase is most significant for the end of the rainy season. The largest increase was observed in the south of the country (up to 1°C over 100 years) while the north has not experienced a significant change⁹. The number of ‘hot days’ and ‘hot nights’¹⁰ has increased significantly, by 6.8% and 8.4% respectively between 1960 and 2003¹¹. These increases are strongest between December and May¹².

Average annual **rainfall** has decreased significantly at a rate of 3.1% per decade between 1960 and 2006. At the same time, the proportion of rain falling in heavy rain events has increased at a rate of 2.6% per decade. Both of these trends are most significant between December and February – in the main rainy season. These trends show regional variability, with largest rainfall decreases in the south and smaller decreases (even some local increases) in the north of the country¹³.

The south and coastal regions have experienced increasing rates of **extreme events**, due to these changes in temperature and rainfall. The south has become hotter and dryer and experiences more frequent persistent droughts, while coastal regions have faced more episodic floods. At the same time, a sea level rise of about 3 cm has been observed at Maputo between 1961 and 2001¹⁴.

Climate change. Climate projections show a significant average **temperature** rise (ranging from a minimum increase of 1.0 °C for 2010–2100 to a maximum increase of 4.6 °C for 2010–2090). Highest increases are expected for inland and southern regions, especially the Limpopo and Zambezi valleys (up to 3.0 °C increase by 2055), but also in coastal areas. Seasonally, the highest increases are projected for the September–November period (the onset of the hot season) – see [Map 1](#). The number of hot days and nights is likely to increase further, occurring on 20–53% of all days and 26–76% of all nights by 2090 (compared to 10% for each in the current situation as a reference value). The likelihood of a maximum daily temperature above 35 °C will

⁷ Climate Service Center (2013); Adaptation Partnership (2012); McSweeney et al. (2010)

⁸ Climate Service Center (2015); Maure, G.A.; Thomas, T.S.; Hachigonta, S.; Sibanda, L.W. (2013): Southern African Agriculture and Climate Change. Chapter 6: Mozambique. <http://www.ifpri.org/sites/default/files/publications/rr179ch06.pdf>

⁹ Climate Service Center (2015); Adaptation Partnership (2012); McSweeney et al. (2010); World Bank (2011)

¹⁰ Defined as days with a temperature that is exceeded on 10% of days/nights in the reference period – i.e. the number of hot days/nights in the reference period is always 10%.

¹¹ McSweeney et al. (2010)

¹² McSweeney et al. (2010); World Bank (2011)

¹³ McSweeney et al. (2010); World Bank (2011)

¹⁴ Climate Service Center (2015); Adaptation Partnership (2012); World Bank (2011)

be 25% higher in 2090 compared to current circumstances. The main increase in number of hot days/nights is projected for the hot season, December–February¹⁵.

Rainfall projections show no substantial change in total annual rainfall on the national level (–8 to +14% for 1975–2100). Regional and seasonal changes are however more pronounced:

- a rainfall increase of 1–8% (2010–2090) is expected for the north of the country, mainly in the rainy season (December–February);
- a decrease is projected for the west, south and central regions of the country (including Zambezi valley) during the onset of the rainy season, with a strong decrease up to 31% projected for September and October;
- another decrease for the south of the country is expected for the main rainy season, December–February;
- The coast may experience a decrease (up to 24%) in rainfall between June and August.

Most models also project a significant increase in the proportion of total rainfall that will fall in heavy rain events, while simultaneously dry spells will be elongated. The intensity of heavy rain events is expected to increase by 10% (2010–2100), while their frequency is projected to increase by 6%. The duration of long-lasting heat waves is expected to increase by 17 days on average by 2100¹⁶. These increases in heavy rainfall as well as heat waves are likely to result in an increase in extreme events, including droughts and floods (see [Map 2](#)). An increase in **droughts**, caused by longer heat waves and dry spells, is expected for central and southern regions of the country¹⁷. At the same time, more **floods** can be expected across the country – especially during the rainy season. While the north is likely to experience floods more frequently, the magnitude and damage of floods will often be higher in the south. The Limpopo basin has been indicated as a hotspot for floods, with an average increase of 25% in the magnitude of flood peaks (see [Map 3](#))¹⁸. **Cyclones** will continue to form a danger for the east of Mozambique. Although they may occur less frequently, their intensity and associated precipitation is likely to increase¹⁹.

While more severe cyclones have been identified as the main threat for the coastal region until 2030, accelerating **sea level rise** is expected to present the greatest danger after 2030. Between 1990 and 2090, projections for sea level rise range from 13–56 cm²⁰. Another threat for coastal regions is **erosion**, which is a severe danger due to increased cyclone intensity along soft coastlines combined with sea level rise. The most vulnerable area is around the city of Beira, characterized by a delta and mangrove forest in the north and high vegetated dunes in the south. Erosion is less severe in northern Mozambique due to a protective coral reef; the coral is however threatened by extractive activities, over-fishing, and sea level rise. Some scenarios

¹⁵ Climate Service Center (2015); Adaptation Partnership (2012); McSweeney et al. (2010); World Bank (2011); Van Logchem, B.; Queface, A.J. (eds.) (2012): *Responding to Climate Change in Mozambique: Synthesis Report*. Maputo INGC. <http://www.undp-aap.org/sites/undp-aap.org/files/INGC%20Synthesis%20Report%20ENG.pdf>

¹⁶ Adaptation Partnership (2012); McSweeney et al. (2010); Davis, C.L. (2011): *Climate Risk and Vulnerability: A Handbook for Southern Africa*. Council for Scientific and Industrial Research, Pretoria, South Africa. http://www.sarva.org.za/sadc/download/sadc_handbook.pdf

¹⁷ World Bank (2014): Mozambique Dashboard. http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=MOZ&ThisTab=NaturalHazards

¹⁸ World Bank (2011 and 2014); USAID (2012): Mozambique: The Impact of Climate Change on Water and the Coastline. http://www.sarva.org.za/sadc/download/moz2012_08.pdf

¹⁹ World Bank (2014)

²⁰ Climate Service Center (2013); Van Logchem and Queface (2012); McSweeney et al. (2010)

suggest that erosion could push parts of Mozambique's coastline as far as 500 meters inland, posing serious challenges for these densely populated areas²¹.

Climate change will affect **water availability** and **food security** in Mozambique in a number of ways:

- yields will decrease due to more hot days during the harvest cycle of major grain crops, while a less predictable onset of the rainy season increases risks of crop failure;
- higher evapotranspiration combined with erosion, deforestation and general climate roughness will in most areas lead to reduced recharge of water in the soil, causing low groundwater tables, empty wells, and a lack of water for consumption and irrigation (see [Map 4](#));
- at the same time, higher evapotranspiration (9–13% by 2060) increases water demand, mostly in central and southern regions; this increase will be greater than potential rainfall increases projected for some areas;
- more severe floods and droughts make food production risky: households move their fields to more fertile and less drought-prone lowlands, but consequently face increased risks of floods;
- if current usage patterns of Mozambique's abundant but unevenly distributed water resources are continued, the Limpopo river will be dry most of the year and the Zambezi's flow will decrease by 15%;
- projected rainfall decreases for Zimbabwe and Zambia will decrease river flows in Mozambique because of the country's nine international river basins, and hence decrease water availability;
- as a result of these developments (and under current population growth rates), per capita water availability will decrease from 1900 to 500 m³ per year (2000–2050; see [Map 5](#))²².

²¹ World Bank (2014); USAID (2012); Van Logchem and Queface (2012)

²² World Bank (2011); Van Logchem and Queface (2012); USAID (2012); Warner, K.; Van der Geest, K.; Kreft, S. (2013): Pushed to the Limit: Evidence of climate change-related loss and damage when people face constraints and limits to adaptation. UNU-EHS. <http://www.ehs.unu.edu/file/get/11480.pdf>; GFDRR (2013): Country Program Update: Mozambique. http://www.gfdr.org/sites/gfdr.org/files/Mozambique_Country_Program_Updates_2013.pdf; Wingqvist, G.Ö. (2011): Environment and Climate Change Policy Brief – Mozambique: Generic outline. http://si-daenvironmenthelpdesk.se/wordpress3/wp-content/uploads/2013/04/Mozambique-Env-and-CC-Policy-Brief_20111.pdf

Socio-economic vulnerability

Key facts:

GDP (PPP) per capita (2015) ²³ :	USD 1,185.8
Population (June 2016) ²⁴ :	28,751,362
Projected population (2050) ²⁵ :	65,544,460
Population density per km ² (2014) ²⁶ :	35
Human Development Index (2014) ²⁷ :	180 out of 188 countries
Corruption Perception Index (2015) ²⁸ :	112 out of 168 countries
Gender Inequality Index (2014) ²⁹ :	135 out of 188 countries
Adult literacy (2015) ³⁰ :	58.8% (male 73.3%; female 45.4 %)

Mozambique is not only vulnerable to climate change due to its physical situation, but also due to socio-economic issues that increase negative climate change effects and decrease the population's capacities to adapt. Agriculture is mainly rain-fed and highly dependent on natural resources that may be decreased or degraded due to climate change. Mozambique's high level of poverty and low education/literacy limit people's options for making agricultural activities more climate-resilient and for finding alternative livelihoods. Climate change is expected to cause a drop in GDP of 4–14% or costs of up to USD 7.6 billion dollars by 2050, seriously hampering economic development. Mozambique's poor infrastructure (only 6% of highways are paved) limits people's mobility in case of extreme events. Population growth (2.5% per year) further increases pressure on natural resources. The majority of Mozambique's population lives in the coastal regions – where floods, cyclones, erosion and sea level rise pose serious risks – increasing their vulnerability to climate change³¹.

Climate change has disproportionate effects on women and girls in Mozambique, since they are more dependent on natural resources for household and agricultural tasks. Women are normally responsible for crop production (men are in charge of livestock) and availability of food and water for the household. Women's rights and control over natural resources is less than men's, and they are often underrepresented in decision-making bodies. Women's burdens are aggravated if they are left alone by men who migrate to larger cities or even abroad (which is according to some reports an increasingly common coping strategy to climate-related hazards, while other studies report reduced male migration in recent years)³². As a result, in many areas over 50% of households are female-headed, and women and girls need to cope with the burdens of reduced water availability and food security³³.

²³ World Bank Data – GDP per capita, PPP. <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

²⁴ World Population Review – Mozambique. <http://worldpopulationreview.com/countries/mozambique-population/>

²⁵ UNDESA (2015): *World Population Prospects: The 2015 Revision*. <http://esa.un.org/wpp>

²⁶ World Bank Data – Population density. <http://data.worldbank.org/indicator/EN.POP.DNST>

²⁷ UNDP (2015) http://hdr.undp.org/sites/default/files/2015_human_development_report_1.pdf, p. 210

²⁸ <http://www.transparency.org/cpi2015/results>

²⁹ <http://hdr.undp.org/en/content/table-4-gender-inequality-index>

³⁰ CIA (2015). The World Factbook – Mozambique. Available via <https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>

³¹ World Bank (2011); Winqvist (2011)

³² Arnall, A.H. (2006): *Understanding Adaptive Capacity at the Local Level in Mozambique*. ACCRA. http://community.eldis.org/.5af30949/Mozambique_Synthesis_Report_3_WEB.pdf

³³ Midgley, S.; Dejene, A.; Mattick, A. (2012): *Adaptation to Climate Change in Semi-Arid Environments: Experience and Lessons from Mozambique*. FAO. <http://www.fao.org/docrep/015/i2581e/i2581e00.pdf>; Mucavele, S.

Mozambique's vulnerability is to a large extent due to its dependence on agriculture, which contributes about 28% of its GDP and employs 81% of its labour force³⁴. Most of the country's agricultural production is done by small-scale subsistence farmers and 95% of food production is rain-fed. Few farmers can afford to invest in advanced agricultural technologies – and those who do, often on more fertile soils along river banks and flood plains, risk destruction of harvests by floods³⁵. The best soils are located in the country's extensive network of low-lying floodplains; however, these regularly experience flooding, which can overwhelm local coping capacities³⁶.

Mozambique's main crops in terms of consumed quantities are cassava, maize, wheat, rice and sorghum. Wheat is not produced domestically; the other four are among the most important production crops of the country, together with high value crops such as tobacco, potato, coconut, groundnut and cotton³⁷.

For some of these crops, climate change effects have been estimated over the period 2010–2055³⁸ (assuming an overall decrease in precipitation and an increase in temperature):

- cassava yields will benefit from increased temperature, but suffer from changing precipitation patterns: overall yields are expected to decrease by 2%;
- maize and soybean yields suffer from temperature and rainfall changes, resulting in projected decreases of 24% and 25% respectively;
- sorghum and groundnut yields suffer from temperature increases and slightly from rainfall changes, causing estimated decreases of 17% and 20% respectively;
- cotton responds well to changed rainfall patterns but not to temperature increase, and is expected to face a 24% yield decrease³⁹.

These impacts are average results for the entire country and do not account for regional variations. Maize, for example, is very sensitive to drought. As a result, maize yields in parts of the southern half of the country (the line between Tete in the northwest and Sofala in the east) may decrease by 45% (see [Map 6](#)), and similar projections exist for other main crops (see [Map 7](#)). In semi-arid regions such as those in Gaza province, even relatively drought-resistant crops (such as banana and sweet potatoes) will suffer major yield losses under the projected climate change⁴⁰. In the northern part of the country, however, a shift to crops that tolerate wetter conditions – such as cassava, maize, groundnut and rice – may increase future food security⁴¹.

(2010): Gender and Climate Change in Mozambique. MUGEDE. <http://yorkspace.library.yorku.ca/xmlui/bitstream/handle/10315/27508/CHAPTER%208.pdf?sequence=8>

³⁴ CIA (2015). The World Factbook – Mozambique. Available via <https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>

³⁵ World Bank (2011); USAID (2014). <http://www.usaid.gov/mozambique/agriculture-and-food-security>

³⁶ Arnall (2006)

³⁷ Maure et al. (2013)

³⁸ These figures take into account changes in precipitation, temperature, CO₂ and O₃ (the latter decreases the crop's carbon use efficiency and interacts with other climate change effects).

³⁹ Van Logchem and Queface (2012)

⁴⁰ Van Logchem and Queface (2012); Midgley et al. (2012)

⁴¹ World Bank (2011)

Limited land access is a major restraint for people's options to cope with climate change. Land access restrictions often make it impossible for farmers to move to different areas, and restrict their coping options to changes in planting/harvesting patterns and finding alternative livelihood activities.

National government strategies and policies

Mozambique has ratified the UN Convention on Biological Diversity (CBD) for which it had a National Biodiversity Strategy and Action Plan approved in 2003, the Convention to Combat Desertification (CCD) for which it has not yet developed National Action Programmes, and the Framework Convention on Climate Change (UNFCCC). It ratified the Kyoto Protocol in 2005 and submitted its NAPA in 2008. Mozambique also ratified UN conventions on Ozone Layer Protection and on Wetlands⁴².

Mozambique's per capita CO₂ emissions are with 0.1 tonnes per year significantly lower than the global average (4.9 tonnes) and even lower than the average of low-income countries in general (0.3 tonnes)⁴³. Yet it has been ranked third among African countries most exposed to risks from climate-related disasters, and the cost of inaction on climate change was estimated at USD 450 million per year⁴⁴. This is a clear reason for the country's strong priority on adaptation – instead of mitigation – in its climate change policies and strategies. Since 2000, Mozambique's concerns on climate change have increased due to successive floods. This has led to government *resettlement* programmes, mainly in the Limpopo and Zambezi valleys. The government encourages farmers living in resettlement villages to access new land in high zones for use during the wet season, but to commute to/from their original low zone fields during the dry season, when there is a smaller risk on flooding. There is little data available on the numbers moved or socio-economic impact, despite the scale of the resettlement programmes⁴⁵.

The Government of Mozambique drafted a First National Communication on climate change in 2003, emphasizing coastal protection, agriculture and water resources. This was followed by the submission of a National Adaptation Programme of Action (NAPA) in 2008, with a continuation of these three themes and addition of early warning systems as a fourth⁴⁶. To date, only one project to address the NAPA priorities has been approved for funding – the United Nations Joint Programme on Environmental Mainstreaming and Adaptation to Climate Change, funded by the government of Spain, with a particular focus on strengthening adaptive capacity of agricultural producers⁴⁷.

In 2012, Mozambique launched its National Climate Change Adaptation and Mitigation Strategy for 2013–2025 (NCCAMS). The national priority is defined in its mission *“to increase resilience in the communities and the national economy including the reduction of climate risks, and promote low-carbon development and the green climate economy through the integration of*

⁴² IrishAid (2014)

⁴³ CDKN website: Mozambique. <http://cdkn.org/regions/mozambique/>

⁴⁴ Climate Investment Funds (2012a): *Mozambique Lays Groundwork for Climate Resilient Future*. <https://www.climateinvestmentfunds.org/cif/node/10878>

⁴⁵ Arnall (2006)

⁴⁶ Ministry for the Coordination of Environmental Affairs (MICOA) (2008): *National Adaptation Programme of Action*. <http://unfccc.int/resource/docs/napa/moz01.pdf>

⁴⁷ Blythe (2012); Midgley et al. (2012)

adaptation and mitigation in sectoral and local planning. This strategy expanded the focus from primarily adaptation to mitigation, capacity building and financing. Its three objectives are:

- **Adaptation:** to become resilient to impacts of climate change, while minimizing climate risks to people and property.
- **Mitigation:** to identify and implement opportunities to reduce GHG emissions.
- **Capacity and resources:** To build institutional and human capacity and explore opportunities to access technology and financial resources to implement this strategy^{48,49}.

Mozambique, being one of the few African countries with a significant proportion of its area still covered with natural forests, initiated a national REDD+ process in 2008. In a collaboration agreement between the Brazilian Amazonas Sustainable Foundation (FAS) and the Mozambican Ministry for Coordination of Environmental Affairs (MICOA), a National Strategy was prepared and submitted in 2012. This strategy focuses on afforestation and conservation agriculture, and funding is received from the Norwegian and Finnish governments⁵⁰.

Integration of climate awareness and targeted actions across the various line ministries will be critical for the success of climate change strategies. Responsibilities on climate change were so far distributed primarily over the Ministry of Planning and Development, the Ministry for the Coordination of Environmental Affairs (MICOA, the Designated Lead Authority on climate change under the UNFCCC⁵¹), and the National Disaster Management Institute (INGC), in cooperation with line ministries and sector bodies such as the Food Security Technical Secretariat (SETSAN)⁵². A lack of *coordination and cooperation* between the various governmental actors has been mentioned by a number of sources as the major weakness of Mozambique's attempts to combat climate change effects^{53,54}. In order to improve this coordination, a Climate Change Coordination Unit (Unidade das Mudancas Climaticas, UMC) has become operational in 2014, with support from the World Bank's Climate Change Technical Assistance project (CCTAP). This UMC is intended to function as a cross-governmental body for coordination of climate change activities⁵⁵. It has started to develop a national monitoring and evaluation system for the National Climate Change Strategy, which will enable reporting to the CIF and to Mozambique's

⁴⁸ Adaptation Partnership (2012); Kulima Integrated Development Solutions, CSIR and University Eduardo Mondlane (2012): *Climate change health, agriculture and disaster analysis in Mozambique: CDKN Project Reference TAAF-0029b*. <http://cdkn.org/wp-content/uploads/2012/06/Climate-Change-Health-Agriculture-and-Disaster-Analysis-for-Mozambique-FINAL-REPORT.pdf>

⁴⁹ IrishAid (2014): *Ireland's Bilateral Climate Finance Mozambique - 2013 Report*. <https://www.irishaid.ie/media/irishaid/allwebsitemedia/20newsandpublications/Mozambique-Climate-Finance-Report-2013.pdf>

⁵⁰ Siteo, A.; Salomão, A.; Wertz-Kanounnikoff, S. (2012): *The context of REDD+ in Mozambique: Drivers, agents and institutions*. Center for International Forestry Research. http://www.cifor.org/publications/pdf_files/OccPapers/OP-79.pdf

⁵¹ Kulima Integrated Development Solutions, CSIR and University Eduardo Mondlane (2012)

⁵² Kulima Integrated Development Solutions, CSIR and University Eduardo Mondlane (2012)

⁵³ Wingqvist (2011)

⁵⁴ Siteo et al. (2012)

⁵⁵ The World Bank (2014): *Mozambique Climate Change Technical Assistance Project - Implementation Status & Results*. http://www-wds.worldbank.org/external/default/WDSContentServer/WDS/AFR/2014/06/01/090224b0824b7943/1_0/Rendered/INDEX/Mozambique000M0Report000Sequence001.txt

Council of Ministers⁵⁶. It has also started developing a climate knowledge management hub hosted by a Mozambican University (UEM)⁵⁷.

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)⁵⁸. There are concerns that the increase in responsibilities by MITADER may reduce the visibility of climate change, despite the potential for improved integration across the climate, land and rural development sectors⁵⁹.

Intended Nationally Determined Contribution (INDC)

Mozambique's INDC aligns with its National Climate Change Adaptation and Mitigation Strategy (NCCAMS) and covers both mitigation and adaptation activities that Mozambique intends to implement by 2030.

Mitigation. Mozambique aims, on a preliminary basis, a total reduction of about 76,5 MtCO₂-eq in the period from 2020 to 2030 compared to a Business-as-Usual (BAU) scenario with 23.0 MtCO₂-eq by 2024 and 53.4 MtCO₂-eq from 2025 to 2030. These reductions are estimates with a significant degree of uncertainty and will be updated in early 2018 with the results from the Biennial Update report. The INDC highlights that the implementation of any proposed reduction is conditional on the provision of financial, technological and capacity building support from the international community

Sectors targeted for mitigation are: (i) energy, (ii) land use (change) and forestry, and (iii) waste. Mitigation measures are to be implemented between 2020 and 2030 and are to be achieved by the implementation of various policies and programmes, for example:

- NCCAMS (2013 to 2030)
- Energy strategy (Mozambique asked the World Bank to support them in updating the current strategy and with the preparation of a national electrification strategy, in 2016)
- Biofuel policy and strategy
- New and renewable energy development strategy (2011 to 2025)
- Conservation and sustainable use of energy from biomass (2014–2030)
- Master plan for natural gas (2014–2030)
- Renewable energy feed-in tariff regulation (REFIT)
- Mozambique's integrated urban solid waste management strategy (2013–2025)
- REDD+ strategy
- Renewable energy atlas
- Solid waste landfill with methane recovery
- Urban mobility project in Maputo.

⁵⁶ Climate Investment Funds (2012a)

⁵⁷ The World Bank (2014)

⁵⁸ Hanlon, J. (2015): *Nyusi's Government: A Careful Balance*. <http://www.clubofmozambique.com/solutions1/sectionnews.php?secao=mozambique&id=2147486549&tipo=one>

⁵⁹ CDKN Africa. March 4, 2016 Opinion: The impact of 2014 elections on climate change governance in Mozambique, available at. http://cdkn.org/2016/03/impact-of-elections-on-climate-change-in-mozambique/?loclang=en_gb

Adaptation. Aligning with the NCCAMS eight strategic actions are aimed at: reducing climate risks, water resources, agriculture, fisheries and food security and nutrition, social protection, health biodiversity, forests and infrastructure. Specific proposed actions include:

Strengthening early warning systems and capacity to prepare and respond to climate risks

- improve capacity for Integration Water Resources management (IWRM), including building climate resilient hydraulic infrastructure;
- reduce vulnerability to climate change related diseases;
- reduce soil degradation, planting trees for local use;
- climate resilient mechanisms for infrastructure, urban areas, coastal zones;
- promote transfer and adoption of clean and climate change resilient technologies.

Mozambique recognises several challenges to implementation of the INDC: (i) lack of funding, (ii) weak or insufficient knowledge and technical capacity, and (iii) insufficient outreach to the private sector and weak coordination of implementation of approved policies.

Climate finance

No figures are available concerning the total contribution of the Mozambican government to climate change related actions. In a UN publication, it was concluded that total environmental (including climate change) expenditures equalled about 3.5 billion MZM (ca. USD 125,000) per year between 2007 and 2010, which is 4.3% of the state budget and 1.4% of GDP. For the same period, annual economic losses due to environmental degradation and inefficient use of resources were estimated at 24 billion MZM (9% of GDP)⁶⁰.

Mozambique receives international climate funding from the Global Climate Change Alliance (GCCA), CDM, and the World Bank Climate Investment Funds. Among all Sub-Saharan African countries, Mozambique was third (in 2014) in terms of the climate finance that had been approved (ca. USD 130 million; South Africa was first with around USD 500 million, primarily for renewable energy⁶¹).

The EU's Global Climate Change Alliance (GCCA) implemented 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 was in operation from June 2011 until December 2015 and had a budget of €47 million (of which €15.2 million from the GCCA (including €5 million from Ireland), €31.5 million from DANIDA, and €0.3 million from the Government of Mozambique). This GCCA project aimed to support the government's capacity and strategies on climate change by working towards the following results:

- strengthened institutional capacity and technical expertise of key government institutions;
- information sharing and awareness campaigns, with dedicated training courses;
- support to implementation of the national response to climate change (Environment Strategy for Sustainable Development, National Adaptation Programme of Action) via a number of pilot projects⁶².

⁶⁰ UNDP and UNEP (2012): *Public Environmental Expenditure Review, Mozambique, 2005–2010*. <http://www.unpei.org/sites/default/files/dmdocuments/PEER%20factsheet%20english%2010113.pdf>

⁶¹ Barnard, S.; Nakhlooda, S.; Caravani, A.; Schalatek, L. (2014): *Climate Finance Regional Briefing: Sub-Saharan Africa*. Climate Funds Update. <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9341.pdf>

⁶² Global Climate Change Alliance website: <http://www.gcca.eu/national-programmes/africa/gcca-mozambique>

A second phase of the GCCA is being prepared, but it is uncertain if Mozambique will be included in the new program.

Under the GEF/Climate funds, Mozambique has been awarded 11 grants (USD 44,7 million). GEF funded projects in Mozambique currently being implemented include support for the preparation of the National Adaptation Plan and adaptation in the coastal zones⁶³.

Another pool of international climate finance from which Mozambique receives funds is 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 (see below under 'Projects')⁶⁴. Mozambique has received a 'Readiness preparation grant' to help it develop an Emission Reductions Program Idea Note (ER-PIN), which it will use to apply for funding under the Forest Carbon Partnership Facility (FCPF). Mozambique is on track to receive funds from this facility⁶⁵.

Mozambique has also been awarded up to USD 91.6million as a pilot country in the Pilot Program on Climate Resilience (PPCR), a part of the Climate Investment Funds (CIF) portfolio which specifically aims at *adaptation* in developing countries⁶⁶. PPCR funding consists of grants and near-zero interest credits⁶⁷. Co-financing of USD 165.9 million is expected. Climate Investment Funds (CIF) are supported by five multilateral development banks, including AfDB and IFC. Mozambique is one of ten African countries receiving PPCR funding. Countries use the PPCR support for the infrastructure, urban development, climate information systems, agriculture and landscape management; and development of local and national capacities for climate resilient planning and action⁶⁸.

There has also been a recent grant (2015) from the Climate Investment Funds through its Clean Technology Fund (CTF) for solar PV development by the private sector. Mozambique is one of five countries in a regional program, which will support private sector investments in utility-scale solar PV plants. Mozambique has recently submitted (June 2016) an Investment Plan to the CIF Forest Investment Program (FIP) that includes a funding request for a grant of USD 10.8 million and a loan of USD 13.2 million. There will be two projects under the FIP: one project will focus on national and landscape level interventions that aim to reduce emissions and promote rural development; the second project will leverage the private sector to link communities to the opportunities provided by major forest sector plantation investment.

⁶³ GEF website: available at <http://www.thegef.org/> and [https://www.thegef.org/projects?search_api_views_full-text=&views\[0\]\[view_dom_id\]=eb4d89454963b91a5809e168efa3d8ba&views\[0\]\[view_name\]=projects_listing_search&views\[0\]\[view_display_id\]=page&views\[0\]\[view_path\]=projects&f\[0\]=field_country%3A113&f\[1\]=field_p_focalareas%3A2207&index_id=main&facet_field=field_p_trustfundname](https://www.thegef.org/projects?search_api_views_full-text=&views[0][view_dom_id]=eb4d89454963b91a5809e168efa3d8ba&views[0][view_name]=projects_listing_search&views[0][view_display_id]=page&views[0][view_path]=projects&f[0]=field_country%3A113&f[1]=field_p_focalareas%3A2207&index_id=main&facet_field=field_p_trustfundname)

⁶⁴ UNDP website: CDM Opportunities and Challenges in Mozambique. http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/strategic_themes/climate_change/carbon_finance/CDM/mozambique_opportunities/

⁶⁵ <https://www.forestcarbonpartnership.org/mozambique>

⁶⁶ USAID (2012): *Climate Finance: Mozambique training course on the use of weather and climate information in decision-making*. http://www.sarva.org.za/sadc/download/moz2012_11.pdf

⁶⁷ Climate Investment Funds (2012b): *Pilot Program for Climate Resilience: Mozambique*. <http://www-cif.climateinvestmentfunds.org/country/mozambique>

⁶⁸ Climate Investment Funds: Pilot program for Climate Resilience: Mozambique available at <http://www-cif.climateinvestmentfunds.org/country/mozambique>

Climate change projects

In addition to the international funds mentioned above, a wide range of donors also support climate change-related institutions and projects in Mozambique in bilateral projects and programmes.

Some projects and programmes that are currently being implemented, with a focus on food security and/or water, are:

- various CDM projects, including a clean energy project for a factory near Maputo (validation stage) and a domestic cook stove substitution project (registered late 2014)⁶⁹;
- a multi-purpose water storage project to build climate resilience in the Limpopo river basin is underway, for which the African Water Facility (AWF, managed by AfDB) offered a grant to the government of Mozambique to execute a feasibility study⁷⁰;
- ‘Coastal City Adaptation Project’ in Pemba and Quelimane, funded by USAID (started in 2014)⁷¹;
- ‘Adapting to climate change in Mozambique’, funded by GIZ (2012–2017)⁷²;
- ‘Master plan Beira 2035’⁷³ and ‘GreenInfra4Beira’⁷⁴ projects, implemented by Dutch consortia;
- ‘Feed the Future’, a regional food security programme with a Mozambique sub-programme with a minor focus on climate change, funded by USAID⁷⁵;
- ‘PROSAN’ aiming at ‘tackling food and nutrition insecurity while strengthening climate change resilience’, funded by Irish Aid and implemented by CARE International⁷⁶.

For a list of projects in Mozambique funded through multilateral climate funds, see the [Annex](#).

Climate contribution of the Netherlands Embassy: Pitch & Bid

Beginning in 2014, embassies with development programs have annually been preparing a climate Pitch & Bid. The *Pitch* communicates the embassy’s climate-smart actions that will address climate change. Based on the actions described in the Pitch, assignment of the Rio Markers and budget information, the embassy prepares a *Bid* which is an estimate of how much is likely to be spent on projects that are relevant for climate in the coming three years. For Mozambique the Bid estimates a climate contribution for 2016–2018 of € 29,263,075 to climate finance [2016: € 10,440,136; 2017: € 10,088,989; 2018: € 8,703,950]. Of this, € 5,084,578 is for mitigation (renewable energy), and € 24,178,497 for adaptation.

⁶⁹ UNDP website; UNFCCC website: *Programmes of Activities*. <https://cdm.unfccc.int/ProgrammeOfActivities/registered.html>

⁷⁰ <http://www.afdb.org/en/news-and-events/article/mozambique-awf-supports-multi-purpose-water-storage-project-to-build-climate-resilience-in-limpopo-river-basin-13857/>

⁷¹ <http://www.chemonics.com/OurWork/OurProjects/Pages/Mozambique-Coastal-City-Adaptation-Project.aspx>

⁷² <http://www.giz.de/en/worldwide/20431.html>

⁷³ <http://www.dutchwatersector.com/solutions/projects/306-masterplan-beira-2035.html>

⁷⁴ <http://www.dutchwatersector.com/solutions/projects/349-greeninfra4beira.html>

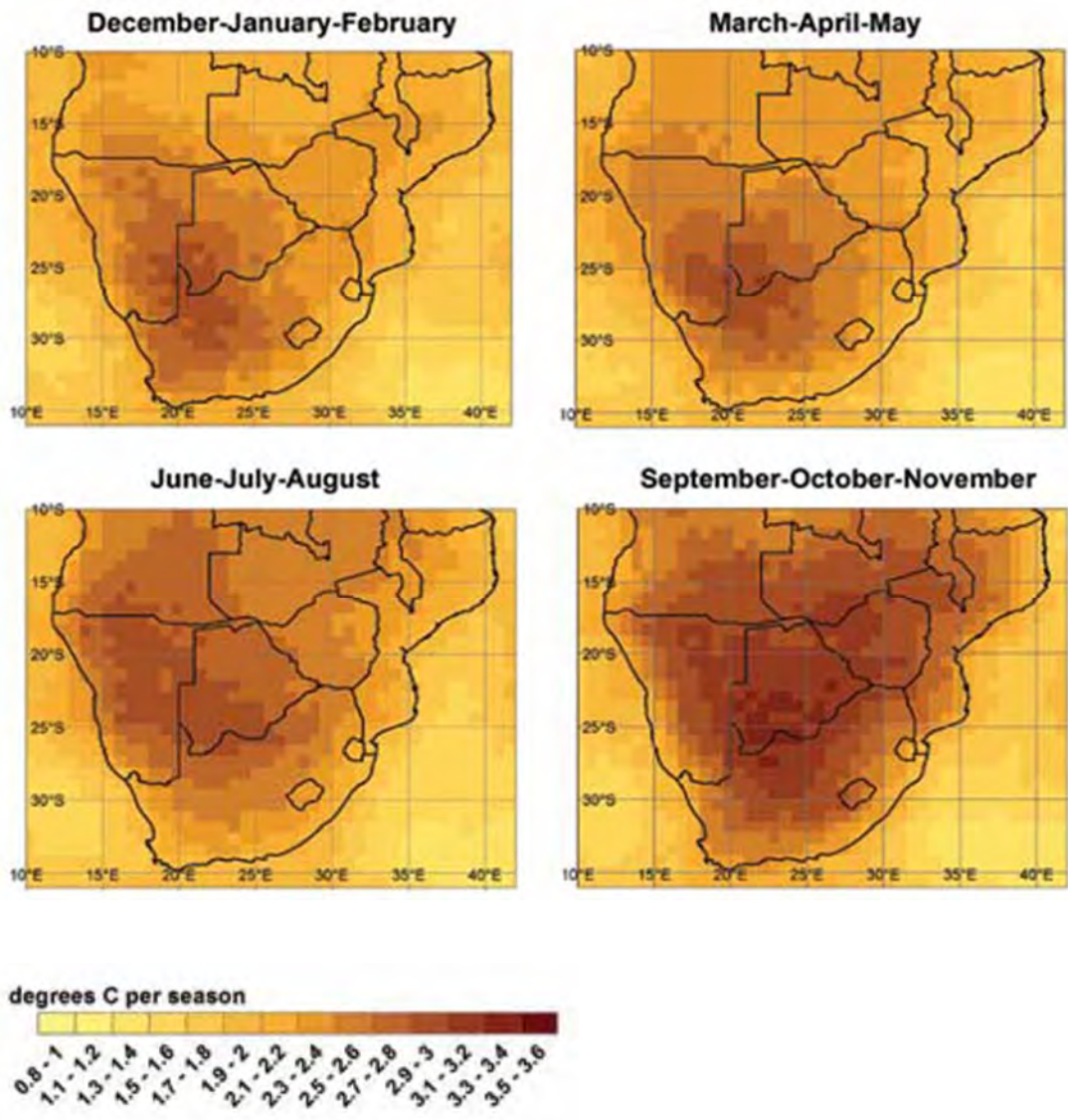
⁷⁵ <http://www.usaid.gov/mozambique/agriculture-and-food-security>

⁷⁶ IrishAid (2014)

The Embassy's Pitch indicates the following focus areas for its climate contribution:

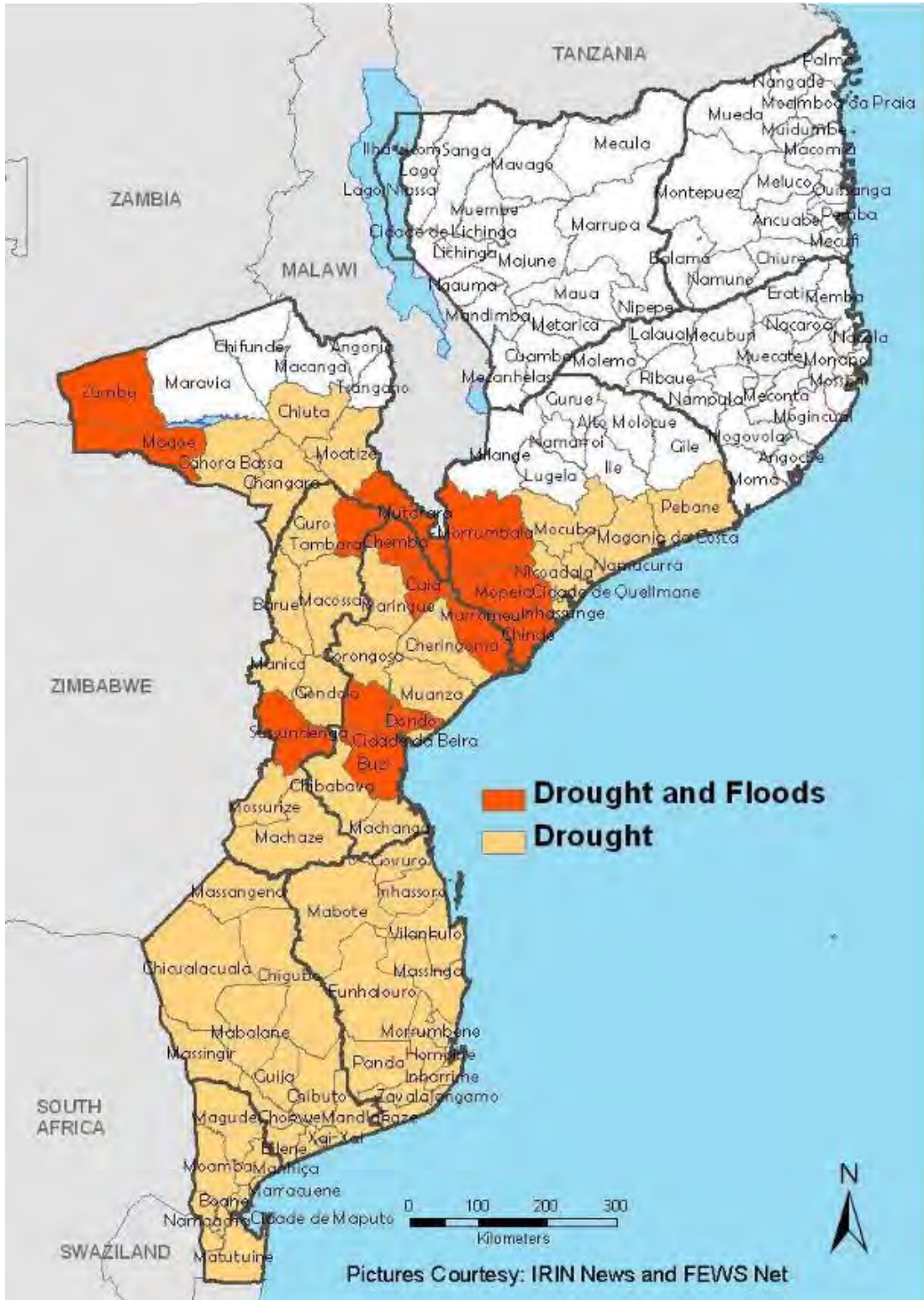
- in all institutional development programs, in the food & nutrition spearheads, **climate-smart agriculture** is promoted;
- stimulate strategic partners to **communicate and promote** through local TV/radio and events climate-smart successes and the results achieved;
- **promote, endorse and support the inclusion of climate change** [awareness, knowledge, technical skills, and proactive management] in its programs: for example, the inclusion of CC in the curricula of NICHE courses, capacity building in projects such as WaterNet and PRIMA (planning and operational level) of individual and local authorities, as well as with communities and farmer associations;
- **promote, endorse and support climate-smart criteria** in the selection of investors in Zambezi Valley and channel investment to regions that are climate-safe or with improved awareness and resilience;
- promote business ideas based on **low cost clean energy solutions** that help smallholder farmers adapt to climate change;
- **ensure specific attention for CC** in the land-use planning and strategic environmental analysis exercise in the Zambezi Valley.
- **build critically needed capacity** in climate-smart infrastructure planning in FIPAG and AIAS;
- further **strengthen early warning systems** and flexibility in responding to climate related disasters such as floods and droughts;
- **EU joint programming**: climate-smart planning and the use of joint indicators will be promoted.

Map 1: Projected seasonal temperature change (1980-2050)



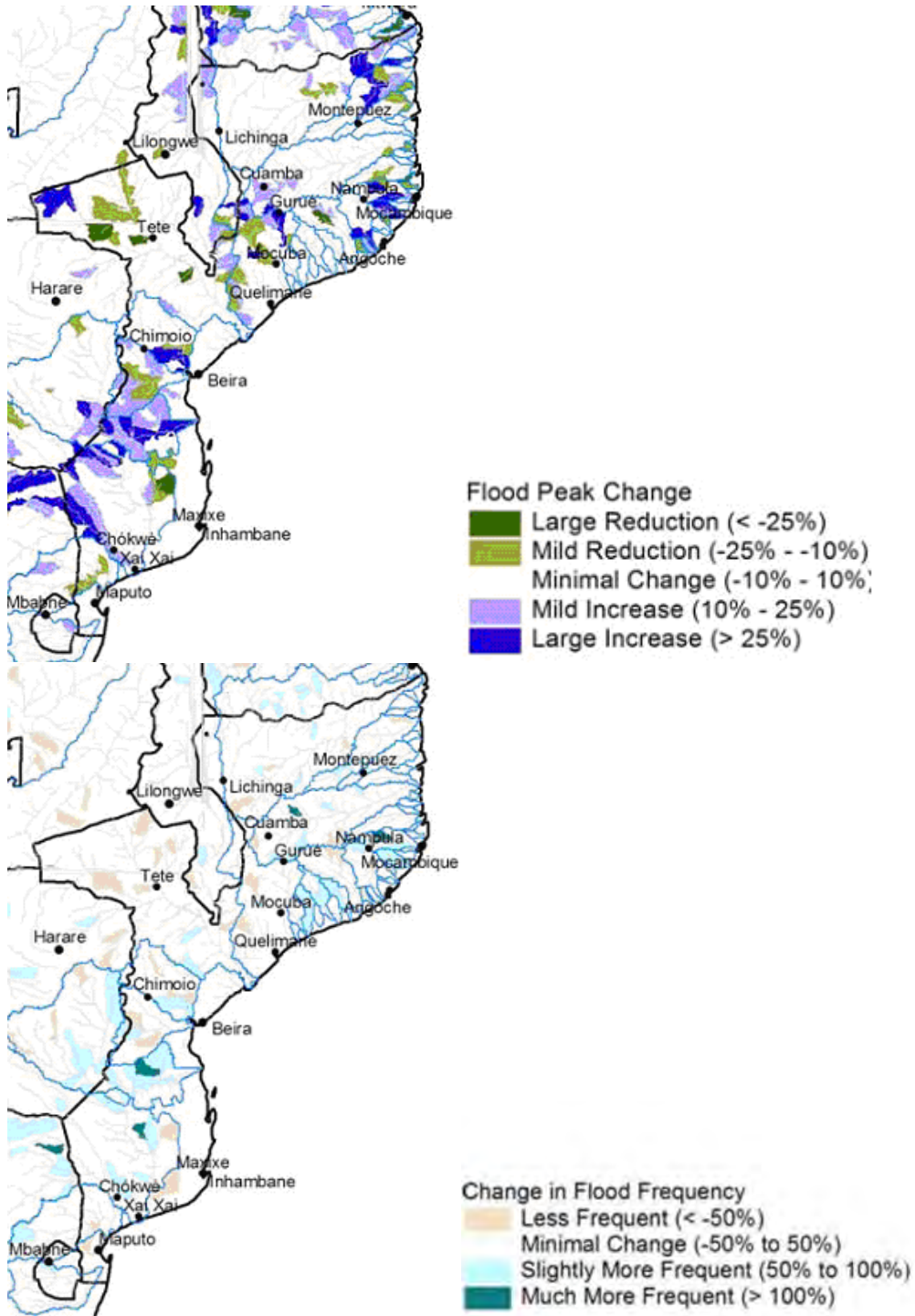
Source: Davis (2011)

Map 2: Areas frequently affected by floods and droughts



Source: <http://www.audiencescapes.org/mozambique-provincial-radio-maputo-radio-mozambique-community-UNESCO-media-project-catholic-manica-central-sofala-tete-zam-bezia>

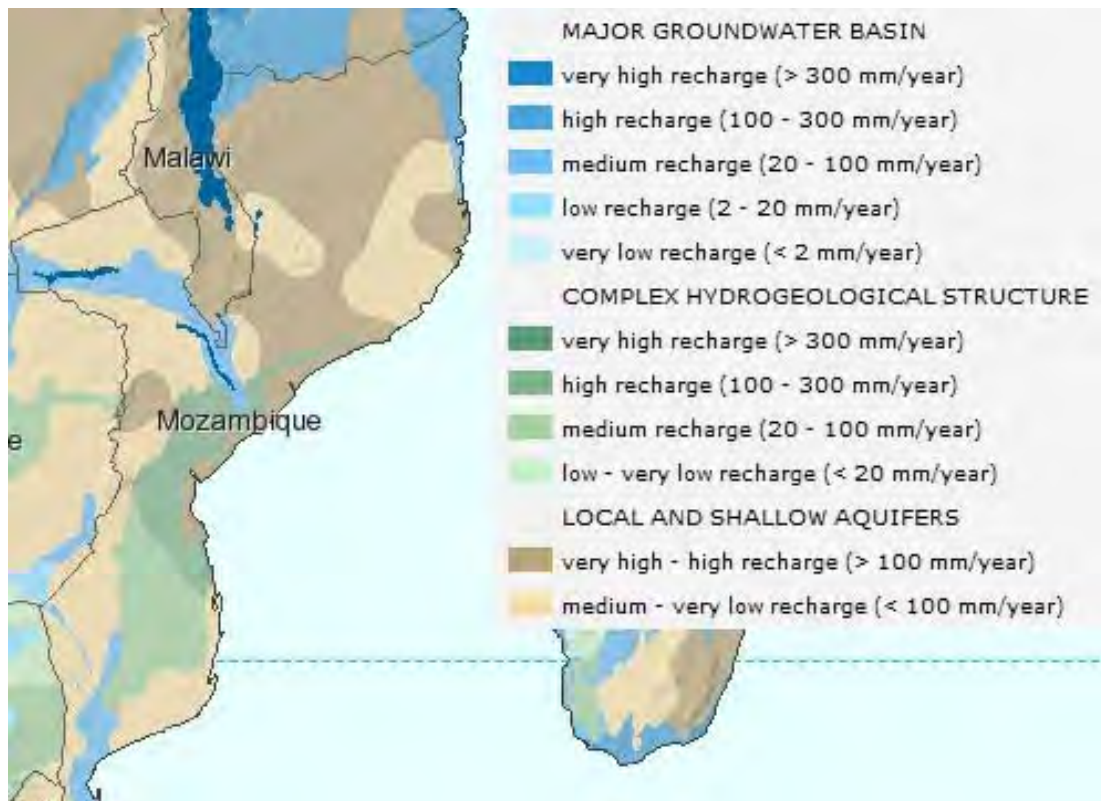
Map 3: Expected changes in magnitude (top) and frequency (bottom) of floods (2010–2045)



Source: INGC (2009): Study on the impact of climate change on disaster risk in Mozambique.

http://www.irinnews.org/pdf/synthesis_report_final_draft_march09.pdf

Map 4: Groundwater basins and recharge



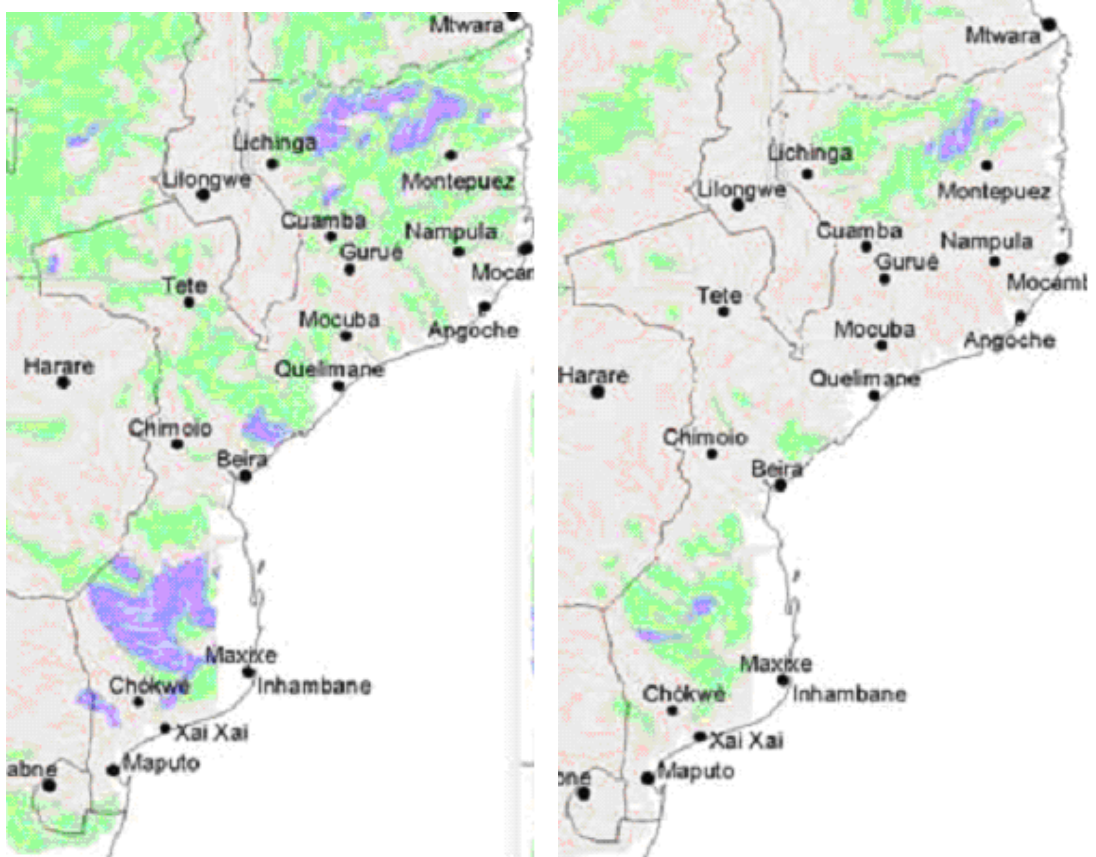
Source: WHYMAP (2012).

http://www.bgr.de/cgi-bin/ms481/mapserv.exe?java=off&map=f%3A\\www\\Anwendungen\\fishy\\whymap\\whymap.map&zoomsize=2&layer=Grid&layer=Salt-lake&layer=Lake&layer=Hydrogeo1&layer=Hydrogeo2&layer=ice&layer=Ocean&layer=admin&layer=conti&layer=relief&map_size=900+855

Map 5: Water availability in 2000 (left) and projections for 2050 (right)

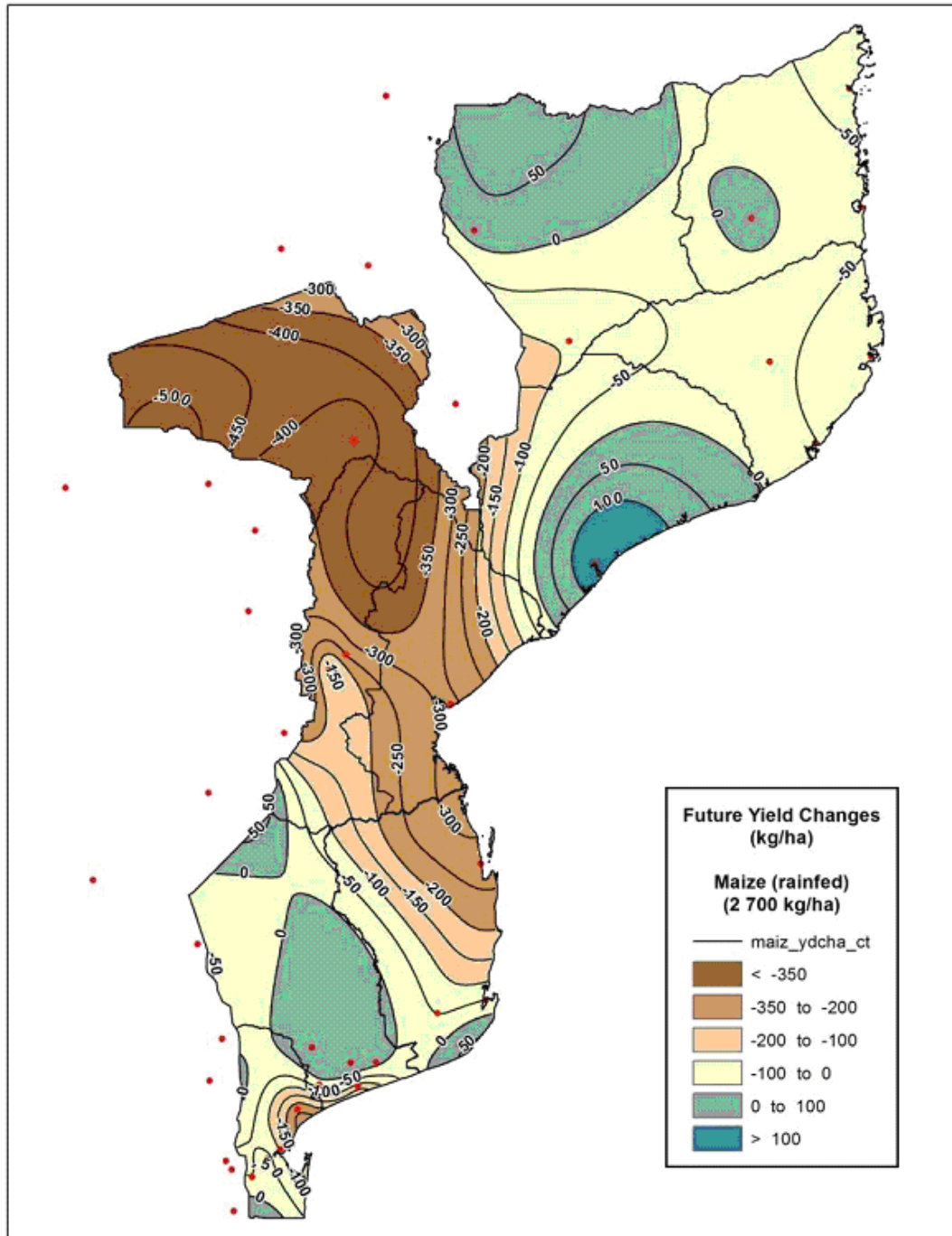
Gross Water Availability per Capita

- < 1000 m³/capita/year
- 1000 - 10000 m³/capita/year
- > 10000 m³/capita/year



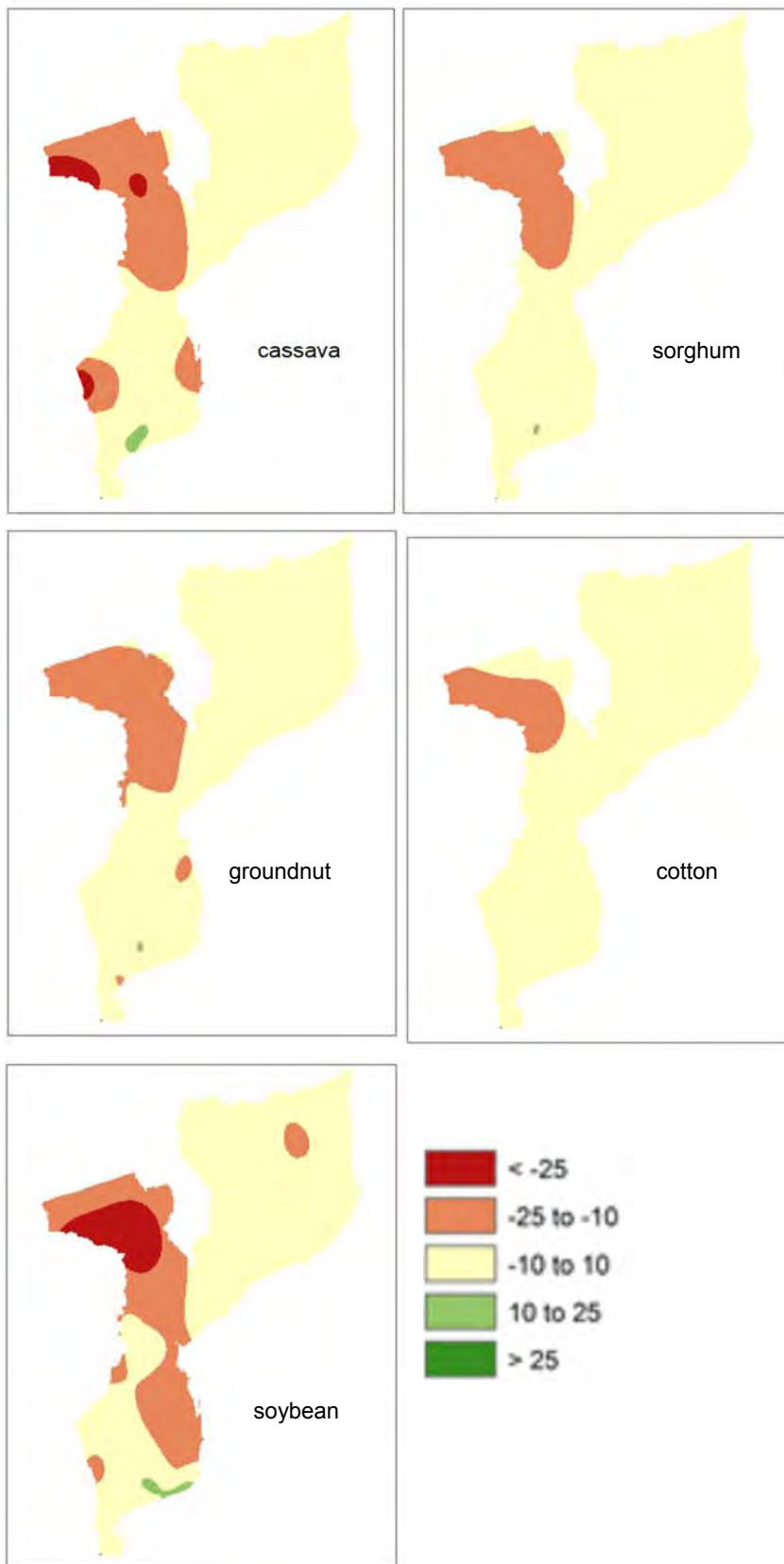
Source: INGC (2009)

Map 6: Expected changes (2010–2055) for rain-fed maize yields



Source: Van Logchem and Queface (2012)

Map 7: Projected changes (2010–2055) for cassava, sorghum, groundnut, cotton, and soybeans, in % of present yields



Source: Van Logchem and Queface (2012)

Annex: List of projects in Mozambique under multi-lateral climate funds

Main source: *Climate Funds Update (2016)*: <http://www.climatefundsupdate.org/data>

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Smallholder Irrigation Feasibility Project	Pilot Programme for Climate and Resilience (PPCR)			Multilateral
Environment Main-streaming and Adaptation to Climate Change	MDG Achievement Fund	7	7	Multilateral
Pro-poor Value Chain Project in the Maputo and Limpopo Corridors (PROSUL)	Adaptation for Smallholder Agriculture Programme (ASAP)	5	0.5	Multilateral
Strengthening Capacities of Agricultural Producers to Cope with Climate Change for Increased Food Security through the Farmers Field School Approach	Least Developed Countries Fund (LDCF)	9.2	9.2	Multilateral
Baixo Limpopo Irrigation and Climate Resilience Project (AfDB)	Pilot Programme for Climate and Resilience (PPCR)	15.8	0.03	Multilateral
Climate Change Technical Assistance Project	Pilot Programme for Climate and Resilience (PPCR)	2		Multilateral
Coping with Drought and Climate Change	Special Climate Change Fund (SCCF)	1	1	Multilateral
GCCA – Support Project to the Government of Mozambique: Main-streaming of Climate Change into policies and strategies to adapt to Climate change impacts	Global Climate Change Alliance (GCCA)	17	12	Multilateral
National Adaptation Programme of Action (NAPA)	Least Developed Countries Fund (LDCF)	0.2	0.2	Multilateral

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Adaptation in the coastal zones of Mozambique	Least Developed Countries Fund (LDCF)	4.5	4.5	Multilateral
Design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	Pilot Programme for Climate and Resilience (PPCR)	1.5	1.01	Multilateral
Sustainable Land & Water Resources Management (AfDB)	Pilot Programme for Climate and Resilience (PPCR)	15.8	0.2	Multilateral
Climate resilience: Transforming Hydro– Meteorological Services	Pilot Programme for Climate and Resilience (PPCR)	15	1	Multilateral
Coastal cities and climate change	Pilot Programme for Climate and Resilience (PPCR)	15.8		Multilateral
Roads and bridges management and maintenance program APL 3	Pilot Programme for Climate and Resilience (PPCR)	15.8		Multilateral
Towards Sustainable Energy for All in Mozambique: Promoting Market–Based Dissemination of Integrated Renewable Energy Systems for Productive Activities in Rural Areas	Global Environment Facility (GEF6)	2.9	2.9	Multilateral
Readiness preparation grant	Forest Carbon Partnership Facility (FCPF)	3.8	3.5	Multilateral
Mozambique Agriculture and natural resources landscape management project	World Bank	40		Multilateral
Water services and institutional support I and II	World Bank	3.8 & 90		Multilateral
Emergency resilient recovery project for the north and central	World Bank	40		Multilateral
Artisanal fisheries and climate change	World Bank	3.4		Multilateral

Name of Project	Fund	Funding Approved (USD millions)	Disbursed (USD millions)	Fund Type
Conservation areas for biodiversity and development project	World Bank	40		Multilateral
Cities and climate change (PPCR AF)	World Bank	15.8		Multilateral
Enhancing spatial data for flood risk management project	World Bank	8.8		Multilateral
Water resources development flood response, additional finance	World Bank	32		Multilateral
Greater Maputo Water Supply Expansion Project	World Bank	178		Multilateral
Climate change technical assistance project	World Bank	2		Multilateral
Cities and climate change	World Bank	120		Multilateral
Water Resources Management	World Bank	70		Multilateral
PROIRRI Sustainable Irrigation Development	World Bank	70		Multilateral
Maputo Municipal Development Program II	World Bank	50		Multilateral
Adaptation to climate change	GIZ	2.5		Bilateral
Feed the Future ⁷⁷	US AID and Brazilian Cooperation Agency (ABC)	2		Multilateral
Adapting to climate change in Mozambique's coastal cities	US AID			Bilateral
PROSAN Programme on food security and nutrition 2012-2017 ⁷⁸	Irish Aid	0.8	0.8	Bilateral

⁷⁷ <https://www.usaid.gov/news-information/press-releases/jul-1-2015-united-states-and-brazil-expand-partnership-promote-food-security>

⁷⁸ <https://www.irishaid.ie/media/irishaid/allwebsitemedia/20newsandpublications/publicationpdfsenglish/Coun-try-Climate-Action-Reports-Mozambique-FINAL.pdf>