Plan Market













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Key country indicators

Location

Mozambique is located along the southern coast of and has the third longest coastline in the East African region. Its total population is estimated at about 25.7 million in 2015. The country's total surface area is 786,000 km², the coastline measures an area of 2470 km and the total continental shelf area is about 104,300 km² long (CIA, 2013) (Hoguane and Pereira, 2003) (World Bank Group, 2017). The country is divided ecologically into the swamp coast, the parabolic dune coast and the delta coast.

Population	28,000,000
GDP	
GNI	
Total land area	786,000 km²
Length of coastline	2,470 km
Exclusive Economic Zone	
Continental shelf	104,300 km²
Mangrove	2,909 km²
Coral reef	1,860 km²
Marine protected area	%18 of territorial water
	Source: (World Bank, 2017)

Marine resources

Mozambique has 100,000 km² of marine waters and possess abundant marine and freshwater fishery resources. The Mozambique has an exclusive economic zone, which stretches 200 nautical miles from the coastline and 13,000 km² of inland waters (Transtec, 2013). Mozambique imposes national legislation over its EEZ for the preservation of the marine environment and scientific research. The economy of Mozambique is boosted mainly by the activities in Sofala Bank and Maputo Bay and Beira, which are highly productive in terms of agriculture and fisheries activities.

Ecosystem management and conservation

The challenge

Coastal ecosystems are being degraded under pressure from growing populations with their demands for resources including land for food and settlements.

The situation

Biodiversity

Mozambique coastline is very important and supports a number of marine ecosystems such coral reefs, mangrove forest, seagrasses, bays, sand dunes, estuaries, coastal rivers, banks and lakes, marine weed and swamps which support pristine ecosystem, high biological diversity, high endemism, and endangered species. These all provide a number of ecosystem goods and services including habitat, shelter and food for a number of marine organisms, nursery areas for juvenile fish and invertebrates provide resources for many communities along the coast and providing attractions tourists and eco-tourism activities to the Mozambican coastline. The ecosystem goods and services that these habitats provide were valued by UNEP/Nairobi Convention (2008), based on Costanza et al. (1997).



Coastal habitat

Mozambique's coastal habitat consists of fisheries, mangroves, coral reefs, salt marshes and sea grass beds. Mangroves occupy a total of 396,080 ha along the shorelines and estuaries and are crucial to the coastal communities. Coral reefs cover an estimated area of 1,890 km² and play an important role supporting the communities in food production, boosting tourism and as a source of income (Spalding et al., 2001) (Bjerner & Johansson, 2001) (Pereira, 2003) (Schleyer et al., 1999). They are a source of food and shelter for different types of marine species and are responsible for about 70 per cent of fish catches.

Seagrass beds, provide a unique role in increasing and intensifying the growth of marine ecosystem and marine biodiversity. The thirteen species of seagrasses found in Mozambique include Cymodocea rotundata, Cymodocea serrulata, Halodule minor, Halodule uninervis, Halodule wrightii, Halophila ovalis among others. seagrasses are vital in stabilizing effects on the shorelines, provision of food



nursery grounds and shelter for juvenile fish, as well as refuges from predation for numerous fishes, invertebrates and other animals (Gell & Whittington 2002; Gullström et al., 2002; Orth et al., 1984;) They provide economic goods such as an extensive number of fish and invertebrates harvested by many of coastal communities (Gullströom & Dahlberg, 2004). They also harbour nitrogen-fixing bacteria and facilitate mineral circulation between the water and the sediments (Oliveira et al., 2005). They help in carbonation in sand production.



The constraints

High population density

The coastal areas are characterized by extremely high population densities – over two-thirds of the country's population reside within the coastal region (ASCLME, 2012; Barnes et al., 1998; Ruby et al., 2008). The population densities of Maputo, Beira, Nacala and Mozambique island are 1,525 persons/km², 625 persons/km², 409 Persons/km² and 13,000 persons/km² respectively.

Mangrove, seagrass and coral degradation

Mangroves are being depleted at a rate ranging from 15.2 per cent in Maputo province, to 4.9 per cent in Sofala. The major drivers of mangrove depletion are anthropogenic activities such as uncontrolled exploitation for firewood, charcoal, fencing, medicinal uses, fish trapping and pole production. Clearance for agriculture (mainly to pave way for rice fields) and salt production. Increased coastal pollution from discharge of sewage and industrial effluents. Reduction of freshwater flow due to industrial and dam construction and abstraction. Uncontrolled influx of people from mainland to the coast leading to increased overexploitation of mangroves (Barbosa et al. 2001). The growth and productivity of mangroves is affected by deforestation mainly in areas such as Maputo and Beira.

The main threats to seagrasses are beach seining, trampling and sedimentation. The trampling occurs during the collection of invertebrates and the sedimentation is associated with river discharges.

Habitat degradation

However studies have shown that increased population in and around rivers such as the Sofala Bank (Lutjeharms 2006, Barlow 2007, 2008), the discharges from Zambezi, Pungué, Buzí and Save rivers, the most productive shelf of the channel and in the southern provinces have led to enormous and devastating outcomes. Effects such as coastal erosion, sedimentation, water pollution, over-exploitation of resources, deforestation, and reduction and modification of biological diversity (Sete et al., 2002).

Migration of fishermen from different coastal communities due to fluctuation in fish resources (Lopes et al., 1997) have creates adverse social consequences for example spread of HIV/AIDS and communal conflicts (Ministerio das Pescas, 2007)

These practices harvest both adult and juvenile with no discrimination between species causing more destruction of habitats. Cutting of mangrove forest is a major cause of deforestation in Mozambique. And because of the interlinkage between mangrove, seagrass and other coastal habitants any pressure on them causes devastating effects on the ecosystem

Impact of destructive fishing gear on endangered species

Marine species; Dugongs, in Mozambique are found in Maputo and Inhambane Bays with the largest population in Eastern Africa found in Bazaruto Bay (Guissamulo 1993, Muir et al. 2004). However, recent observations indicate that Bazaruto Bay dugong population is declining due to over-fishing in the main channels (Muir et al. 2004). Dolphins, whales and seals A total of seven species of dolphins inhabit the littoral waters off Mozambique. The most common species in inshore waters are Indo-pacific bottlenose and humpback dolphins (Muir et al. 2004). From the seven species of whales recorded in Mozambican waters, Humpback whales (Megaptera novaeangliae) and Minke whales (Balaenoptera acutorostrata) are common waters. Mozambique hosts five species of marine turtle including the green (Chelonia mydas), olive ridley (Lepidochelys olivacea), loggerhead (Caretta caretta), hawksbill (Eretmochelys imbricata) and leatherback turtles (Dermochelys coriacea) (Louro et al. 2006, Costa et al. 2007).

Endangered species are depleted by destructive and non-selective fishing gears, for example bottom trawls, beach seining entanglements in gillnets (Guissamulo and Cockcroft 1997) and this causes destruction of ecosystems that support them. Marine mammals are also vulnerable to the destruction of habitat, accidental and intentional catches and pollution (Guissamulo 1993). Little is known about the extent of marine mammal bycatch in Mozambique.

The opportunities

Mangrove restoration activities

There are many benefits associated with the restoration of mangrove forests. These include carbon sequestration, fish production and storm protection with benefits to human health and wellbeing (Narayan, Foley, Haskell, Cooley, & Hyman, 2017). In addition, mangrove forests provide a nutrient-rich environment, they act as shelter for juvenile fish and marine invertebrates and also play an important role as nursery and feeding ground of many important commercial species of fish, prawns and crustaceans. Other ecosystem services provided include construction material, firewood, charcoal. Mangrove also act as a natural barrier or stabilizer of the coastline by preventing erosion and sedimentation. They also help to contribute to detoxification and depuration of waste waters, and protect inland areas from weather extremes such as storm surge and extreme high tide events (Bandeira et al., 2009; Paula et al., 2014).

Target 14.2: Protect and restore ecosystems

UN definition: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Status: The proportion of the national exclusive economic zones managed using ecosystem-based approaches is 2.23 per cent or 12,821 km²

Source: (UN Stats 2019)



A study in Quelimane, the administrative capital of the Zambezia Province, comparing the benefits from constructing an earthen dike versus mangrove restoration for storm protection, found that although the mangrove accorded higher storm protection in addition to the carbon sequestration and fish production. Although sensitive to the carbo



Action for endangered species

In order to reduce incidents on endangered species, there is a need to conduct research on the selective and environmentally sound fishing gears. More investigation and research on the restoration of the ecosystems such as mangroves, seagrass beds and coral reefs. An assessment to be carried out on the populations of dugong, their distribution and trends in Bazaruto Bay, southern Quirimba Archipelago and Maputo Bay by installation of tracking systems in place like satellites. However, there are some mitigation measures in place to reduce marine mammal by-catch. Marine mammals (whales and dolphins) are an internationally protected species and as per Mozambique's Forests and Wildlife Regulation (Decree 12/2002 of 6 June) catching, touching, killing, feeding or disturbing marine mammals is prohibited.

Conserve coastal and marine areas

Currently MPA cover a total area of about 20,462km² of which 8,633km² encompass the marine ecosystem. According to the new Biodiversity Conservation Law (Law 16/2014 of 20 June) conservation areas in Mozambique should be classified as Total Conservation Areas, where the extraction of natural resources is not allowed and Sustainable Use Conservation Areas where a certain level of natural resources extraction is allowed but subject to a Management Plan.

Target 14.5: Conserve coastal and marine areas

UN definition: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

Status: The average proportion of marine key biodiversity areas covered by protected areas was 66.13% more than double the area in 2011.

Source: (UN Stats 2019)

The different categories of Marine Protected Areas in Mozambique include Partial Reserves (e.g. Ponta do Ouro Partial Marine Reserve); National Parks (e.g. Bazaruto Archipelago National Park and the Quirimbas National Park); Environmental Protection Areas (Primeiras and Segundas Environmental Protection Area); and the Total Protection Zones (Cabo de São Sebastião Total Protection Zone). The terminology and classification of current MPAs are updated according to the new system put in place by the Biodiversity Conservation Law (Law 16/2014 of 20 June).

Table 1: Existing MPAs in Mozambique

MPA	Year	Total area km²	Marine ecosystem km²
Quirimbau National Park	2002	7,506	1,430
Primeiras & Segundas Environmental Protection Area	2012	10,409	5,000
Cabo de Sao Sebatiao Total Protection Zone	2003	300	80
Bazaruto Archipelago National Park	1971	1430	1295
Panta do Quro Partial Marine Reserve	2009	678	678
Total			

Figure 1: Marine Protected Areas





Fisheries

The challenge

Mozambique has great fishing potential along its coastline and within its EEZ including a variety of pelagic fish species like tuna, mackerel, marlin and sailfish, starfish and billfish. These have the potential to financially support coastal communities. However, the sector is under-performing and overfishing and destructive fishing techniques are leading to declining fish catches and a degraded ecosystem. The rapid and uncontrolled expansion of artisanal fisheries is also threatening the sustainability of the fish resource. The challenge is to promote sustainable rural development and reduce poverty, through the sustainable management of Mozambique's marine resources.

The situation

The fish economy

The fisheries potential of Mozambique is estimated to be between 220,000 and 330,000 tonnes and the sector is said to have the potential to contribute about 3 per cent of GDP. (Fisheries Master Plan 2010-2019).

Capture fisheries in 2016 was 299,591 tons while total fisheries production in the same year was 300,771 tons (World Bank, 2019). (MOF, 2013). In 2012, national fish production was 208 000 tons, of which 89 per cent originated from artisanal fishing, 10 per cent from semi-industrial fishing and industrial and 0.3 per cent from aquaculture. In terms of value, artisanal catches accounted for 89% of the total, industrial and semi industrial fisheries 11% and aquaculture only 0.4%. Fisheries is the main source of income for 87% of unit owners mainly found in Nampula and Sofala provinces (Jone et al., 2013). It contributes poverty relief and food security.

Food security

The fish sector accounts for 50 per cent of protein consumed nationally and in some instances is the only accessible source of protein (Souto, 2014) (Brugere and Maal, 2014). The fishery sector therefore plays a major role in addressing the issue of food security and livelihoods (Benkenstein, 2013a).

Structure of the fisheries sector

Fisheries in Mozambique comes from artisanal, semi industrial and industrial fisheries. Semi-industrial fishing mainly comprises of small trawlers which are involved in domestic coastal shrimp fisheries and it accounts for 2 per cent of annual marine catches and 6 per cent of total value (Souto, 2014). Industrial fishing includes large vessels flagged in Mozambique, this type of fishing mostly targets crustaceans – coastal shrimps and deep-sea shrimps which are mainly harvested for the European market. It accounts for 7 per cent of annual marine capture and 52 per cent of total value (Oceanic Développement, 2014).

	Catch (tons)	Share of total catch%
Capture	222,101	99.68
Commercial	26,046	11.68
Artisanal	196,055	88.00
Aquaculture	721	0.32
Industrial	201	0.09
Small Scale	514	0.23
Total		

Source: Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014

Table 2: Mozambique Artisanal Fish Production Total Catch, 2012(tons)		
Lobster	159	
Crab	1,346	
Fish, marine	10,874	
Fish inland waters	68,215	
Shallow water shrimp	3,020	
Shrimp for Shrimp paste	2,241	
Cephalopoda	1,671	
Shark	653	
Other	4,557	
By-catch	3,319	
Total	96,055	

Source: Mozambique Ministry of Sea Inland Waters and Fisheries, 2014

The constraints

Harmful practices and increasing effort of artisanal fisheries

Artisanal fishing represents 80 per cent of total fish landings, which mainly target near-shore fish stocks such as pelagic species, demersal line fish and crustaceans such as shrimp and crab and is carried out along the coastline mainly for subsistence and commercial purposes (Benkenstein, 2013b). Sixty percent of artisanal fishing takes place in maritime waters, in beaches and the open sea, while the remaining 40% is carried out in inland waters primarily in Niassa and Tete Province (Jone et al., 2013). Small-scale fisheries, although based on traditional practices, have undergone significant changes in recent years. The number of fishers has increased significantly and so has the use of motorised boats, improved fishing gears and more intensive use of these fishing gears. The most common fishing gears are gill nets (42%), hand lines (23%) and beach seines (18%). Harmful fishing practices, such as the use of mosquito nets or fine-mesh seine nets, are still common in certain areas. Despite a lack of concrete data there are indications that catches are decreasing (Benkenstein, 2013).

Overfishing

Like other coastal countries, Mozambique fishing sector is in a critical and vulnerable stage due to pressure from over exploitation, illegal fishing, increased population along the coastal area, and this has disrupted and undermined the ecosystem by use of wrong or inappropriate and destructive fishing practices such as use of mosquito nets, gill nets, traps and poison, cutting of mangrove trees, and also overlapping measures in place in a fight for resources (Pereira, 2011).

Poor information foundation for sustainable fisheries management

Stock depletion of wild shrimp due to over fishing (Oceanic Développement, 2014).

- There is little information on the level of exploitation of the fish species targeted by artisanal fisheries.
- There is also limited information on by-catch species in shrimp fisheries.
- There is also limited information on the reproductive biology of the main species caught in artisanal fisheries.
- Also, no specific studies have been undertaken to examine the damage caused to the seabed by beach seines and other damaging fishing practices in Mozambique.
- Despite the importance of migratory species for the commercial, recreational and artisanal line fisheries in Mozambique, no genetic studies been carried out and there are no specific species management plans.

The opportunities

Strengthening the legal framework

The Fisheries Law (Lei de Pescas) gives responsibility for managing the sector to the Ministry of Fisheries. However, the ministry is yet to take concrete actions towards the management of the fisheries. The establishment of marine protected areas such as Parque Nacional das Qurimbas, Parque Nacional de Bazaruto and Reserva Especial de Ponta de Ouro has been made to protect threatened species. Other factors associated with Mozambique's devastating position are poor and weak institutions, drained and poor infrastructures and heavy tax costs that are being imposed thus hindering the private sector investments, insufficient access to finance and failure to fully meet the international export requirements.

Target 14.4: Conserve coastal and marine areas

UN definition: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and. unregulated fishing and destructive fishing practices and implement science-based management plans, in. order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum

Status:

- Proportion of fish stocks within biologically sustainable level No data
- Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing No data

Source: (UN Stats 2019)

The policy framework includes the Fisheries Master Plan 2010–2019, the National Plan to Combat Illegal, Unreported and Unregulated Fishing, the Strategic Plan for the Artisanal Fishing Sub-Sector and Agenda 2025, the country's long-term development blueprint, amongst others. The policy agenda realizes the importance of the fisheries sector to poverty human livelihood, food security and the country's economy.

Aquaculture and marine culture

The growth of aquaculture and marine culture aims to reduce pressure on the capture fisheries while at the same time creating jobs, stable income and improving food security (Blythe et al., 2014). The climate is good for aquaculture development and the tropical tropical environment conducive for wild native species such as the giant tiger prawn (FAO, 2017b). Equally freshwater species such as the tilapia though still in its infancy stage have been cultivated in Mozambique.



Marine culture which is mainly farming in sea foods has also picked up. Sea fish such as shrimp and prawns are mainly cultivated for external markets (FAO, 2017b; Omar, 2013).

Although the marine and freshwater aquaculture are still in their infancy stage, statistics show that they have a potential of producing 800,000 to 2 million tons respectively (Mozambique Ministry of Sea, Inland Waters and Fisheries, 2013; 2014). Some of the initiatives to support this industry include:

- Association of shrimp Producers helping in establishment of the commercial shrimp industry (Blythe et al., 2014)
- Aquapesca, Indian Ocean Aquaculture, Sol and Mar investing US \$100 million in the fishing sector (Omar, 2013)
- National Institute for Aquac Development of Small scale Fisheries giving support to small scale sector (Benkenstein, 2013a). This institute also supports the sector in enhancing the standard of living and fight poverty in fishing communities (Darkey and Turatsinze, 2014)
- Aqua Development Strategy 2008-2017.

South West Indian Ocean Fisheries Governance and Shared Growth Program (SWIOFish)

This programme started in 2015 and using a three-pronged approach (economic, social, and environmental) aims to increase the benefit of the sector to coastal community livelihoods. The initial countries supported by the project include Comoros, Mozambique and Tanzania and regional activities implemented by the Indian Ocean Commission. It has now expanded to include Madagascar, Seychelles and Maldives. In 2017, the SWIOFC countries agreed adopted guidelines for Minimum Terms and Conditions for Foreign Fisheries Access in the SWIOC region; and also coordinated their positions in the Indian Ocean Tuna Commission.



As part of Mozambique's SWIOfish Program, Mais Peixe Sustentável provides matching grants to support artisanal fishermen and encourage micro, small and medium enterprises to sustainably expand fisheries and aquaculture value chains

Development of the Tuna fisheries industry

The Government is currently developing a national tuna industry to increase the contribution of these fishery resources to national socioeconomic development. Efforts include increasing the number of fishing vessels and improving landing sites to directly benefit Mozambique and its citizens. This strategy was developed by the Government under the Fisheries Master Plan and the Strategic Plan for Tuna Fisheries Development 2010–2019. In 2013, Mozambique submitted a fleet development plan for 2014–2028 to the Indian Ocean Tuna Commission (Oceanic Développement, 2014).

Compliance with international fisheries standards

Full compliance with European Union standards related to fish exports poses enormous challenges for LDCs such as Mozambique. It is financially costly, and administratively and institutionally complex. Mozambique is unable to fully meet public standards or satisfy industry requirements and standards that are higher than public standards. As with all fish and seafood exports originating from LDCs, such exports from Mozambique are thus confined to wholesales, which generally offer prices lower than those offered by supermarkets.

Climate change

The challenge

Climate change poses a threat to marine ecosystems, fisheries through the impacts on the freshwater systems due to shifting rainfall patterns, increased evaporation levels, frequency and intensity of floods and droughts, ocean warming and acidification (Benkenstein, 2013). There will also be impacts on the coastal communities and the fishermen and processors who depend on the fishery and resource.

The situation

Historical situation

Between 1960 and 2006, temperatures increased by 0.6°C while mean annual rainfall decreased at an average of 2.5 mm per decade, largely due to decrease in precipitation during the rainy season. Over this time the rainy season started later and the dry seasons lasted longer. Extreme events such as cyclones, heavy rains and droughts have increased in number since the 1950s.

Climate projections

The projections are that mean annual temperatures in Mozambique are likely to rise by 1.0-2.8°C by the 2060s. Precipitation is likely to increase and become more intense in the rainy season. Overall, the frequency and intensity of the extreme weather events is likely to increase. Sea level rise may average 0.18-0.59 m by the 2090s (USAID, 2012).

The constraints

Poverty and low socio-economic status

Poverty, a fast-growing population that is insufficiently prepared, low literacy levels are likely to combine to reduce the resilience to climate change. For instance, literate, prepared people have options to make agriculture more climate-resilient and probably the skills for finding alternative livelihoods. By 2050, it is expected that climate change may lead to a 4-14 per cent decline in GDP (MOF, 2018) Most people live in the coastal regions – where floods, cyclones, erosion and sea level rise pose serious risks – increasing their vulnerability to these events. The population is growing fast at an annual rate of 2.5 per cent driving pressures on natural resources. Infrastructure development is also low with only 6 per cent of highways paved. This slows down response and mobility in case of emergencies (MOF, 2018).

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.

Disporportionate Impacts on women and girls

There is a gender bias to the impacts of climate change. Women and girls are responsible for provision of household food, water and crop production. The projections of increased droughts, floods and bush fires are likely to lead to increasing agricultural losses with impacts on the households. Women who have the responsibility to provide for them will thus be more vulnerable to climate change. Agriculture in Mozambique is primarily rainfed and contributes 28 per cent of GDP and employs 81 per cent of its labour force. Overall, where men tend to migrate to cities to look for work, the women are left with the household responsibilities further aggravating the situation.

Growing data, research and capacity needs

There is much need for specific data to support decision making for increased resilience to climate change. Some of the data needs include better climate monitoring and modeling, coastal zone mapping, early warning and vulnerability mapping, flood prediction and monitoring systems for rivers and cities at risk from cyclones and storms surges. Managing, packaging and dissemination of climate change information to support increased awareness and evidence-based policy making will be of paramount importance.

The opportunity

Institutional framework

The institutions that manage climate change in Mozambique include the Ministry for the Coordination of Environmental Affairs (MICOA) which is the lead environmental management and coordination body, and the national focal point for the United Nations Framework Convention on Climate Change. Others include the National Directorate of Forests (within the Ministry of Agriculture and Rural Development), the National Meteorology Institute on New Early Warning Systems/Warning of Tropical Cyclones and the Technical Secretariat for Food Security and Nutrition addresses climate change and food security challenges.

Legal and policy framework

Initial National Communication of 2003 formed the basis against which the Climate policy was formulated. Mozambique has also articulated its National Adaptation Programme of Action (NAPA) (2007).

Western Indian Ocean Large Marine Ecosystems Strategic Action Programme Policy Harmonisation and Institutional Reforms (SAPPHIRE)

States