



ambição pela biodiversidade

**BIODEV
2030**



CONCEPTUAL MODELS OF SECTORAL VOLUNTARY COMMITMENTS FOR MOZAMBIQUE



Integrating Biodiversity into the
Agriculture, Fisheries and Extractive Industry Sectors

Maputo, August 2023





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Title

Conceptual Models of Voluntary Sectoral Commitments for Mozambique - Integrating Biodiversity into the Agriculture, Fisheries and Extractive Industry sectors

Final Draft

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Note: *The names of the companies mentioned as pivotal in the conceptual models of voluntary commitments are only from the perspective of the building of the concept, which does not necessarily mean that these companies have already committed to implementing the voluntary commitments.*



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LIST OF ABBREVIATIONS AND ACRONYMS

DINAB	National Administration of Conservation Areas
DINAF	National Directorate of Forestry
ANAC	National Administration of Conservation Areas
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund
BIOFUND	Foundation for the Conservation of Biodiversity
PTA/CTA	Land and Environment Department of the Confederation of Economic Associations of Mozambique
UP	Pedagogical University
DNPAC	National Directorate for the Promotion of Commercial Agriculture
INoM	Oceanographic Institute of Mozambique
CBD	Convention on Biological Diversity
NBSAP	National Biodiversity Strategy and Action Plan
MITADER	Ministry of Land, Environment and Rural Development
SDG	Sustainable Development Goals
AFD	French Development Agency
IUCN	International Union for Conservation of Nature
SACA	Strategic Actions for Climate Adaptation
NAP	National Adaptation Plan
NGO	Non-Governmental Organisation
VC	Voluntary Commitment
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
SME	Small and Medium-sized Enterprises
CCPs	Community Fishing Councils
SDZ	Zambezia Development Society
CLUSA	Cooperative League of the United States of America
COPAZA	Cooperativa de Produtores da Alta Zambézia
AGRICOM	Upper Zambezia Farmers' Co-operative
DPSIR	Agricultural Products Trading CompanyDriver
SDAE	District Office for Economic Activities
MTA	Ministry of Land and Environment
GDM	Marromeu District Government
APAMO	Association of Sugar Producers of Mozambique
DNA	National Sugar Distribution Company

WTO	World Trade Organisation
SADC	Southern African Development Community
IDEPA	National Institute for Fisheries and Aquaculture Development
INAMAR	National Institute of the Sea
TAC	Total Allowable Catch
TAE	Total Allowable Effort
IFC	International Finance Corporation
MIGA	Multilateral Insurance Guarantee Agency
IMC	Investment Management Certificate
AfDB	African Development Bank
ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
IDBG	Inter-American Development Bank Group
IsDB	Islamic Development Bank
ENH	National Hydrocarbons Company
INP	National Petroleum Institute
PS	Performance Standards
FAN	Foundation for the Enhancement of the Business Environment
MRV	Mozambique Rovuma Venture
ESF	Environmental and Social Framework

1. BACKGROUND

Several ecosystems, including those located within the boundaries of Conservation Areas, have suffered different levels of degradation over the years, and this has contributed to the reduction of biodiversity in Mozambique. In more extreme cases, the degradation of ecosystems has resulted in the extinction of some species and an increase in the number of vulnerable and threatened species. If ignored, this accelerated loss of biodiversity could have irreversible consequences for ecosystems and the national economy.

Nevertheless, Mozambique has made efforts aimed at preserving its biological heritage. Through Resolution 2/94 of 24 August, the country ratified the Convention on Biological Diversity (CBD) and drew up a National Biodiversity Strategy and Action Plan (NBSAP, 2015-2035). Through National Target 17 of the NBSAP, Mozambique has committed itself to engaging the different sectors in biodiversity issues by 2020 and to developing sectoral targets based on the national targets, integrating them into sectoral plans and effectively starting their implementation (MITADER, 2015).

Globally, recent scientific knowledge indicates that the acceleration of the loss and decline of biodiversity and ecosystem services is associated with activities carried out by economic sectors, including agriculture, mining and fisheries. In the agricultural sector, the main drivers of biodiversity loss are the conversion of natural habitats into cultivated fields and the excessive use of agro-chemical inputs. In the fisheries sector, the main pressures on marine biodiversity are overfishing, the capture of juveniles and the use of destructive fishing practices that lead to stock variations, disrupt the food chain and affect marine habitats and species, especially shrimp and crabs. Lastly, in the extractive sector, the development of infrastructures associated with the prospecting, site preparation and extraction phase have an enormous potential for direct and indirect impact on biodiversity, ranging from disturbance, damage or loss of habitat and reduction of biodiversity richness and abundance. For example, some of the most dangerous direct impacts on biodiversity in this sector occur at the production (extraction) stage in open-cast mines.

Against this background, if urgent measures are not taken at global, national and especially sectoral level, the risk of mass extinction of species will increase in the coming decades, since the health of the ecosystems on which humans and all other species depend is deteriorating at an unprecedented rate. As a result, livelihoods, food security, health and quality of life around the world become more vulnerable and can further threaten the country's economy and finances due to the dependence of economic activities on biodiversity.

2. INTRODUCTION

To ensure the sustainable supply of vital ecosystem goods and services that support the development of humanity, such as food, fibre, timber, carbon sequestration, water regulation, etc., it is urgent and imperative to adopt measures aimed at reducing the accelerated loss of biodiversity.

Nature conservation is a non-negotiable requirement for achieving a more prosperous, healthy and just world. However, if the world does not reverse the loss of biodiversity, it will weaken any chance of achieving the Sustainable Development Goals (SDGs) by 2030. One of the main challenges is to make the global community realise that the future of nature and the existence of humanity and all life on earth depends on the actions of each one of us to bring about a positive and measurable change in biodiversity. It is therefore important that countries work harder on different opportunities and approaches to reconcile economic development, biodiversity conservation and the reduction of global warming.

The BIODEV2030 project, funded by the French Development Agency (AFD), coordinated in 16 countries by Expertise France and implemented in 811 countries by the International Union for Conservation of Nature (IUCN) and in another 822 by the World Wildlife Fund (WWF), seeks to address the causes of biodiversity loss by encouraging all stakeholders – state actors, the private sector, civil society organisations and local communities – to commit to its preservation through voluntary initiatives based on scientifically identified objectives. The first phase of the project began in March 2020 and ended in December 2022.

The “**BIODEV2030 method**” is participatory, inclusive and inspired by the long-term strategic approach to integrating biodiversity into economic sectors and is based on three main stages: (1) a scientific diagnosis of the threats to biodiversity (IUCN, 2021); (2) a study of the sectors/sub-sectors selected by the stakeholders as having the greatest impact, in order to identify compromise scenarios (IUCN, 2022); and (3) a sectoral and intersectoral dialogue in multi-actor platforms to specify the content of voluntary commitments (see Fig. 1) (Vergez, 2022). This method has made it possible in just over two and a half years of implementation to:

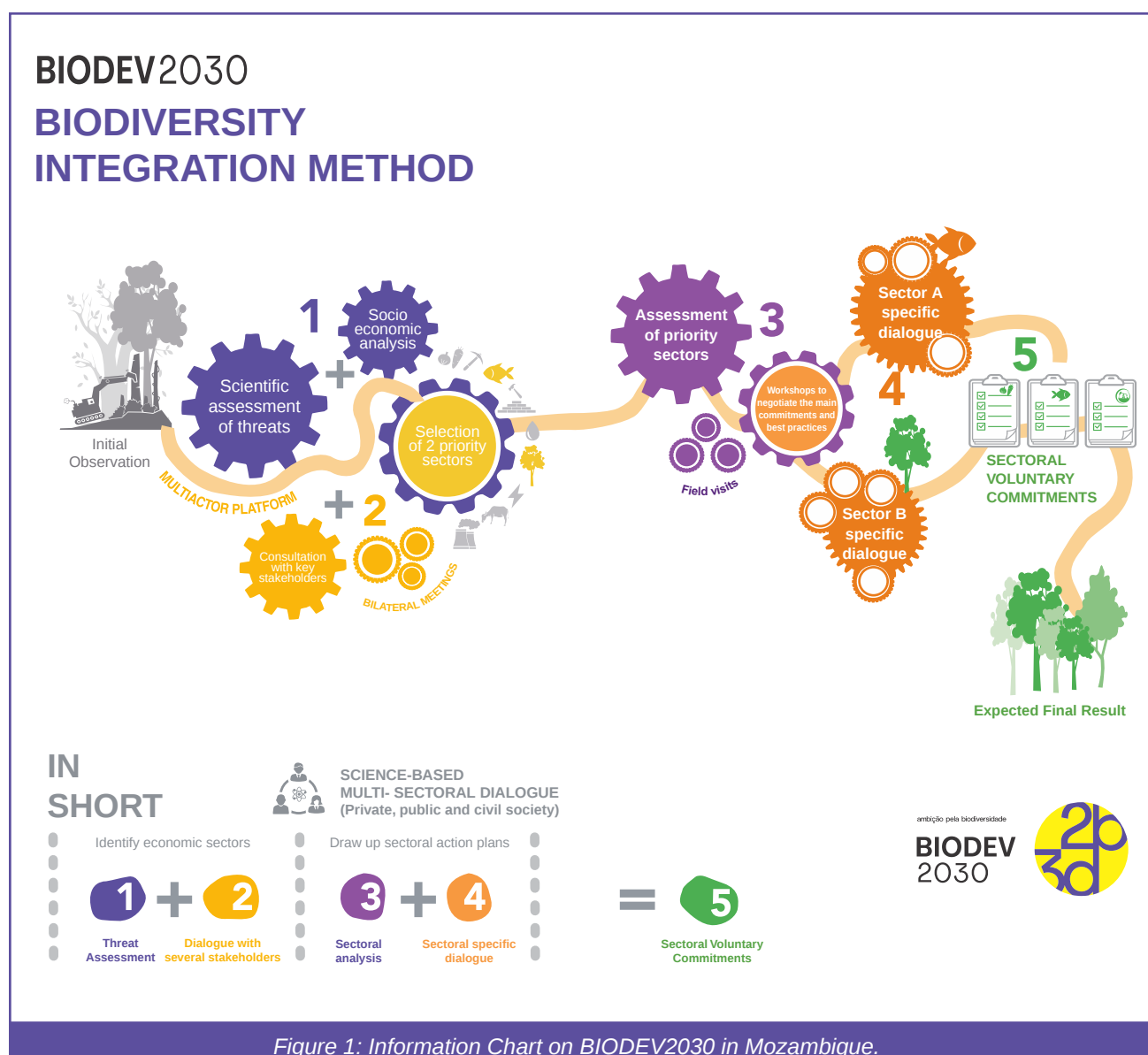
- 1) Identify on a scientific basis the economic sectors of agriculture, extractive industry and fisheries as priorities for reducing environmental pressures, such as conversion, loss and fragmentation of natural habitats, overexploitation of species (overfishing), pollution; and as key sectors for economic development and livelihoods in Mozambique;
- 2) Assess the opportunities and challenges for the transition to more sustainable practices in the value chains of soya and sugar in agriculture, heavy sands, oil and natural gas in the extractive industry, and shrimp and crab in fisheries;
- 3) Conduct two scientifically informed multisectoral dialogues, where the first agreed on the

¹Benin, Burkina Faso, Etiópia, Fiji, Guínea, Moçambique, Kenya, Senegal.

²Cameroon, Gabon; Guyana, Madagascar, Democratic Republic of Congo, Tunisia, Uganda and Vietnam

sectors to be engaged in voluntary commitments and the second discussed the good practices to be considered for voluntary commitments;

- 4) Organise six sub-sectoral seminars in the landscapes relevant to the selected value chains, including a meeting with the financial sector, to work together with the value chain actors to define the best practices that could be included in voluntary commitments and agree on the corporate approach to them.



3. BIODEV2030 VOLUNTARY COMMITMENTS

Under BIODEV2030, a "Voluntary Commitment (VC) is an agreement in which one or more stakeholders commit to mobilising and implementing a series of shared, science-based strategic actions that will bring about a positive, measurable change in biodiversity." (Garcia et. al., 2021). The voluntary commitment can be implemented by an individual, institution or group of stakeholders, at the level of an economic sector, on a national, territorial or local scale. It is a written and public moral document that must contain detailed actions and an implementation plan with targets and the role of each stakeholder. It should be based on a quantitative approach with a timetable and key indicators and linked to a recognised monitoring and evaluation system. It should also ensure that once implemented, it contributes to meeting the targets of the National Biodiversity Strategy and Action Plan (NBSAP, 2015-2035), the National Adaptation Plan's (NAP) Climate Adaptation Strategies and Actions (SACA) and the Sustainable Development Goals (SDGs).

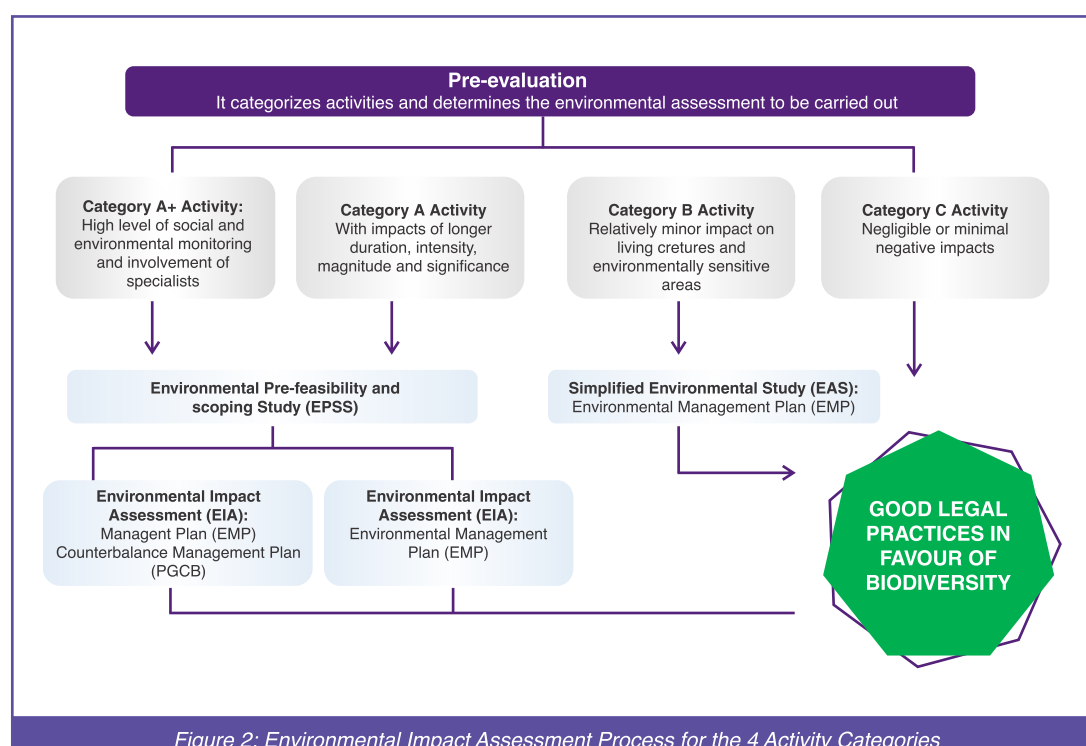
The voluntary commitments under BIODEV2030 have a role for each category of national actors, namely:

1. **The State** - *is responsible for formulating and implementing policies for biodiversity conservation, promoting green incentives; providing biodiversity-related information to the private sector and promoting coordination between the different actors;*
2. **The NGOs** - *are responsible for conducting and monitoring community-based biodiversity conservation actions, proposing policies to the state and establishing partnerships with the private sector, with a view to responding to biodiversity and climate mainstreaming objectives;*
3. **Academia and research** - *are responsible for promoting partnerships with NGOs and the private sector in order to guarantee research in the process of implementing Vcs;*
4. **Private Sector** - *is responsible for reducing impacts on biodiversity and achieving sustainable use by acquiring knowledge about the impact of its business activities on biodiversity and implementing biodiversity-sensitive activities; adhering to good environmental practices in the implementation of its activities. It must also promote co-operation between different companies for the conservation and sustainable use of biodiversity;*
5. **Financial institutions** - *are responsible for developing sectoral environmental guidelines to make the financing of investments that comply with voluntary commitments secure; working together with borrowers to improve their environmental performance and mitigate damage through an engagement policy;*
6. **The press** - *is responsible for promoting sustainable use through information. Once VCs have been signed by stakeholders, it will be important to enhance them with positive communication about stakeholders' efforts and commitments.*

3.1. Assumptions for voluntary commitments under BIODDEV2030

BIODEV2030's voluntary commitments are based on three fundamental assumptions: firstly, **the implementation of best practices that contribute to reversing the biodiversity loss curve**; secondly, the need for **best practices not to be a legal obligation and not to form part of the Environmental Management Plan (EMP)** that the applicant must consider in order to obtain the licence to operate.

In Mozambique, the approval process for any investment involves obtaining an environmental licence (see Fig. 2). This environmental feasibility certificate for an activity is granted after an Environmental Impact Assessment (EIA) process that allows for the identification and prior qualitative and quantitative analysis of the beneficial or adverse environmental effects on biodiversity. The EIA begins with a pre-assessment to categorise investments in terms of probable risks to the environment and ends with a recommendation to integrate best practices favouring biodiversity and the environment in general, even for the category of activities classified as having a non-significant impact and therefore not required to have an Environmental Management Plan (GM, 2015). Furthermore, under the terms of the Ministerial Decree on Offsets, when applying the mitigation hierarchy to projects that have to offset, offset management plans can only be approved on the basis of what is established in the environmental management plan (including the appropriate measures for prevention, minimisation and recovery, restoration or rehabilitation of damage to biodiversity) (GM, 2022).



The third assumption is that **the impact of implementing best practices will be greater if they are promoted in voluntary corporate commitments.**

This assumption is that large companies or coalitions of large companies promote to the Small and Medium-sized Enterprises (SMEs) that provide them with services or to communities and producer associations **best practices for integrating biodiversity and climate** into their day-to-day economic activity (Fig. 3).

This corporate approach must be combined with the establishment of enabling political and legal conditions that attract green investment, as well as the creation of green financial products in the country. In this way, large companies and SMEs also benefit and indirectly benefit from the financial sector.

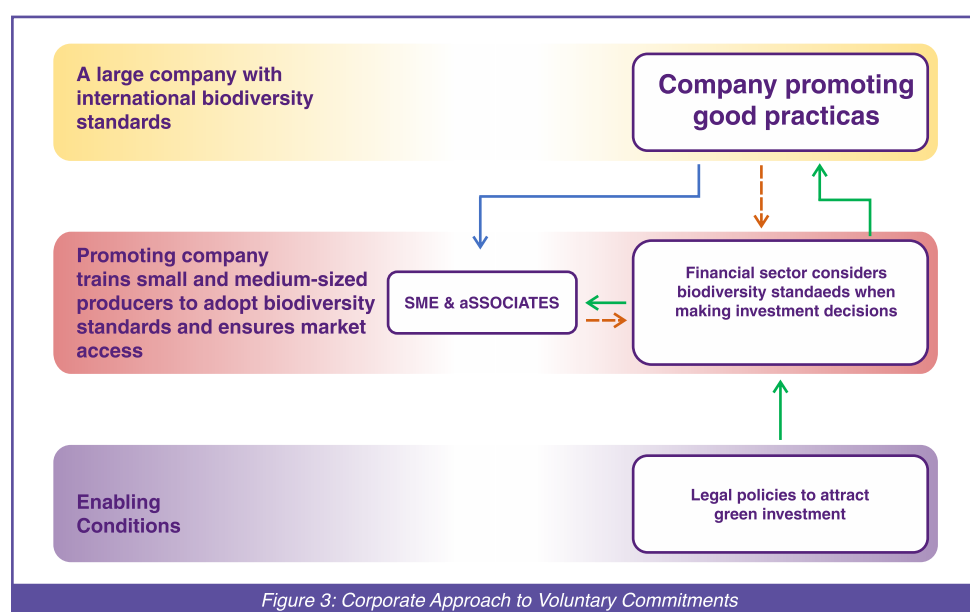


Figure 3: Corporate Approach to Voluntary Commitments

3.2. Best practices that could be part of voluntary commitments

The report on assessing the opportunities and constraints for implementing voluntary commitments identified a set of best practices to be implemented in each of the six value chains as a way of reducing the negative impact on biodiversity.

On the other hand, the negotiation process for the design of voluntary commitments identified among these good practices those that are and those that are not a legal obligation. The latter were

taken as a basis for discussion and identification of best practices, with the potential to reduce the negative impact of the activity on biodiversity that could be included in the voluntary commitments.

The process of sub-sector dialogue with the actors in the value chains took place in Maputo city for the sugar and oil and gas value chains, in the district of Guruè for the soya chain, in the city of Quelimane for the heavy sands value chain and in the city of Beira for the shrimp and crab chains, which resulted in the identification of the following best practices. The sub-sector dialogue also included a meeting with members of the Mozambican Banking Association, which discussed the financial sector's efforts to include aspects of biodiversity conservation in its business dealings.

Soya Production	Sugar Production
➤ Promotion of organic fertilisers; ➤ Use of adapted high-yielding crop varieties; ➤ Wild seed; ➤ Agro-forestry approach; ➤ Conducting action research to add and adopt appropriate mitigation measures, as well as a risk assessment framework to predict the effects of mitigation measures on biodiversity.	➤ Adoption of Integrated Pest and Disease Management (IPM); ➤ Adoption of genetically modified crops, especially those resistant to diseases and pests; ➤ Adoption of precision agriculture; ➤ Conducting action research to add and adopt appropriate mitigation measures, as well as a risk assessment framework to predict the effects of mitigation measures on biodiversity.
Heavy Sands	Oil & Gas
➤ Establishment of voluntary exclusion zones; ➤ Adoption of biodiversity standards as values for the development of the extractive industry in the country; ➤ Fostering and supporting intensive agriculture in communities to supply production to large companies; ➤ Restoration of mangroves; ➤ Support for sustainable fishing.	➤ Creation of voluntary exclusion zones; ➤ Adoption of Biodiversity Standards as values for the development of the oil and gas industry in the country; ➤ Training and capacity-building for local service providers at the Business Development Centre with a view to certifying their services and increasing their eligibility for the environmental and social standards of large companies.
Prawns and Crabs	
➤ Mangrove restoration; ➤ Sanctuaries for Community Fishing Councils (CCPs); ➤ Corporate support for small fishermen through the allocation of regulated materials and the functionality of the value chain; ➤ Improving working tools for members and strengthening enforcement against bad fishing practices; ➤ Biodiversity Standards adopted as values for the development of fishing in the country.	

3.3. Conceptual models of voluntary commitments

As part of BIODIV2030, the best practices described above can only become voluntary commitments if they are included in conceptual models that will be described below. These models can be applied in different situations in which a large company can influence and facilitate the production process of small and medium enterprises and associations and ensure that their activity adds biodiversity values and local economic development.

3.3.1. Conceptual model for the soya value chain

Nature of the Voluntary Commitment	SECTOR	AGRICULTURE
	VALUE CHAIN	SOYA
CORPORATIVE	COVERAGE	Regional
Regional and economic background		
Zambézia is the province with the largest area under soya cultivation (52% or 33,949 ha) and the largest soya producer in the country (43% or 29,082 tonnes). The district of Guruè is the second largest producer of soya in Zambézia province (33%). The district's recorded soya production in the 2020/2021 harvest was 9,473 tonnes. This production is the contribution of small and medium-sized farmers. Additional quantities of soya (6,300 tonnes) were produced by the private company Hoyo-Hoyo, on an additional area of approximately 2,360 hectares. The Guruè District is mountainous with steep slopes. It is characterised by a diversity of micro-agro-ecological zones within a relatively small area. Degradation is marked, with 65 per cent of agricultural land classified as degraded. The area is densely populated, with an average of 0,2 ha per household. Most households depend on agricultural crops of cereals, pulses and tubers. In recent years, soya production has gained particular prominence and has changed the lives of some households that have adopted soya production (Rosário et al., 2022). Soya production is seen as a success story, as it is a lucrative crop for small landowners, who are multiplying rapidly in the region. For this reason, the people of Guruè already consider this success to be "a revolution" (Hanlon & Smart, 2012), since soya grows well in Guruè (1) and the neighbouring districts of Molumbo (2) and Mecuburi (3). In these districts it is possible to increase production substantially. Soya beans are also in demand as chicken feed. Almost a fifth of the soya producers in Mozambique are in the district of Guruè. Soya production employs over 5,000 peasants and some single and associated farmers, as well as a few companies.		
Actors in the value chain		
The soya value chain in Guruè district is made up of seed suppliers (CLUSA, World Vision, AGRICOM); seed multiplication agents (COPAZA); soya producers (single, cooperative/association, COPAZA, HOYO-HOYO, MOZA FARMS); processors (COPAZA, NOSSARA); buyers (Abílio Antunes, Farmers of Manica province; a feed processing unit (UP2) in Guruè) (under construction); and the RAS oil refineries in Cuamba); local traders (local aggregators); large traders (Royal Group in Nacala) and large international markets, such as India and China.		

This soya chain arrangement in this district encourages the implementation of a voluntary corporate commitment, which links small producers, micro-enterprises and large companies.

Some Non-Governmental Organisations (NGOs), such as CLUSA and World Vision, have been supplying certified seeds at the start of soya production in the district. Local co-operatives (e.g. COPAZA) and private companies (such as AGRICOM) have recently emerged as seed suppliers.

Medium-sized commercial soya farmers use certified seeds supplied by CLUSA or bought from local agro-dealers and the local input supplier (AGRICOM).

Small-scale soya farmers cultivate small areas (0.5-2.0 ha) and use domestic labour. Farmers intercrop soya with guandu beans; they use "inoculants" to treat the seeds and have introduced bradyrhizobia for nitrogen fixation as well as inorganic pesticides. Farmers make limited use of agricultural inputs such as herbicides, fertilisers and pesticides. Practices of rotating soya crops with maize are common among small farmers. Some farmers have been trained to produce homemade biological fertilisers prepared from a mixture of dried and crushed papaya leaves and ash. Other farmers intercrop soya with maize and/or pigeon peas. CLUSA also promotes the use of conservation agriculture practices. Through its Conservation Agriculture Programme (PROMAC I and II), CLUSA has introduced COVAJO and RIPER techniques to soybean production. These techniques involve less soil disturbance and are believed to increase the resilience of cropping systems to climate change.

The big soya producers in the district of Guruè are Hoyo-Hoyo Agribusiness and AGROMOZ. Hoyo-Hoyo Agribusiness farms around 3,000 ha, out of a total of 5,000 ha of land that it has legal permission to farm in Ruace. This company works under the concept of conservation agriculture and soya production is fully mechanised. In this process, only natural water sources, riverbanks (50-200 m), steep areas around mountains (where farming is not possible, ranging from 50 to 100 m) are avoided. They use direct planting techniques. The use of soil fertilisers is based on the results of soil tests (precision farming techniques).

The produce is sold to local traders and/or large traders. As an example, COPAZA was contracted by SeedCo to multiply soya seeds for the input supplier (AGRICOM). In 2020, COPAZA supplied around 200 tonnes of soya seeds to AGRICOM (Rosário et al., 2022).

Analysing biodiversity risks under the DPSIR framework

Soy production involves deforestation, slurry and burning practices, mechanisation, the use of pesticides, herbicides and fertilisers, all of which contribute to forest conversion, habitat loss and degradation. Soya production requires all trees to be removed from the field to avoid competition for resources (e.g. light). In the district of Guruè, the area earmarked for soya production has been cleared and the natural vegetation converted into continuous fields. The remaining natural vegetation around the soya plantations consists of small, isolated patches in cemeteries or as strips of vegetation along riverbanks. The consensus is that the tree cover in this district has changed since the introduction of soya in 2015.

The suppression of natural vegetation has affected the quality of the habitat with impacts on the diversity of flora and fauna. The local population recognises that most of the areas used for soya production were once habitat for a diversity of wildlife, including mammals, herpetofauna, birds,

among others. Currently, only small rodents, reptiles and a few birds occur. These facts confirm the previous IUCN report (IUCN, 2021), which blames monoculture production (such as soya), the intensive use of mechanisation and fertilisers/agrochemicals as factors contributing to habitat loss and changes in land cover, with a high degree of threat to plants, herpetofauna, birds and mammals.

The district of Guruè has the potential to reduce and restore threats. Threats have a high impact on species and, if reduced, contribute significantly to improving species survival.

Voluntary commitment approach

Forest conversion, habitat loss and degradation can contribute to the alteration of biogeochemical cycles with an impact on global biodiversity. The alteration of biogeochemical cycles is known to contribute to climate change with direct impacts on economic sectors such as agriculture. Climate variability favours the occurrence of pests, imposing the intensive use of pesticides in agriculture, with impacts on biodiversity.

In addition, in recent years soya production has recorded an incidence of pests for which farmers have had to purchase and apply insecticides. The intensive use of pesticides and herbicides can contaminate surface and groundwater, with impacts on biodiversity and the health of the local population. Therefore, engaging economic sectors that improve the status of biodiversity through voluntary commitments can help reduce the disruption of biogeochemical cycles, with benefits for biodiversity and local economies.

The new MANMART animal feed processing plant under construction will need around 30,000 tonnes of soybeans a year and more than 90,000 tonnes of corn a year. It will also set up a chicken production unit in the district, which in turn will be able to provide organic fertiliser for the soya fields. MANMART is interested in acquiring all the soya production in this district and therefore intends to implement a development programme in which it will train family producers, associations and micro and small businesses in nature-friendly soya production techniques, such as Organic farming implemented in partnership with local educational and applied research institutions; Conservation agriculture through intensification of farming, rotation and intercropping; ZERO or minimum tillage and Agroforestry. To this end, farmers will be encouraged to use short-cycle varieties and organic fertiliser from MANMART. MANMART will set up a monitoring unit to check that soya production meets the standards and criteria for adhering to them. MANMART will only buy soya from producers who adhere to its nature-friendly business principles.

Expectations of success

- Producing high-quality soya in a stable way that doesn't harm biodiversity.
- Find producers who are very aware and who also have the technical capacity to follow standards in soya production.
- Shorten the soya chain within the district and increase income for small farmers without harming biodiversity.
- Reduce pressure on and loss of biodiversity.
- Regenerate ecosystems.
- The company adds new values (biodiversity conservation and local economic development) to soya and supplies it to consumers.

Challenges

- Business incentive policies.
- Financial products to support success.
- Scientific support for monitoring success in biodiversity metrics.

Type of voluntary commitment

(I) Local initiative

Risk of conflict/need to create synergies

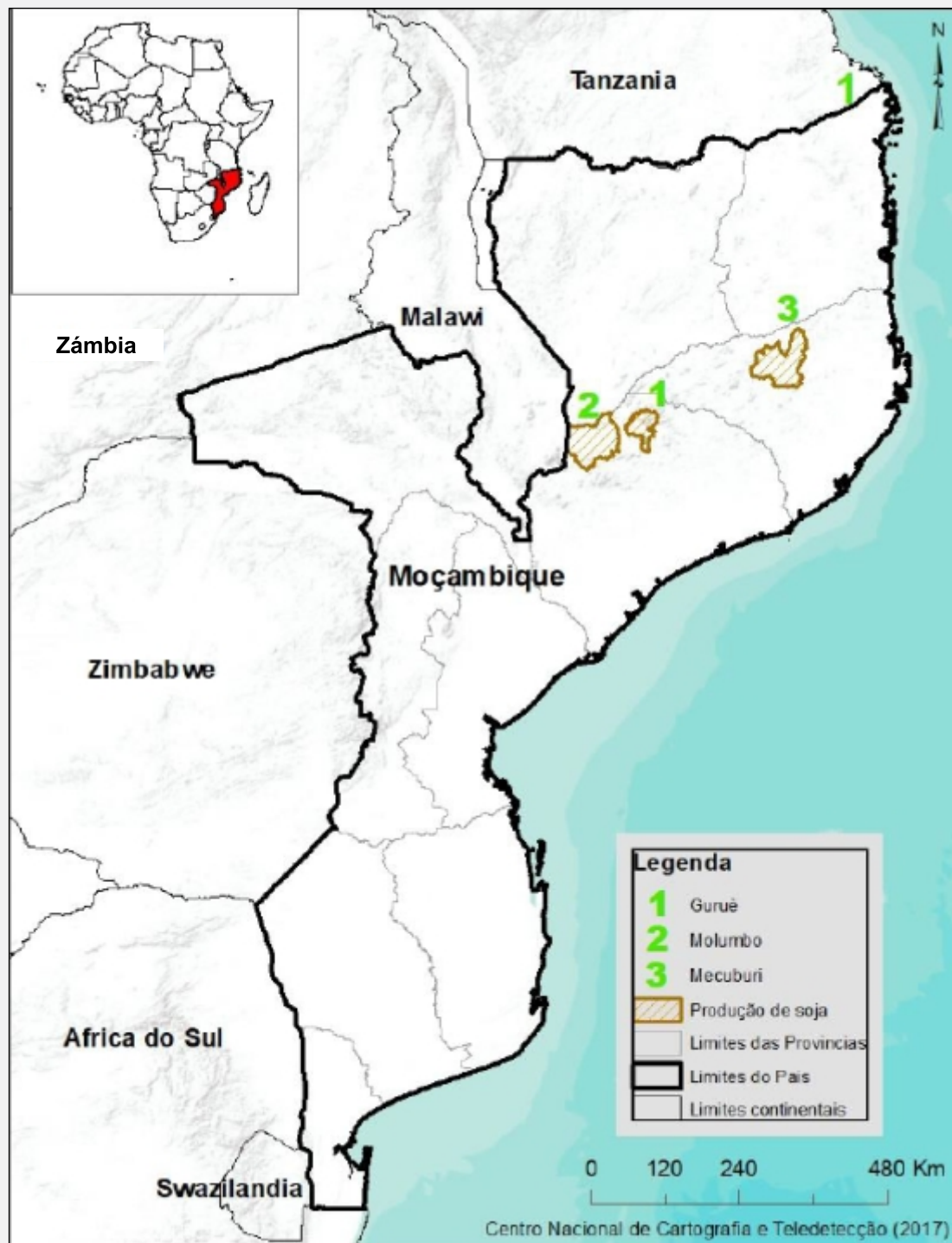
- SUSTENTA Programme
- Role of the SDAE

Alignment with NBSAP targets: M5, M8, M12, M20

Alignment with SACA: A9, A14, A15

Alignment with SDG:





ACTION PLAN

PROBLEM

Deforestation of natural vegetation in the Guruè landscape

DESIRED OUTCOME:

- Reducing threats to biodiversity
- Restoring biodiversity

IMPLEMENTING AGENT: MANMART

Purpose	Actions	Indicators	Partners	Deadline
Reversing degradation	Promoting organic fertilisers	Share of agricultural area under productive and sustainable agriculture Changes in soil organic carbon stocks	SDAE Single soya producers Co-operative/ association COPAZA, HOYO-HOYO, MOZA FARMS	One crop season
	Use of adapted high-yield crop varieties	Extent of forest cover Quantity of soya purchased by MANMART	SDAE MANMART Single soya producers Co-operative/association COPAZA, HOYO-HOYO, MOZA FARMS	One to five crop seasons
	Agro forestry outgrowers scheme	Habitat Biodiversity Index Red List Index (pollinator species) Number of threatened species Yield per ha Number of producers with the technical capacity to follow standards in soya production	SDAE MANMART Single soya producers Co-operative/association COPAZA, HOYO-HOYO, MOZA FARMS	One to five crop seasons
	Use of wild seed	Habitat Biodiversity Index Yield per ha	SDAE MANMART Single soya producers Co-operative/association COPAZA, HOYO-HOYO, MOZA FARMS	One crop season

3.3.2. Conceptual model for the sugarcane value chain

Nature of the Voluntary Commitment	SECTOR	AGRICULTURE
	VALUE CHAIN	SUGAR CANE
CORPORATE	COVERAGE 1, 2, 3, 4	Nationwide

Regional and economic background

Mozambique's installed sugar production capacity is 530,000 tonnes/year. Between 2017 and 2021, the factories produced an average of 315,418 tonnes/year, equivalent to 60% of the installed capacity. The sugar sector employs around 17,000 workers, down from a total of 24,500 workers in 2015 (BM, 2022).

According to O'Laughlin and Ibraimo (2013) quoted by BM (2022), the multiplier effects of the industry are increasingly limited and there is a perception on the part of independent producers that prices are to their disadvantage, given the asymmetry of information between factories and sugarcane producers in price fixing, a fact that does not stimulate production (BM, 2022). This is one of the most employable industries in rural areas and has the potential to improve the socio-economic conditions of the communities surrounding the factories.

Marromeu District is located in the Zambezi Delta. Its history is linked to biodiversity conservation, the sugar industry and the railway. With a surface area of around 5,871 square kilometres, less than 10% of the area is occupied by the human population. Around 80% of its area is occupied by biodiversity conservation areas, including reserves and game farms. In addition, almost the entire district is a wetland and has already been declared a Ramsar Site (MTA/GDM, 2023).

Sena Sugar Estates Ltd. was established in 1920 as a result of the merger of several sugar companies, namely the Mozambique Sugar Company, the East African Sugar Company and The Sena Sugar Factory. Since its establishment, it has been an agro-industrial company dedicated to sugar production on land allocated by the Mozambique Company in Luabo and Marromeu. It was later renamed Companhia de Sena (the Sena Company), which in the meantime had to stop production during the war. It only restarted sugar production in 2001 and reached a production figure of around 70,000 tonnes in 2005.

Currently, commercial agriculture, dominated by sugar cane production by the Companhia de Sena, covers around 5,700 ha of irrigated land, with the potential to expand to just over 15,000 ha. At Companhia de Sena, the average sugar cane yield is reasonable, but on a downward trend, ranging from 40 to 80 tonnes/ha to a potential of 80-100 tonnes/ha (MTA/GDM, 2023).

Açucareira de Xinavane is located in the Manhiça district of Maputo province, on the coastal alluvial plains of the Incomáti and Incoluane river basins. Its history is intertwined with agribusiness and agro processing, with a focus on the complementary raw materials of sugar cane and maize. Açucareira de Xinavane occupies a total area of 22,522.08 ha. Of these, around 6,679 ha are planted, of which 5,174 ha belong to the sugar mill; 1,230 ha to the Vamagogo Association; 185 ha to the Macupulane Association and 90 ha produced by the Maguiguana Association. This sugar plantation produces around 72,000 tonnes of sugar a year (Jelsma et al., 2010).

The Xinavane Sugar business emerged from the merger of Tongaat Group Limited and Hulett's Corporation Limited. Its operations date back to the mid-19th century. The company has had a primary listing on the Johannesburg Stock Exchange since 1952, and a secondary listing on the London Stock Exchange since 1939. Since its incorporation it has been an agro-industrial company dedicated to sugar production, relying on solid relationships with various stakeholders. These partner relationships continue to contribute to achieving the strategic objectives of the business, while also meeting the objectives of its various stakeholders, including shareholders, governments, private farmers and their representative bodies, communities, employees and

people who are impacted by the company's operations. Thanks to the fulfilment of its objectives, this business group operates around 8,000 hectares in the Mafambisse sugar plantation, working with a universe of 6,000 sweet cane producers divided into 25 associations, which farm an area of 18,000 hectares for production.

Tongaat Hulett's Group Limited's key operational goal is to promote agricultural sustainability. Its policies in place ensure that land management practices integrate agricultural and sustainability aspects to achieve broader development imperatives, for example food security.

This approach includes the participation of affected communities, the promotion of community development, the improvement of agricultural production and farming systems, as well as the conservation and rehabilitation of land resources. It has an agricultural training centre at its Xinavane operations to build the capacity of small farmers, while the company uses its regional expertise to add value to various water management forums, as well as facilitating food crop production initiatives.

Nonetheless, the focus on monoculture in Marromeu (1), Mafambisse (2), Xinavane (3) and Maragra (4) (shown on the map) and the demand for land from subsistence farmers who practise rainfed and shifting agriculture in an area with a strong biodiversity conservation legacy, can exacerbate land use conflicts, putting pressure on the persistence of species that the conservation areas claim to be protecting.

Actors in the value chain

Mozambique has favourable conditions for sugar cane production. The expansion of this production has been modest, taking into account the country's agricultural potential. The largest share of sugar cane is produced by sugar companies (75 per cent), and the remainder by independent producers, who are unaware of the indicative selling price of sugar cane at the start of the season, making it difficult to encourage production. The main players in Mozambique's sugar value chain are sugar cane producers, sugar factories, the Association of Mozambican Sugar Producers and the National Sugar Distributor.

Sugarcane producers include farmers who operate in the initial phase of this chain, in the production of the main raw material. Sugarcane farming comprises 4,000 sugarcane growers, most notably 447 private farmers and 60 private growers' associations, who together supply 25 per cent of the sugarcane processed by the industries. Generally speaking, in addition to producing its own raw materials, the sugar industry also provides support for some private producers. Sugar cane producers are organised into small associations or cooperatives, which in turn are associated with the Federation of Agriculture, which brings together various agricultural crops.

The sugar factories operating in Mozambique are: Conventional and Refined: Maragra Açúcar, S.A., Tongaat Hulett - Açucareira de Mafambisse, Companhia de Sena, S.A., Tongaat Hulett - Açucareira de Xinavane; Organic: (S.A., Pure Diets Moçambique, Eco Farm Moçambique, Eco Energia de Moçambique) (BM, 2022).

There is an Association of Sugar Producers of Mozambique (APAMO). This association, whose members are Açucareira de Moçambique, SARL, Açucareira de Xinavane, SARL, Companhia de Sena, SARL, and Maragra Açúcar, SARL, is responsible for representing, supporting and coordinating the common interests of its members, with the aim of promoting their brand and contributing to the growth, sustainability and recognition of the industry. To this end, it carries out advocacy activities to improve the sector's business environment, networking and technical support.

Sugar is supplied by Distribuidora Nacional de Açúcar (DNA). DNA's partners are Açucareira de Moçambique, SARL, Açucareira de Xinavane, SARL, Companhia de Sena, SARL and Maragra Açúcar, SARL. DNA is the entity established strategically to guarantee a market for national production. This institution is responsible for commercialising sugar on the domestic market, as well as coordinating the logistics of exporting the surplus. To this end, the company has three distribution centres in the domestic market and has distributors in 46 cities and 41 districts, linked to a consignment model.

Mozambican sugar is both consumed on the domestic and international markets. On the international market, it is exported thanks to international networks (ACP/EU Sugar Protocol, Sugar Protocol Follow-up Measures Programme, World Trade Organisation (WTO) and Southern African Development Community (SADC) Trade Protocol) to the United States of America and the European Union (BM, 2022).

Analysing biodiversity risks under the DPSIR framework

In the Marromeu District in particular, family farming accounts for just over 50,000 hectares (43,613 ha of arable land), equivalent on average to around 1.6 hectares for each household. Average incomes in this sector are generally low due to the fact that production is predominantly rainfed and with low input use. The main crops grown by the family sector are Cereals: maize, rice, sorghum, millet; Pulses: beans and peanuts; Oilseeds: sesame; Tubers: cassava, sweet potatoes, yams; and Vegetables: tomatoes, onions, others. Average yields are estimated at around 1.4 tonnes/ha for cereals; 0,8 tonnes/ha for beans and peanuts; and 9 tonnes/ha for vegetables. Irrigation covers only 131 ha, and the use of agrochemicals is negligible (MTA/GDM, 2023).

Commercial agriculture is dominated by sugar cane production by the Companhia de Sena, which currently occupies around 5,700 irrigated hectares, with the potential to expand to 15,000 hectares (arable land: 14,650 ha). The Sena Company uses irrigation systems, agricultural machinery and agro chemicals (MTA/GDM, 2023). To do this, it builds irrigation and other associated infrastructures; it plans to increase the areas under irrigation; it increases the operation and traffic of agricultural equipment and vehicles, and it increases the labour of the factory with waste effects on the environment. These activities can have a negative impact on biodiversity as they modify micro-habitats; increase water consumption in agricultural activity to unsustainable levels; increase the use of labour and increase atmospheric and aquifer pollution in an area where deforestation, erosion, floods and fires have already been observed, even though it is an area with extensive mangroves, wetlands, protected areas and an extensive hydrographic network.

The negative impacts of sugar production on biodiversity seem to be no different from what happens in the sugar plantations of Mafambisse, Xinavane and Maragra. In these areas, companies recognise the dependence of their business on the persistence of biodiversity; that their activities can impact biodiversity, and therefore a positive attitude on the part of companies in favour of biodiversity is urgently needed.

Voluntary commitment approach

The approach described below focuses on the case of the Marromeu sugar factory. Similar analyses would not find different results for the Mafambisse, Xinavane and Maragra sugar mills, since there is a high degree of situational commonality.

The latest population census for the Marrromeu district shows that there are around 155,000 inhabitants. The district's population is growing at an average annual rate of 2.9% (above the national average). The population density is 27 inhabitants per square kilometre, but it has a lot of attractive potential, as immigration is 2.1% and outflows are low (emigration rate of 1.6%). A large part of its population is young (49%), which represents a potential asset for its economy.

These data suggest that population growth could put pressure on land use, mainly for human settlements and agriculture. Considering the conservative current scenario of 1.6 hectares for each household and the rate of population growth, it is expected that the use of land for human settlements, agriculture, grazing, social facilities, water supply and sanitation could conflict with the design of development with respect to nature conservation, not least because a large part of the most suitable areas for agriculture are in risk zones.

Both family and commercial farming face enormous challenges. Their development must take into account the high rate of population growth, the availability of land, local communities' needs for building materials, firewood and charcoal, limited access to natural forests due to restrictions imposed by conservation and the conflict between the two types of agriculture, as well as environmental sensitivity.

Companhia de Sena is clear that the development of its business depends on biodiversity. It understands that sugar cane production takes place in an area primarily of nature conservation, the protection of which also protects its enterprise given its exposure to the effects of climate change. On the other hand, it is aware that it is a competitor for land in this region; therefore, more land used by it to produce sugar cane has implications for family farming and can delay the development of local communities.

For the Companhia de Sena, the negative impact on biodiversity is shared with family farming, livestock farming, fishing and other activities carried out by local communities. For this reason, a corporate approach to protecting biodiversity in the Zambezi delta will better help to reduce losses and stimulate biodiversity restoration. This arrangement favours the implementation of a voluntary corporate commitment, which binds family farming and large companies, in this case the Companhia de Sena.

With potential arable land of around 15,000 hectares owned by the Companhia de Sena, it is currently working on around 5,700 irrigated hectares (MTA/GDM, 2023). The remaining area has been idle, fuelling conflict between the company, the conservation sector and local communities. There is a perception that the Companhia de Sena should pass on this remaining land for use by conservation or local communities. Companhia de Sena has an EMP and through it complies with the law and also follows all national and international environmental corporate procedures. Its environmentally friendly business model includes precision agriculture, action research, a new environmentally friendly irrigation technique and voluntary exclusion zones. In these voluntary farming zones, it aims to encourage the production of sugar cane by households. Thus, with the desire to increase the volume of its business, the company will work together with local communities and act as a production aggregator. Households enrolled in the initiative will have to follow the company's environmental standards in order for their produce to be purchased by the Companhia de Sena. The inputs, ploughing and environmental techniques for sugar cane production used by the company will be passed on to the family farmers. The company will establish a monitoring team to gauge producers' compliance with environmental standards, as part of its environmental compliance strategy under the terms of its certification. On the other hand, other cash crops (soya and sesame) will be promoted on the company's remaining areas (around 8,000 hectares). Likewise, the company will assist all producers with production techniques in accordance with Biodiversity Standards as Values for Development.

Success expectations

- Producing high-quality sugar cane in a stable way that doesn't harm biodiversity.
- Find producers who are very aware and who also have the technical capacity to follow standards in sugar cane production.
- Shorten the sugar cane chain within the district and increase income for small farmers without harming biodiversity and reducing land conflicts.
- Reduce pressure on and loss of biodiversity and be aligned with the conservation sector.
- Regenerating ecosystems.
- The company adds new values (biodiversity conservation and local economic development) to sugar cane and other cash crops and supplies them to consumers.
- In the future, the company will advance its initiatives to achieve biodiversity conservation in production areas and to guarantee quality, and will build even better co-operative relationships with producers, distributors and consumers in Luabo.

Challenges

- Business incentive policies.
- Financial products to support success.
- Scientific support for monitoring success in biodiversity metrics.

Type of voluntary commitment

- Iniciativa com alcance Local

Risk of conflicts

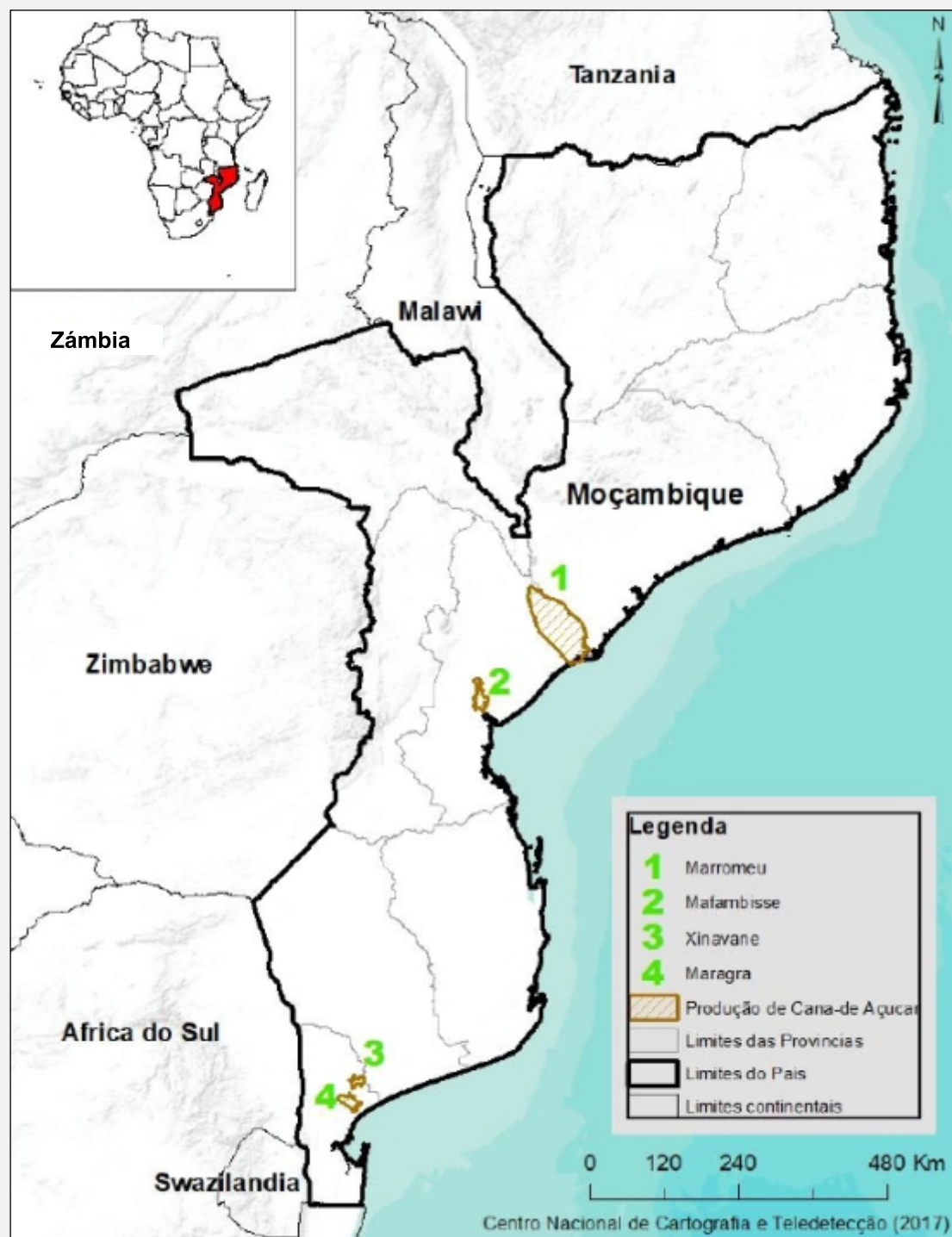
- SUSTENTA Programe
- SDAE Role

Alignment with the NBSAP: M5, M8, M12, M20

Alignment with SACA: A9, A14, A15

Alignment with the SDG:





ACTION PLAN

PROBLEM

Reduction of biodiversity in sugarcane-growing areas

EXPECTED RESULT:

- Reducing threats to biodiversity
- Restoring biodiversity

IMPLEMENTING AGENT: SUGAR COMPANIES

Purpose	Actions	Indicators	Partners	Deadline
Revert deterioration	Integrated Pest and Disease Management (IPM) adopted	Number of threatened species Yield/ha	SDAE Family sugar cane producers Mozambique Sugar Producers Association National Sugar Distributor Maragra Açúcar, S.A. Tongaat Hullett – Açucareira de Mafambisse Companhia de Sena, S.A. Tongaat Hullett – Açucareira de Xinavane	One to five years
	Genetically modified crops adopted, especially crops resistant to diseases and pests	Forest cover extended Amount of sugar cane bought from family producers bought by sugar companies.	S.A., Pure Diets Moçambique Eco Farm Moçambique Eco Energia de Moçambique SDAE Family sugar cane producers Mozambique Sugar Producers Association National Sugar Distributor Maragra Açúcar, S.A., Tongaat Hullett - Açucareira de Mafambisse, Companhia de Sena, S.A., Tongaat Hullett - Açucareira de Xinavane); Orgânico, S.A., Pure Diets Moçambique, Eco Farm Moçambique, Eco Energia de Moçambique	
	Precision agriculture adopted	Number of threatened species Species richness Number of family producers adopting precision agriculture	SDAE Family sugar cane producers Mozambique Sugar Producers Association National Sugar Distributor Maragra Açúcar, S.A., Tongaat Hullett - Açucareira de Mafambisse, Companhia de Sena, S.A., Tongaat Hullett - Açucareira de Xinavane); Orgânico, S.A., Pure Diets Moçambique, Eco Farm Moçambique, Eco Energia de Moçambique	Five years

3.3.3. Conceptual model for shrimp and crab value chains

Nature of the Voluntary Commitment	SECTOR	Fisheries
	VALUE CHAIN	Shrimp and crabs
CORPORATE	COVERAGE 1, 2, 3	Local Scale

Regional and economic background

Mozambique has abundant fishing resources all along its coast, specifically on the Sofala Bank (1), Inhambane coast (2) and Maputo coast (3). This approach will focus on the Sofala Bank, due to the existence of an experienced aggregator (PESCAMAR) with an interest in implementing voluntary commitments.

The Sofala Bank is made up of a portion of the continental shelf with a coastline of wide beaches flanked by a series of dunes. This bank is located between the Angoche district in Nampula province and the Save River, which is 500 kilometres long and stretches across three provinces (Nampula, Zambézia and Sofala).

The number of fishing centres in the Sofala Bank region increased slightly by 5.3% compared to 2012, from 528 to 556 in 2019. In 2019, there were 28,968 vessels, of which 26,377 were in maritime waters and 2,591 in inland waters. There were also 32,861 fishing gears in 2019, of which 28,468 were in maritime waters and 4,393 in inland waters. Some 123,178 artisanal fishermen are registered, of which 117,185 are active in maritime waters and 5,993 in inland waters. These figures suggest that fishing activity in general and shrimp and crab fishing are under strong and permanent pressure.

The potential catch of crab is estimated at around 12,676 tonnes. In the last five years, there has been great interest in crab fishing due to the demand for exports. The majority of crab processors are based in Zambézia province. The demand for their export has resulted in a rapid expansion of the crab market in coastal communities, which has increased the pressure on this resource. In addition, closure periods have been introduced to stop the pressure (3 months in 2018 and 5 months in 2019).

Actors in the value chain

Actors in the value chain

The shrimp and crab value chain is made up of suppliers of inputs (boats, nets, hooks and fuel); those involved in the artisanal, semi-industrial and industrial capture of fish (casual fishermen, permanent fishermen, fishermen without a boat, crew members, migrants, ship carpenters, ship mechanics, redfish mongers) who use trawls, surface nets, bottom nets, boat nets and hooks with fishing line. Artisanal fishermen use a sailing and/or rowing boat; a plank canoe and a dugout canoe and are equipped with a net/dragnet and a net/hook with the predominant net sizes being less than an inch, an inch, an inch and a half, two inches and more than two inches. (IDEPA, 2019). In addition to these, the chain continues with Processing or Conservation (Fresh fish, Dried fish, Conservation methods, Post-catch losses, Fuel); Transport and Marketing (Intermediation, Fish routes, Fish markets, Ice, Terms of trade); Final consumer (Self-consumption, Local market, Hotels, Supermarkets, Export, Demand). The main players in industrial fishing on the Sofala Bank are: Stonechen Comercial, Yinuo Lda and PESCAMAR.

The artisanal fishing value chain also includes two main groups of stakeholders, namely: (i) main actors, which are elements of the chain that intervene directly in the activities of supplying fishing inputs (Icbal Haidar Ali, Electro Marine (Nampula), Commercial Fishing, Wing Koon, Lda, Jian Pescaria, Lda, Ulzeir, Lda, Arsol, Lda,

Cogebe, Lda, Sufiyan comercial, Lda); Fish catching (Fishermen, Fishermen's Associations); Processing and Preservation (Fishermen and their families, Individual Processors), Transport and Marketing (Local Traders, Urban Centre Traders and Retailers (Urban Centres); as well as fish consumption (Local consumers, Consumers in urban centres), and (ii) chain support services, which are elements of the external environment that provide technical assistance, finance activities, build market infrastructures with the aim of improving the performance of the value chain as a whole. In addition, there are cultural factors, habits and customs that play an important role in the performance of the fish value chain on the Sofala Bank. Support services are provided by Fisheries Consultative Councils (CCP's), IDEPA (Assistance and institutional support), INOM (Research), INAMAR, SDAEs (Licensing of boats), NGOs (Institutional support for fishermen's associations) (IDEPA, 2019).

Analysing biodiversity risks under the DPSIR framework

Catches from the industrial sector have fallen significantly since the early 2000s and have been partially offset by an increase in catches from artisanal fisheries (De Sousa et al., 2016). For example, in 2021, crab catches fell to 6,019 tonnes, down from 8,400 tonnes the previous year. Despite suggesting encouraging figures of 5,901 tonnes in 2021 compared to 5,801 tonnes in 2020, shrimp catches are still well below the figures seen in the 2000s. This decline in catches from the industrial sector began in 1992 with overcapacity in the industrial fleet following the discovery of deep-water stocks, which fuelled greater pressure on this resource. Added to these factors are overfishing (unsustainable) and the effects of climate change, as well as the use of harmful gear, destruction of mangroves and poor inspection (IDEPA, 2019). Although shrimp in Mozambique have historically been abundant, their biomass is now threatened, and this poses a risk to people's livelihoods and biodiversity. Despite a history of unsustainable industrial fishing in deep waters, there are significant improvements today. For example, the target of the ideal number of industrial fishing boats of 30 to 34 beyond the first three nautical miles has been reached and the management method of TAC (Total Allowable Catch) has changed to TAE (Total Allowable Effort). These developments have had significant impacts on the sustainability of industrial fishing nowadays. However, there are still some challenges related to the negative impacts on habitat caused by the use of trawls.

An estimated 85 per cent of unwanted fish and other marine creatures are caught during commercial shrimp fishing (IDEPA, 2019), and this figure is a major risk to the health of biodiversity and the ecosystem. On the other hand, Mozambique is the third most vulnerable country to climate change in Africa. Coastal erosion threatens the resilience of coastal infrastructure, which makes the fishing market less accessible. Recurrent droughts cause people to switch from farming to fishing, thus increasing the pressure on fisheries resources such as shrimp and biodiversity in general. Pollution and the destruction of habitats including mangroves, which are the nursery ground for shrimp, crabs and other species, are major challenges in favour of biodiversity conservation. In Mozambique, mangroves are abundant in the regions where the Zambezi, Púnguè, Buzi and Save rivers flow into the Indian Ocean. Between 2001 and 2020, 7,114 ha of mangrove forest (1.84% of the total) were lost (Campira et al., 2021). This is where the mangrove crab spends most of its life cycle.

Shrimp and crabs depend on the mangrove ecosystem for most of their life cycle. Mangroves have a nutrient-rich environment and are also an important habitat for other species (e.g. plankton, fish, birds) where they spend part or all of their life cycle. Some of these species have high economic value for coastal communities and are key populations in other habitats, such as coral reefs, seagrass beds and offshore as adults. In addition,

mangroves protect the coastline (e.g. by preventing erosion) and inland areas (e.g. from extreme climates) and act as phyto-remediators (e.g. detoxification and purification of wastewater). Coastal communities also obtain building material, firewood and tannins from mangroves.

The main risk to the mangrove ecosystem for the fisheries sector in Mozambique is related to its reduction due to unsustainable deforestation for activities other than fishing (e.g. agriculture, salt production, heavy sands and hydrocarbon extraction). Therefore, the decrease in the abundance of mangroves in coastal areas will have a direct impact on the population stocks of shrimp and crabs and other associated species, and indirectly will have a negative effect on the population of other habitats (e.g. coral reefs, seagrass, offshore). (IDEPA, 2019).

Improving the state of biodiversity will have positive effects on the fisheries sector, since it is assumed that the process will contribute to the recovery of species populations and also provide various fishing species options for fishermen.

Voluntary commitment approach

Aquatic and coastal ecosystems in general provide many ecosystem services. The oceans capture carbon from the air, produce the air we breathe and balance the planet's temperature. Mangroves are nurseries for the reproduction of various marine species (e.g. crabs and shrimps); they provide coastal protection against strong winds and cyclones; they stabilise soils against erosion; they bio filtrate pollutants; they have cultural value and carbon sequestration – contributing to climate change mitigation (Macamo et al., 2021). Unfortunately, they are affected by overfishing, habitat change, pollution, incidental and discarded fishing, nautical tourism, land dumping, exotic species, coastal urbanisation and climate change.

Even recognising the impact imposed by these threats on shrimp and crab stocks, it is still possible to put Mozambique's shrimp and crab fisheries on a sustainable footing by offering better yields, reduced impacts on the marine environment, higher margins and long-term security – but this will require the collaboration and commitment of all those involved and an effective management and control regime. And this is relevant because annual catches contribute millions of euros to the GDP and 90% of Mozambican fishermen practise artisanal fishing. Approximately 20 per cent depend on fishing as a source of income; fish accounts for half of the population's protein intake (IDEPA, 2019).

The value chain is made up of suppliers of fishing inputs, fishermen, processors, intermediaries, traders and consumers. This arrangement of the shrimp and crab chain is conducive to the implementation of a corporate voluntary commitment, which binds artisanal fishermen and large companies such as PESCAMAR, which is a certified and experienced shipowner in the market with supply contracts for European Union markets (Spain and Portugal). The quality requirements for fish entering the European Union have global consequences on a social, environmental and economic level, and open up space for corporate commitments.

A company like PESCAMAR can bring together artisanal fishermen, training them and assisting them in the corporate form to adopt Biodiversity Standards as Values for the Development of fisheries on the Sofala bank. In addition, PESCAMAR, together with the CCPs and associates, can create a monitoring and inspection unit to ensure that the fishermen comply with the biodiversity standards. PESCAMAR is interested in buying all the shrimp from artisanal fishermen. Other operators may also include crab. The matrix of commitment standards may include the purchase of nets with appropriate mesh for the fishermen. In an exclusive way, the PESCAMAR-

fishermen coalition will provide its members with appropriate fishing nets and will implement mangrove restoration programmes in specific areas of interest.

PESCAMAR will also be able to support government initiatives in aquaculture. It is through action in mangrove restoration that crab catch will also gain momentum. This will immediately benefit artisanal fishermen and biodiversity, but it will also open up the possibility for artisanal fishermen to export themselves to overseas markets in the future, following international standards.

Success expectations

- Shrimp fishing and packaging to the required standards.
- Reducing the fishing effort of PESCAMAR on the high seas.
- Shortening of the shrimp and crab chain into the Sofala bank.
- Reduction of pressure and loss of biodiversity.
- Ecosystem regeneration.
- New values (biodiversity conservation and local economic development) added by the company and transferred to the households.
- The successful implementation of today's voluntary commitments by PESCAMAR will allow the company to continue to implement its initiatives to achieve biodiversity conservation in fishing areas in the future and, in order to guarantee quality, to build better cooperative relations with producers, distributors and consumers in neighbouring districts.

Challenges

- Business incentive policies.
- Financial products to support success.
- Scientific support for monitoring success in biodiversity metrics.

Type of voluntary commitment

- Local initiative

Risk of conflicts/need to create synergy

National mangrove restoration programme

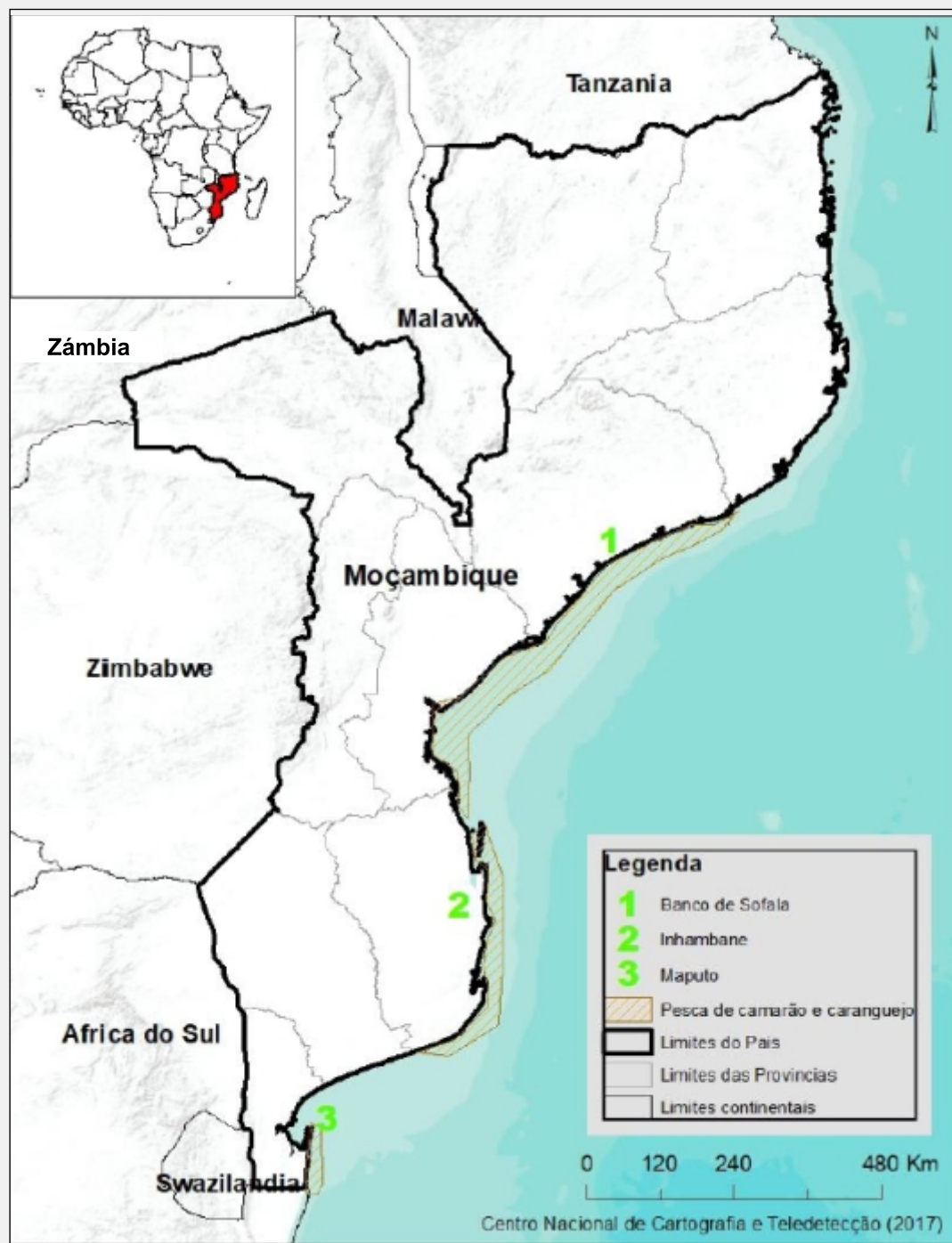
National Inspection Strategy

Alignment with NBSAP: M5, M8, M12, M20

Alignment with SACA: A9, A14, A15

Alignment with SDG:





ACTION PLAN

PROBLEM

Reduction of marine biodiversity on the Sofala Bank

EXPECTED RESULT:

- Reducing threats to biodiversity
- Restoring marine biodiversity

IMPLEMENTING AGENT: PESCAMAR

Purpose	Actions	Indicators	Partners	Deadline
Reverse the deterioration	Restoration of mangroves	Mangrove cover Species richness Number of threatened species Fish catch Shrimp catch Crab catch	DPP Input suppliers Artisanal fishermen Semi-industrial operators Industrial operators Consumers	Five years
	Sanctuaries for Community Fishing Councils (CCPs)	Mangrove cover Species richness Number of threatened species	DPP Input suppliers Artisanal fishermen Semi-industrial operators Industrial operators Consumers	
	Corporate support for small fishermen through the allocation of regulated materials and the operation of the value chain	Species richness Number of threatened species Live coral cover Seagrass cover and composition	DPP Input suppliers Artisanal fishermen Semi-industrial operators Industrial operators Consumers	
	Improving members' working tools and strengthening enforcement against bad fishing practices	Species richness Number of threatened species Live coral cover Seagrass cover and composition Share of fish stocks within biologically sustainable levels	DPP Input suppliers Artisanal fishermen Semi-industrial operators Industrial operators Consumers	
	Biodiversity Standards Adopted as Values for the Development of Fisheries in the Country	Mangrove cover Species richness Number of threatened species Live coral cover Seagrass cover and composition Proportion of fish stocks within biologically sustainable levels Quantity of shrimp bought by PESCAMAR from artisanal fishermen	DPP Input suppliers Artisanal fishermen Semi-industrial operators Industrial operators Consumers	

3.3.4. Conceptual model for the heavy sands value chain

Nature of the Voluntary Commitment	SECTOR	Extractive industry
	VALUE CHAIN	Heavy sands
CORPORATE	COVERAGE 1, 2, 3, 4, 5, 6, 7, 8	Nationwide

Regional and economic background

Mining activity has grown a lot over the last ten years in Mozambique, in almost every province. The heavy sands industry has been establishing itself almost everywhere in the country, especially in the coastal zone.

Around two thirds of Mozambique's 30 million people live in the coastal area and earn their living from the resources found there. The coastal area is attractive to the population due to easy access to resources and a large number of opportunities, since the main cities, services and industries are located in the coastal area. The population density in coastal areas is around 120 inhabitants per square kilometre, compared to the country's average of two inhabitants per square kilometre. However, the coastal area has a high diversity of habitats and biodiversity, with endemic and endangered species. In addition, the coastal area is rich in diverse resources, including fisheries, fauna and coastal flora that provide a livelihood for communities. Its rich biodiversity has led to the establishment of at least ten conservation areas and nine key biodiversity areas.

Mining mainly affects coastal and terrestrial biodiversity, with heavy sands mainly affecting coastal biodiversity. Due to the start-up of heavy sands mining projects, some marine and aquatic ecosystems in the Pebane, Inhassunge and Chinde districts have been destroyed. The extraction of heavy sands has been triggering the closure of traditional water wells where communities used to get their supplies, as well as the destruction of vegetation from which communities get their food. For example, between 2001 and 2020, Mozambique lost 7,114 ha of mangrove forest (Campira et al., 2021), mainly caused by the conversion of mangrove forest into wetlands, predominantly in Zambézia and Sofala provinces. Losses of mangroves, often also located in heavy sand mining areas, can pose a serious threat to the livelihoods of communities living in the coastal area.

Actors in the value chain

Mozambique is rich in mining resources, including heavy sands. Although it already plays a significant role in the global production of various minerals, the heavy sands sector is at an early stage of development. Its potential is largely untapped, including deposits in Angoche (1) operated by the Haiyu Mozambique Mining Company; Moma deposits (2) operated by Kenmare Resources plc; Moebase and Naburi (3) operated by Pathfinder Minerals Plc; Pebane (4) operated by TMZM Resources; Inhassunge and Chinde (5) operated by Africa Great Wall Mining Company Development; Jangamo, Dongane and Ravene, (7) operated

by Mineral Resource and the Chibuto deposits (8) operated under the AFECC Group. These companies mainly produce ilmenite, zircon and rutile for markets mainly in the USA, Europe and Asia and can boost economic growth and development but have an inherent negative impact on the landscape. The downstream heavy sands industry depends on imports, mainly from South Africa and China.

Although legislation on local content is under discussion, local service companies face difficulties in conforming their services to the standards and certifications required by the heavy sands' companies. An additional effort will be needed to get them on board.

Analysing biodiversity risks under the DPSIR framework

The extraction of heavy sands follows a ritual that begins with the clearing of vegetation before mining. In this clearing process, the topsoil is removed to a depth of 200 mm. This operation leads to loss of habitat and consequent loss of species; it can disrupt local communities and the breeding season of marine animals; increase demand for water sources and even spillage of fuels and other contaminants. During the mineral extraction phase, the landscape can be altered, demand for services can grow and human settlement can increase due to the opening of roads. Finally, during processing, exposure of organisms to persistent toxicity and loss of original vegetation and biodiversity can be observed. In addition, the development of infrastructure connected to mining can attract human populations, causing new threats or exacerbating pre-existing threats, such as overexploitation (e.g. hunting, fishing); human settlements and work camps can often be built without ecological consideration. Therefore, adopting good environmental practices and biodiversity standards through voluntary commitments can have a high potential for biodiversity conservation through the restoration of species richness and ecosystem services.

Voluntary commitment approach

The activities of the heavy sands industry include, but are not limited to, drilling, blasting trenches, establishing camps, building roads, constructing the mines (removing vegetation and soil), constructing office plants and other buildings, building mining camps, creating low-grade and high-grade stockpiles, transporting ore to crushers and processing, blasting to release ore, milling ore, leaching/concentrating ore using chemicals, smelting/refining ore and transporting it to the end market. These activities generate inherent impacts on the landscape in general, and biodiversity in particular. The key is to anticipate impacts in order to prevent, mitigate, compensate and weigh them against development goals. The greatest potential for impacts on biodiversity occurs through the cumulative effects of multiple projects in different sectors in prospective regions, including indirect impacts from regional development; These are best managed by strategic assessments that consider the development of the whole region over the long term. Thus, a regional approach is more likely to achieve sustainable results. Unavoidable impacts on biodiversity can be partially offset through activities that provide conservation benefits, so that heavy sands projects leave a positive legacy for biodiversity conservation across the region. Unfortunately, some of these projects are located in key biodiversity areas, such as Moebase and Pebane, in Zambezia.

Fortunately, some of the capital-intensive companies operating in Mozambique benefit from the support of World Bank agencies such as the International Finance Corporation (IFC) and/or the Multilateral Insurance Guarantee Agency (MIGA), IMC's (Investment Management Certificate), the African Development Bank (AfDB), the Asian Development Bank (ADB), the Asian Infrastructure Investment Bank (AIIB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the Inter-American Development Bank Group (IDBG), and the Islamic Development Bank (IsDB). This has made it easier to align its activities with biodiversity standards as values for the development of the heavy sands industry in the country. Specifically, Performance Standard 6 - Conservation of Biodiversity and Sustainable Management of Living Natural Resources, acknowledges that the protection and conservation of biodiversity, the maintenance of ecosystem services and the appropriate management of living natural resources are fundamental to sustainable development. These standards were subsequently approved in 2016 by the World Bank Group board to be used as an environmental and social framework applied to all investment policy financing, including preparatory

work for projects that could later be majority-owned by the private sector. However, in the heavy sands business there are many companies whose financiers don't necessarily adopt the above standards; others still invest their own capital. For this reason, there are opportunities in this industry to implement corporate voluntary commitments, which include implementing good practices, such as replanting vegetation, removing waste piles/well walls, fencing off dangerous areas, monitoring infiltration, creating voluntary exclusion zones and implementing mangrove restoration activities.

The heavy sands sector attracts many local service providers at chain level, as part of the legal advent of local content. There is an opportunity to raise your standards on your best practices for the supply chain. For example, the implementation of initiatives aimed at improving the management and certification of local companies, most of which are small and medium-sized, to make them more competitive in accessing the opportunities offered by the industry, in order to bring them into line with biodiversity standards in the heavy sands industry in Mozambique. As a result, the heavy sands companies established a coalition to adopt the grid of best practices mentioned above and packaged them as a set to be followed by the entire network of service providers in Mozambique, as part of a strategy of voluntary commitments.

Success expectations

- Finding national companies that are very aware and also have the technical capacity to follow environmental standards in the heavy sands industry.
- Reduce pressure and loss of biodiversity.
- Regenerate ecosystems.
- Mozambican companies add new values (biodiversity conservation and local economic development) to heavy sands and pass them on to consumers.

Challenges

- Business incentive policies.
- Financial products to support success.
- Scientific support for monitoring success in biodiversity metrics.

Type of voluntary commitment

- Local initiative with national coverage

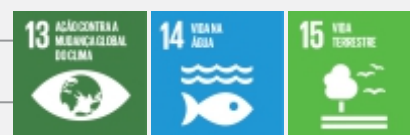
Risk of conflicts

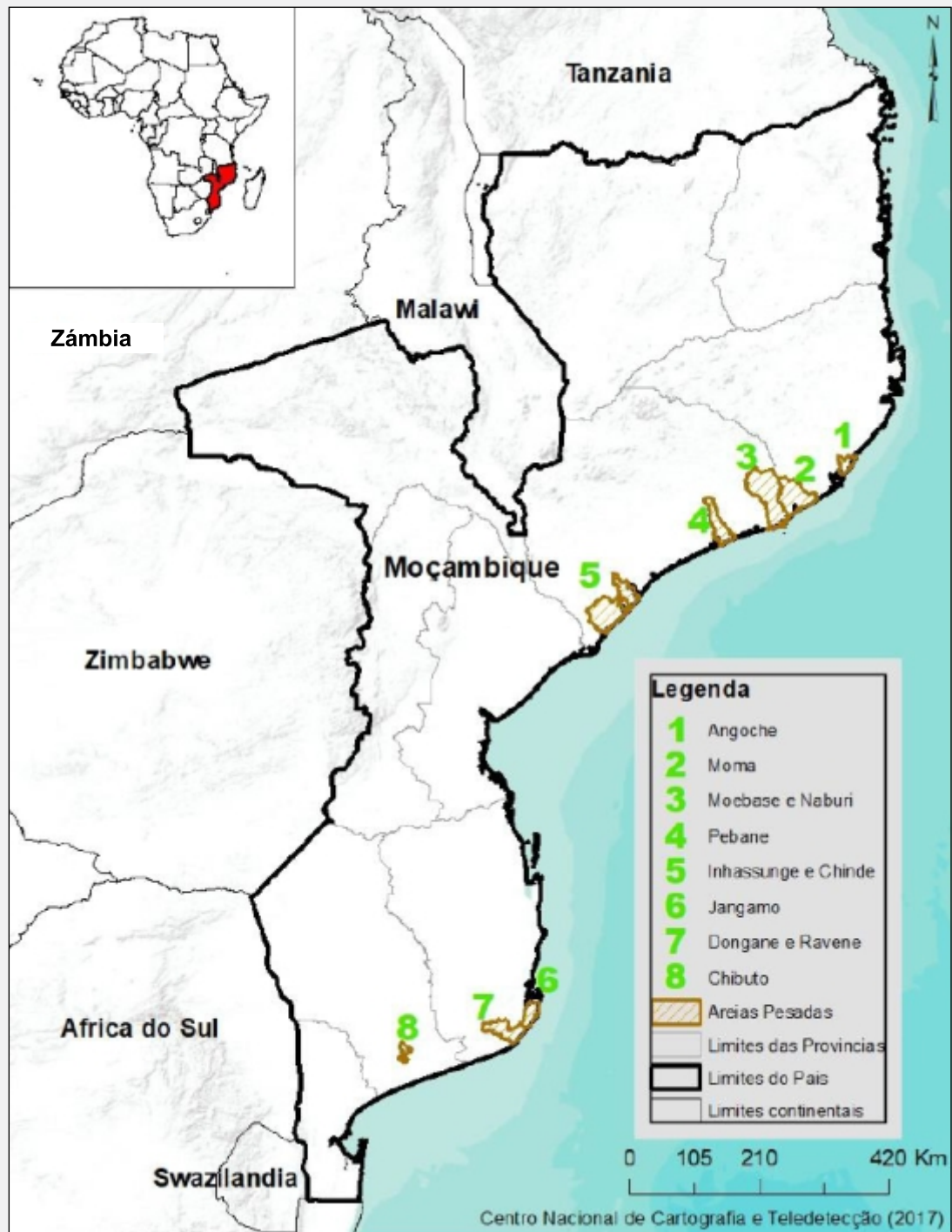
None

Alignment with NBSAP: M5, M8, M12, M20

Alignment with SACA: A8, A9, A14

Alignment with SDG:





ACTION PLAN

PROBLEM

Loss of habitats and species in heavy sand mining areas

EXPECTED RESULT:

-Reducing threats to biodiversity

-Restoring biodiversity

IMPLEMENTING AGENT: Heavy sand mining companies

Purpose	Actions	Indicators	Partners	Deadline
Revert deterioration	Creation of voluntary exclusion zones	Ecosystem integrity index Mangrove cover Number of threatened species	SDAE Haiyu Mozambique Mining Company Kenmare Resources Plc Pathfinder Minerals Plc TMZM Resources Africa Great Wall Mining Company Development Mineral Resource Grupo AFECC	Five years
	Adoption of biodiversity standards as values for the development of the extractive industry in the country	Ecosystem integrity index Mangrove cover Species richness Number of threatened species Species habitat index Water Quality Index for Biodiversity	SDAE Haiyu Mozambique Mining Company Kenmare Resources Plc Pathfinder Minerals Plc TMZM Resources Africa Great Wall Mining Company Development Mineral Resource Grupo AFECC	
	Encouraging and supporting intensive farming in communities to supply produce to large companies	Extent of forest cover Species richness	SDAE Haiyu Mozambique Mining Company Kenmare Resources Plc Pathfinder Minerals Plc TMZM Resources Africa Great Wall Mining Company Development Mineral Resource	One to five years
	Mangrove restoration	Mangrove cover Species richness Number of threatened species Fish catch Shrimp catch Crab catch	SDAE Haiyu Mozambique Mining Company Kenmare Resources Plc Pathfinder Minerals Plc TMZM Resources Africa Great Wall Mining Company Development Mineral Resource Grupo AFECC	Five years
	Support for sustainable fishing	Species richness Number of threatened species Fish catch Shrimp catch Crab catch	SDAE Haiyu Mozambique Mining Company Kenmare Resources Plc Pathfinder Minerals Plc TMZM Resources Africa Great Wall Mining Company Development Mineral Resource Grupo AFECC	

3.3.5. Conceptual model for the oil and gas value chain

Nature of the Voluntary Commitment	SECTOR	Extractive industry
	VALUE CHAIN	Oil and Gas
CORPORATE	COVERAGE 1, 2, 3	Nationwide

Regional and economic background

Mozambique was not a leading oil and gas producer until recent discoveries were made and more international companies were attracted by the investment possibilities in this sector. The discovery of natural gas off the coast of Mozambique in the onshore gas fields (Pande, Temane and Buzi-Divinhe) and in the Rovuma basin with huge amounts of recoverable reserves of 17 tcf to 30 tcf of gas ended up bringing many players in this industry to Mozambique as well as promoting the development of other companies and institutions [Companhia Moçambicana de Petróleos, Limitada; Empresa Nacional de Hidrocarbonetos de Moçambique; Jupiter Juan de Nova Limited; Mozambican Hydrocarbon Company; OILMOZ – Investimentos e Participações, Lda; Rachana Global LDA; Sasol Petroleum Temane (Mozambique); Wentworth Moçambique Petróleo Limitada; BP Mozambique Ltd; Chevron Oil Mozambique; Companhia do Pipeline Mozambique-Zimbabwe Lda; Engen Mozambique Ltd; Exxon Mobil Moçambique Ld; Importadora Moçambicana de Petróleos; Lonropet SARL; Matola Gas Company; Ministry of Mineral Resources and Energy (Mozambique); Mobil Oil Mozambique; National Directorate of Coal and Hydrocarbons; Petrogal Moçambique; Petróleos de Moçambique; Sasol Natural Gas; Sasol Petroleum International (Mozambique); TOTAL Moçambique SARL]. The downstream oil industry depends on imports, mainly from South Africa. The distribution and commercialisation of fuels and lubricants is carried out by the state oil company Petromoc. Other companies include BP and Mobil, Caltex. As a follow-up to this activity, pipelines have also been established to transport gas to South Africa and Zimbabwe.

These discoveries have boosted investments estimated at around 50 billion US dollars, which could not only generate energy but also diversify the national economy and transform the raw material into its by-products and new products, thereby reducing dependence on external financial support. In the last five years (2017-2021) around 18.1 billion US dollars (USD) have been invested in the oil and gas sector in Mozambique (INE, 2023). In 2021 alone, USD 4.69 billion was invested in Oil and Gas activities, which corresponded to a slight increase of 0.9% compared to the amount invested in 2020 (USD 4.65 billion) (INE, 2023).

Mozambique is known internationally for its economy centred on agriculture, fishing and handicrafts. Gas will increase its international market share in the production of metals, paper, oil, chemicals, stone, clay, glass, garments and food processing. There is hope that the oil and gas industry will stimulate job creation, education and agriculture. However, this industry has only just begun. It will continue to fuel other investments in other geographical areas of the country. For example, the recently closed sixth hydrocarbon exploration tender is expected to result in an investment of close to 370 million dollars and a contribution to the training of national staff of around 65 million dollars.

Actors in the value chain

Although not all is known about the occurrence of oil and gas in Mozambique, it is at least known that the following regions hold considerable estimates of natural gas in particular: Northern Rovuma Offshore Region, Southern Rovuma Offshore Region, Rovuma Onshore Region, Maniamba Onshore Basin. Southern Offshore Region, Southern and Western Onshore Region, Central Offshore Region (INP, 2023). The oil and gas value chain in Mozambique is made up of producing companies, pipeline service providers, national distribution service providers and consumer countries.

The main producers of natural gas in the Mozambique Basin are: Total E&P Mozambique Area 1, Empresa Nacional de Hidrocarbonetos, E.P. (ENH), Mitsui E&P Mozambique Area 1, ONGC Videsh Ltd, Beas Rovuma Energy Mozambique Ltd, BPRL Ventures Mozambique B.V., PTT Mozambique Area 1 (Area 1); Mozambique Rovuma Venture (MRV) S.p.A. (Eni, ExxonMobil e CNPC, ENH, Galp Energia Rovuma B.V, KOGAS Moçambique Ltd) (Area 4) e Sasol, ENH, Mozambican State, Mozambican Investors, IFC (Pande and Temane Fields, Inhassoro Area and Buzi Block) (INP, 2023). Gas pipeline services are provided by Sasol, the South African government, ENH and the Mozambican state (for the gas produced in the Pande and Temane fields). Distribution in Maputo Province is provided by Gigajoule, ENH, CMDG, KRX/KSR, ENH, South Korean Government (Carvalho, 2022). For the time being, the consumer markets are South Africa and the United Kingdom.

Analysing biodiversity risks under the DPSIR framework

The oil and gas industry can pose a threat to terrestrial and marine flora and their ecosystems. For example, deforestation can have a direct and indirect impact. The project's implementing agents can prevent these impacts by mainstreaming consideration of biodiversity into management decisions, making investments that benefit biodiversity conservation. Therefore, adopting good environmental practices and biodiversity standards through voluntary commitments can have a high potential for its conservation through the restoration of species richness and ecosystem services.

Voluntary commitment approach

Mozambique has considerable oil and gas resources estimated at more than 170 trillion cubic feet (tcf) of recoverable gas in both Area 1 and Area 4 of the Rovuma basin and in the Pande and Temane area in the south.

Oil and gas industry activities can boost economic growth and development, but they have an inherent impact on the landscape in general and biodiversity in particular. Unavoidable impacts on biodiversity can be partially offset through activities that provide benefits for biodiversity conservation. Unfortunately, both projects located in the Rovuma basin and in the Inhassoro fields are located in key biodiversity areas.

Fortunately, all the oil and gas projects being implemented are capital intensive and enjoy intervention from World Bank agencies, such as the International Finance Corporation (IFC) and/or the Multilateral Insurance Guarantee Agency (MIGA). This makes it easier to align their activities with biodiversity standards as values for the development of the country's oil and gas industry. For example, the IFC's Performance Standard no. 6 (PS6) – Conservation of Biodiversity and Sustainable Management of Living Natural Resources, recognises that the protection and conservation of biodiversity, the maintenance of ecosystem services and the appropriate management of living natural resources are fundamental to sustainable development.

However, although most companies are aligned with the performance standards mentioned above, there are others whose capital is not. For example, under national legislation, Chinese companies are not bound by these standards. In addition, companies in this field may emerge on the local market and under Mozambican law, these companies are not required to comply with IFC standards. This means that the precautionary principle is relevant to the approach of voluntary commitments in the oil and gas industry.

The oil and gas sector has also attracted best practices to the supply chain. For example, there are various initiatives aimed at improving the management and certification of local companies, most of which are small and medium-sized enterprises (SMEs). And also, initiatives aimed at improving their competitiveness in accessing the opportunities offered by the industry, such as the Mozambique LNG programme supported by Total and the Pronacer programme (supported by FAN – Foundation for the Improvement of the Business Environment), which have stimulated the adoption of good practices among SMEs. Basically, this approach has already enabled around 68,000 people to take part in national training during 200 training sessions. Capacita Moçambique's vision is to increase the share of local content in oil and gas businesses by certifying the services of local companies to the environmental standards adopted by this industry. As a result, oil and gas companies form a coalition to adopt voluntary commitments with the entire network of service providers in Mozambique.

Success expectations

- Finding national companies that are well aware and also have the technical capacity to follow environmental standards in the oil and gas industry.
- Reduce pressure on and loss of biodiversity.
- Regenerate store ecosystems.

Challenges

- Business incentive policies.
- Financial products to support success.
- Scientific support for monitoring success in biodiversity metrics

Type of voluntary commitment

(v) A nationwide initiative.

Risk of conflicts

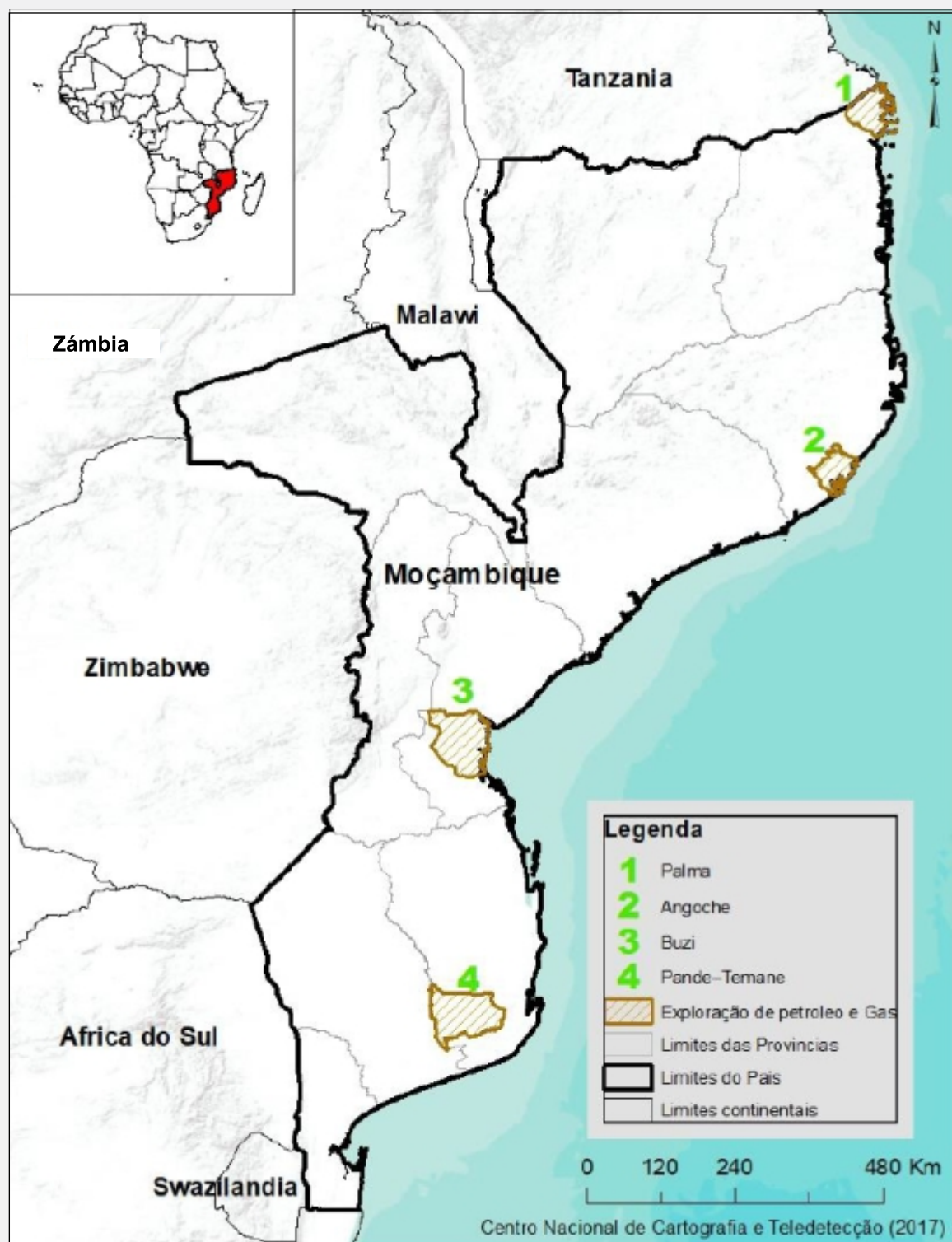
None

Alignment with NBSAP: M5, M8, M10, M12, M20

Alignment with SACA: A9, A14, A15

Alignment with SDG:





ACTION PLAN

PROBLEM

Reduction of biodiversity in oil and gas production areas

EXPECTED RESULT:

-Reducing threats to biodiversity

-Restoring biodiversity

IMPLEMENTING AGENT: Oil and gas companies

Purpose	Actions	Indicators	Partners	Deadline
Revert deterioration	Setting up voluntary exclusion zones;	Ecosystem integrity index Mangrove cover Number of threatened species Biodiversity integrity index Increase in natural secondary forest cover	SDAE Total E&P Mozambique Empresa Nacional de Hidrocarbonetos, E.P. Mitsui E&P Mozambique Area 1 ONGC Videsh Ltd Beas Rovuma Energy Mozambique Ltd BPRL Ventures Mozambique B.V., PTT Mozambique Area 1 (Area 1); Mozambique Rovuma Venture (MRV) S.p.A Sasol IFC Mozambican investors	Five years
	Biodiversity Standards adopted as values for the development of the country's oil and gas industry;	Ecosystem integrity index Mangrove cover Species richness Number of threatened species Biodiversity integrity index Increase in natural secondary forest cover Poverty levels in communities dependent on biodiversity	SDAE Total E&P Mozambique Empresa Nacional de Hidrocarbonetos, E.P. Mitsui E&P Mozambique Area 1 ONGC Videsh Ltd Beas Rovuma Energy Mozambique Ltd BPRL Ventures Mozambique B.V., PTT Mozambique Area 1 (Area 1); Mozambique Rovuma Venture (MRV) S.p.A Sasol IFC Mozambican investors	
	Training, capacity building of local service providers at the Business Development Centre with a view to certifying their services and increasing their eligibility for the environmental and social standards of large companies.	Extent of forest cover Species richness Number of threatened species Fish catch Shrimp catch Crab catch Poverty levels in communities dependent on biodiversity	SDAE Total E&P Mozambique Empresa Nacional de Hidrocarbonetos, E.P. Mitsui E&P Mozambique Area 1 ONGC Videsh Ltd Beas Rovuma Energy Mozambique Ltd BPRL Ventures Mozambique B.V., PTT Mozambique Area 1 (Area 1); Mozambique Rovuma Venture (MRV) S.p.A Sasol IFC Mozambican investors	

4. Enabling environment

4.1. Main government motivations

Biodiversity conservation is a public good. This thinking is related to a global shift in the approach to biodiversity conservation because it is an integral element of sustainable development, and not a purely elitist concern, as was thought in the past.

Encouraging the private sector to voluntarily help implement best practices in favour of biodiversity conservation seems essential, since the private sector can effectively provide a public good that would normally be financed and executed by the government.

Considering the expected advantages of creating a positive fiscal climate for conservation, an important question arises: *What incentives could be offered to the private sector in order to encourage them to carry out the conservation activities identified above?*

- Tax deductions for donations;
- Tax deductions for certain land uses;
- Tax exemptions and reductions for certain voluntary commitments.

There are at least three ways of establishing an enabling environment for voluntary commitments:

- (i) Legal and policy mechanisms.**
- (ii) Setting up an appropriate institutional approach.**
- (iii) Establishing the right financial environment.**

The Gaborone declaration on sustainability in Africa and the implementation of natural capital accounting support the first approach.

The development of the biodiversity economy strategy, the creation of a business and biodiversity platform and a national business and biodiversity network support the second approach.

Finally, adopting an approach that binds all financial services to financial, biodiversity, environmental and social standards; including non-financial criteria in the respective weights in investment eligibility, which suggests some reform in investment legislation; developing green bonds and issuing green loans can support the third approach.

5. Conclusions and recommendations

5.1. Conclusions

- The “BIODEV2030 method” has accurately identified the economic sectors that have the greatest impact on biodiversity and that are of great importance to the local economy;
- The private sector recognises that their economic activities depend on biodiversity and are willing to cooperate more in favour of biodiversity.;
- The financial sector is aware of the impact that the loss of biodiversity and global warming can have on its activity and is considering the need to create green and blue financial products;
- The time is right for Mozambique to implement this approach, since society in general is aligned on the importance of biodiversity and the need to contribute to reducing global warming. In this way, it can embark on voluntary commitments to integrate biodiversity into business.

5.2. Recommendations

Based on the above, the following is recommended:

- The mobilisation of large corporations and their SME suppliers to embrace Voluntary Commitments, which are initiatives in favour of the environment that go beyond what is established in legislation;
- The introduction of an internationally recognised Voluntary Commitment Certification System;
- The creation of a network for monitoring and certifying companies, carried out by private sector consultancies and accredited by international institutions, in order to ensure that users of the Seal of Voluntary Commitments comply with the provisions of their declarations; and
- Encouraging the financial sector and multilateral cooperation agencies to consider Voluntary Commitment certificates as a certification of good environmental practices to be used as another favourable criterion in the allocation of funding.

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Maputo, August 2023



FINANCIAMENTO



COORDENAÇÃO



IMPLEMENTAÇÃO