



ambition for biodiversity

**BIODEV**  
2030



**SITUATIONAL ANALYSIS TO IDENTIFY OPTIONS,  
OPPORTUNITIES, AND CHALLENGES FOR FUTURE COMMITMENTS  
OF ECONOMIC ACTORS IN FAVOUR OF BIODIVERSITY IN  
MOZAMBIQUE – BIODEV2030**



**Strategy for the Engagement of Stakeholders of the Agriculture  
Commercial Crops, Extractive Industry, and Fisheries Sectors in favour of  
Biodiversity Conservation in Mozambique**

**2022**

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## ABREVIATURAS E ACRÓNIMOS

ADNAP	National Administration of Fisheries
AFD	French Development Agency
AfDB	African Development Bank
AQUA	National Agency for Environmental Quality Control
ARENE	Energy Regulator Authority
bbl	Barrels
BES	Biodiversity and Ecosystem Services
COPAZA	Cooperative of Producers of Highlands of Zambézia
CLUSA	National Cooperative Business Association CLUSA International
CCPs	Local Fisheries Advisory Councils
CTA	Association of private enterprises
CTM	Central Térmica de Temane
DINAB	National Directorate for the Environment
DNDAF	National Directorate for Development of Family Agriculture
DNPAC	National Directorate for Promotion of Commercial Agriculture
DPSIR	Driver, Pressure, State, Impact, and Response
EAS	Simplified Environmental Study
EIA	Environmental Impact Assessment
EEZ	Exclusive economic zone
EMS	Environment Management System
EPDA	Pre-Feasibility study and Scope Definition
ESG	Environmental, Social and Governance
FAEF	Faculty of Agronomy and Forestry Engineering
FAO	United Nations Organization for Food and Agriculture
FCPF	Forest Carbon Partnership Facility
FFP	Fishing Promotion Fund
FIDs	Final investment decisions
FIL	Local Investment Fund
FLNG	Floating Liquid Natural Gas
FSMs	First sale markets
GDP	Gross Domestic Product
GHG	Green House Gases
ha	Hectares
HMC	Heavy Mineral Concentrate
IAI	Integrated Agricultural Survey
ICEIDA	Icelandic Development Agency



IDEPA	National Institute for Fisheries and Aquaculture Development
IFC	International Finance Corporation
IIP	National Institute of Fisheries Research
IIAM	Mozambique Agriculture Research Institute
IFAD	International Fund for Agricultural Development
INAMI	National Institute of Mining
INIP	National Institute of Fish Inspection
INP	National Institute of Petroleum
ITIE	Extractive Industries Transparency Initiative
IPM	Integrated Pest Management
IOC	International Oil Companies
IMC	International Mining Companies
IUCN	International Union for Conservation of Nature
ISO	International Organization for Standardization
KBA	Key Biodiversity Area
KPI	Key Performance Indicator
LNG	Liquid Natural Gas
NNL	No Net Loss
M&A	Merge and Acquisitions
MADER	Ministry of Agriculture and Rural Development
MCP	Mineral Concentration Plant
MIREM	Ministry of Mineral Resources and Energy
MSP	Mineral Separation Plant
MTA	Ministry of Land and Environment
MW	Mega Watt
Mt	Meticaís
NBA	National Biodiversity Assessment
NBSAP	National Biodiversity Strategic Action Plan
NORAD	Norwegian Agency for Development
NOSA	National Occupational Safety Association
NOSCAR	National Occupational Safety Credited Awards
O&G	Oil and Gas
PA	Small Farmer
PACE	Emergent Small Commercial Farmer
PEDSA	Strategic Plan for Agricultural Sector Development (2011-2020)
PGAS	Environmental and Social Management Plans
PPA	Petroleum Production Agreement
PROSUL	Pro-Poor Value Chain Development in the Maputo and Limpopo Corridors
PSA	Petroleum Sharing Agreement

RCP	Resettlement Compensation Plan
RUPS	Rotary Uninterruptible Power Supply
SME	Small and Medium Enterprises
SADC	Southern Africa Development Community
SPT	Sasol Petroleum Temane
STAR	Species Threat Abatement and Recovery
SMART	Specific, Measurable, Achievable & Ambitious, Realistic, Time-bound
TOC	Theory of change
t	Tons
Tcf	Trillion cubic feet
TCFD	Task Force on Climate-related Financial Disclosure
TW	Terra watt
UEM	Eduardo Mondlane University
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization.
UP	Pedagogical University
USAID	United States Agency for International Development
VC	Voluntary Commitment
WAVES	Wealth Accounting and Valuation of Ecosystem Services
WB	World Bank
WHIMS	Wet High Intensity Magnetic Separation

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**Executive summary and recommendations**

1. Recent scientific knowledge points to the acceleration of the loss and decline of biodiversity and ecosystem services, globally, associated with activities developed by economic sectors, including agricultural, extractive and fisheries sectors. The health of the ecosystems on which we depend, and on which all other species depend, is degrading today at an unprecedented rate. Altogether, this underlines the more than ever plausible risk of mass extinction of species in the next few decades, if urgent measures are not taken globally and within states.
2. This situation weakens livelihoods, food security, health and quality of life worldwide and poses economic and financial risks. The poorest and vulnerable populations are increasingly at risk to be exposed to disasters, and to the consequences of a loss of natural capital on which they depend for their subsistence and resilience.
3. This report presents the situational analysis process for mainstreaming biodiversity into Agricultural, Mining-Oil&Gas, and Fisheries sectors to support Mozambique's Vision/strategy 2030-2050. The purpose of the situational analysis is to identify the opportunities, constraints and possible scenarios of engagement of actors in the Agricultural, Mining-Oil and Gas, and Fisheries sectors for reducing their pressures on biodiversity in Mozambique.
4. The situational analysis focused on six (6) value chains, two (2) for each economic sector. For Agricultural Sector the situational analysis focused on soybean and sugar cane value chains in Zambézia and Maputo provinces. For the Extractive Industry, the focus was on heavy sands and gas value chains in the provinces of Nampula and Inhambane. For the Fisheries Sector, the situational analysis focused on shrimps and crabs in Zambézia province.
5. The six value chains were selected based on qualitative multidimensional criteria subsequently, followed by the approval of the advisory committee. The qualitative multidimensional criteria consisted of sectors' major pressures on biodiversity and affected provinces, proximity of the economic activities to the Key Biodiversity Areas (KBAs), and economic importance of the value chains.
6. The DPSIR (Driver, Pressure, State, Impact, and Response) framework was used for understanding the structure and causal relationships among driving forces (agriculture, extractive and fisheries sectors) engendering pressures on ecosystems (deforestation, overfishing, mining that induce changes in the status of environment), change of state in affected areas (change of soil, air and water and biodiversity); impact (effects on living beings and no living beings) and responses (decisions or actions by economic actors for controlling driving forces, or pressures or maintain or restore the state of the environment, or to help accommodate the impacts). The DPSIR was also used to guide the development of data collection instruments for identifying options, opportunities and challenges for future voluntary commitments<sup>1</sup> of agriculture, extractive and fisheries sectors, in favour of biodiversity.
7. Data collection instruments were developed and data were collected through desk review, focus group discussion and individual semi-structured interviews, with agricultural producers, private companies, government officers, researchers, and NGOs. A total of 160 participants were interviewed, with the following distributions by economic sector: agricultural sector (34), extractive industry (41), and fisheries sector (85). A SWOT analysis was, also, conducted with these actors to identify opportunities and challenges for implementing voluntary commitments.

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<sup>1</sup> In general terms and using a dichotomy based classification (Darbi, 2020), (i.e. a pole of mandatory actions based on legislation and another pole of voluntary actions), voluntary commitments encompass both, good practices that can surpass government or mandatory actions (from legislations) and good practices that are totally new and independent of legislation.

**Main findings and recommendations by each economic sector****A. Agricultural sector****A.1. Pressures on biodiversity**

The main drivers of biodiversity erosion in the agriculture sector are conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs.

**A.2. Actions<sup>2</sup> (potential voluntary commitments)**

To address conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs the situational analysis recommends the promotion and use of specific practices of sustainable agricultural intensification, for Soybean Value Chain and Sugar Cane Value Chain. MADER should also consider subsidies for agriculture for producing “environmental services”, to reward farmers’ using sustainable agriculture intensification practices.

**A.2.1 Actions to reduce conversion of natural habitats into cultivated fields**Soybean Value Chain*Small (<10ha) and medium farmers (>=10ha)*

- Making efficient use of fertilizer both from natural and artificial sources to replace the use of burning the trees to create fertile fields in the forest for agriculture and to limit the shifting cultivation practice.
- Construction of small dams to enable the production of soybean twice a year on the same field.
- Planting high yielding varieties.
- Implementing no till or reduced till for improving soil structure and fertility.
- Strengthening local structures (community based natural resource management) for controlling the use of fires and other unfavourable practices which contribute for habitat loss and degradation. For example, the local leadership in Gurue are known to have influential power which could help in the mobilisation/awareness raising of local people to avoid bush fires.
- Conducting action research, including participatory technology development and adaptive testing to add and adopt adequate mitigation measures.
- Avoiding or replacing the practice of slash and burning shifting agriculture by using other economic alternatives, such as selective logging /cutting-of trees for marketing and then using money for buying fertilizers. These logging areas will be restricted to the areas under soybean and not to be expanded to other areas.
- When opening new soybean fields, introducing biological corridors consisting of a stand of continuous native vegetation between singular fields to allow movement of species.
- Agro-ecological training, awareness raising and training on “wild-life friendly techniques” for KBAs, and conservation areas.
- Plantation of valuable trees around the edges of the soybean fields to replenish the vegetation (tree) cover.
- Conversion from arable cropping to agroforestry and woodland with native species (Land-use change).
- Dissemination of environmental legislation/standards, in particular the new Ministerial Diploma nº 55/2022 on biodiversity offsetting.
- Conducting action research to evaluate comparative advantages of the “wild-life friendly techniques”

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<sup>2</sup> Actions are a set of good practices potentially to be selected, by the stakeholders, as voluntary commitments.

including tree-based innovations, wild fruit production and bee keeping options versus land-sparing options (use of high yielding varieties) in the areas of rich biodiversity.

- Conducting risk-assessment framework to predict (rebound) effects of the ongoing/proposed mitigation measures on biodiversity.

### **A.2.2. Actions to reduce excessive use of agrochemical inputs**

#### Soybean Value Chain

##### *Small (<10ha) and medium farmers (>=10ha)*

- Use of legumes (cover crops) help fix nitrogen in soils, thus reducing the need for inorganic fertilizer on subsequent crops. They can also provide cover for many farmland bird and insect species.
- Use of inoculant for soybean to improve N fixation. For places where soybean has not been growing before soybeans seeds should be treated with inoculant to introduce the Bradyrhizobia bacteria for nitrogen fixation.
- Use crop varieties adapted to low soil N resulting in lower N<sub>2</sub>O emissions (denitrification).
- Use intercropping and crop rotation to reduce the intensity of pest infestations/damage and consequently reduce the demand for pesticides.

#### Soybean Value Chain and Sugar Cane Value Chain

##### *Large soybean and sugar cane producers (>100ha)*

- Use of inoculant for soybean to improve N fixation. For places where soybean has not been growing before soybeans seeds should be treated with inoculant to introduce the Bradyrhizobia bacteria for nitrogen fixation. (*only soy bean producers*)
- Use crop varieties adapted to low soil N resulting in lower N<sub>2</sub>O emissions.
- Use precision farming to match inputs and practices to localized conditions within the field. The cost of producing the crop in that area can be reduced and the risk of environmental pollution from agrochemicals applied at levels greater than those required by the crop can be reduced, reducing Green House Gases (GHG) emissions from crop production.
- Conduct routine soil analyses to identify the nutrient demand of the crops, and reduce over-fertilization of crops and needless fertilizer production, which significantly reduces total GHG emissions.
- Use disease resistant crop varieties to reduce amount of application of pesticides.
- Use of Integrate Pest Management (IPM), where physical mechanical and chemical methods are optimized for weed and pest control, including biological controls through introduction of natural enemies, such as predators and parasitoids, into a geographic area where do not exist, to limit the use of synthetic and harmful pesticides.
- Use genetically-modified crops (Biotechnology). Herbicide-resistant and pest-resistant crops reduce the number of herbicide/pesticide applications required. Genetically-modified crops, before released/used, must be assessed for environment (including gene flow concerns) and food safety according to National biosecurity regulations and relevant bodies.
- Conducting risk-assessment framework to predict (rebound) effects of the ongoing/proposed mitigation measures on biodiversity.

### **A.3. Opportunities for implementing voluntary commitments in favour of biodiversity**

The current legal framework and agricultural development policies constitute a major opportunity for implementing voluntary commitments in favour of biodiversity. These include the Regulation on the Environmental Impact Assessment Process, Decree No. 54/2015, which regulates environmental licensing of any activity to be carried out on national territory. Under its strategic plan for agrarian development (PEDSA II) 2021-2030, MADER covers environmental metrics/ indicators and the agricultural sector is committed to reduce 13.0% MtCO<sub>2</sub> emissions in (2025) and 9.8% (2030) with respect to 2021. Another MADER's major initiative is SUSTENTA, a government national program for integrating smallholder farming into value chains supported by the World Bank. Under SUSTENTA farmers develop agricultural business plans to improve their households' wellbeing through sustainable (social, economic and environmental) intensification of agriculture. Moreover, the recently published Ministerial Diploma n° 55/2022 on biodiversity offsetting, will contribute for strengthening the legal framework supporting biodiversity conservation, by regulating high level ambition mitigating measures.

Action research on the impacts of economic activities on biodiversity is being conducted by the Faculty of Agronomy and Forestry Engineering (FAEF) of UEM, and other research institutes and higher education institutions such as the unit of agroforest and biodiversity at Mozambique Agriculture Research Institute (IIAM), Unilúrio which is implementing the FARSYMABI project to integrate biodiversity into agricultural policies, Universidade Pedagógica (UP) and Uni-Zambezi. These research activities can be an opportunity to voluntary commitments through promoting good practices in favour of biodiversity.

### **A.4. Challenges for implementing voluntary commitments in favour of biodiversity**

Major challenges to be addressed in order to enable the implementation of VCs aimed at reducing conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs, are: weak agro-ecological knowledge (education); weak capacity for enforcement of environmental policy and this may discourage those actions that surpass government or regulatory actions; weak capacity for conducting applied research to promote adoption of sustainable intensification agriculture practices; and weak compliance with procedures/regulations pertaining biodiversity conservation and land tenure issues.

### **Recommendations to overcome challenges**

To improve the conducive environment for implementing VC, the MTA and MADER should look for funding for projects aimed at enforcing regulations governing the use and management of agrochemicals; and establishing Farmer Field Schools (FFS) methodology for promoting agro-ecological knowledge and adoption of proposed sustainable agricultural intensification practices, including Integrated Pest Management (IPM), high yielding technologies, pest and disease resistant crops, and crops tolerant to low level of soil nutrients.

It is also important considering projects for creating conservation areas to offset the potential devastation of biodiversity by implementation of new agricultural projects. Hence, the MADER, Faculty of Agronomy and Forestry Engineering (FAEF) and other research and high education institutions should collaborate and look for funding for supporting dissemination and implementation of the recently published Ministerial Diploma n° 55/2022 on offsetting, and conducting action research on biodiversity and agro-ecology to deal with complexity of biodiversity offsetting measures and supervision, as well as identifying alternatives for provision of subsidies for conservation of biodiversity. Non-Governmental Organizations (NGOs) dealing with advocacy of land tenure and environmental conservation issues should be involved to mitigate land conflicts between

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private companies (for example, the *Hoyo-Hoyo* agricultural company) and surrounding communities.

## **B. Extractive Sector**

### **B1. Pressures on biodiversity**

Infrastructure development associated with exploration, site preparation and extraction phase, has a huge potential impact on direct and indirect effect to the biodiversity ranging from disturbance, damage, or loss of habitat, and reduction of richness and abundance of biodiversity. In particular, production (extraction) phase for open field mines holds some of the dangerous direct impact to biodiversity.

### **B2. Actions (potential voluntary commitments)**

Potential impacts on biodiversity may be mitigated or prevented with: careful planning and adherence to environmental management systems by companies; establishment and enforcement by governments of responsible practices' legislative and regulatory framework.

#### **B.2.1 Actions included in environmental systems to mitigate or prevent impacts on biodiversity**

- An environmental impact assessment.
- Implementation of an Environmental Management Systems (EMS). EMS sets out the detailed processes for the identification of environmental risks and implementation of action plans to mitigate the impacts of activities.
- Development and implementation of environmental management plan (EMP) to manage and/or mitigate against certain environmental and social impacts.
- Part of the EMP implementation is after separation of Heavy Mineral Concentrate dune rehabilitation is undertaken, followed by planting a variety of vegetation as well as food crops. The area is then transferred back to the local communities.
- Compliance with national legislation and industry standards and principles including protecting and conserving biodiversity and sensitive environmental elements by reducing environmental impacts from mining activities.
- The principles applied in EMS include the following: The principles of pollution prevention, the precautionary principle, compliance with legal and adopted obligations, and continuous improvement.
- Conducting regular performance reviews and legal compliance audits, and acting upon the results to ensure compliance with national laws and Company policy.
- The provision of adequate resources, staff, and training so that employees at all levels recognise and are able to fulfil their responsibilities.
- Developing, maintaining, and testing emergency procedures in conjunction with relevant authorities.
- Obtaining compliance standard.

Another example of good practices derives from pipeline construction (under Oil and Gas projects) Environmental and Social Impact Assessment (ESIA) which resulted on mitigation measures for reducing risk to threatened plants and animal species:

- Slight adjustments to the route.
- Incorporating systematic, comprehensive environmental management practices.
- Stationing an environmental officer to monitor the compliance of the contractor with the EMP.
- Use of industry best practice for hazard prevention e.g. impressed current cathodic protection system

(CP) installed to avoid corrosion.

- Emergency shutdown valves and statutory valve stations.
- An Abandonment Plan for submission to the regulatory authorities.
- The Environmental Management Plan with: (vi) hazard management programs (gas leak, ecological risk); (vi) air pollution management, liquid effluent management, hazardous waste management.
- Compliance of ISO 14001.

### **B.3. Opportunities for implementing voluntary commitments in favour of biodiversity**

- Actors in extractive industry are engaged in a capital intensive sector subject to the financial sector environmental requirements; they feature strong governance standards; they are listed on stock exchanges with obligation to report on sustainability.
- The above actors characteristics constitute an opportunity for the country to incorporate more stringent international environmental standards in national legislation that can benefit biodiversity, some examples are: Water reutilization targets; Carbon emissions targets; Reforestation targets.
- A pro-biodiversity corporate culture can potentially benefit company's business interest such as added income from pro-biodiversity investments, good reputation in the market, facilitated market entry in a growing market; improved stakeholder perception; increased competitiveness.

### **B.4. Challenges for implementing voluntarily commitments in favour of biodiversity**

- The need of multiple stakeholders to agree on common agenda and a specific set of principles to protecting biodiversity in Mozambique.
- The need for establishment of a special funding for introducing voluntary commitments beside what is required from a legal perspective.
- The need to increase government enforcement capability of biodiversity related legislation.
- The need for government institutions capacity building on increasingly complexity of biodiversity institutional and legal requirements.
- The need for strengthening institutional monitoring capability on biodiversity related actions
- The need for establishment of strong multi-stakeholders' communication platform.
- The need to close knowledge gaps between International Oil Companies (IOC) and International Mining Companies (IMC) and government institutions.
- The need of studies on impact of mining and O&G activities on biodiversity.

Specific challenges presented during field visits at Kenmare and Sasol that need to be prioritized are the following:

- Communities are not satisfied with realized benefits from project resource exploration, their expectations have not been met.
  - *Civil society organizations* (CSO) feel that international companies' efforts to increase awareness and improve communication with communities are insufficient.
  - local supplying companies cannot meet required international standards
  - financial sector wants to increase its participation on mining and oil & gas projects
  - Universities are seeking grants from mining and oil & gas concessionaries to undertake research on extractive industry activities' impact on biodiversity
-

**Recommendations to overcome challenges**

In order to take into account the opportunities and challenges presented above the following is recommended:

- Increasingly promoting the implementation of international best practices on mining and oil & gas regarding biodiversity.
- Promoting communication among stakeholders to improve understanding of their expectations.
- Assessing the interdependencies and impact of activities while fostering an open dialogue with communities about these issues.
- Providing financing to government institutions for capacity building and strengthening their monitoring capabilities.
- Providing funding to SME to promote their adherence to good practices in favour of biodiversity.

**C. Fisheries Sector****C1. Pressures on biodiversity**

Overfishing, catching juveniles, and using destructive fishing practices are the major pressures on biodiversity causing unbalanced stock variations, disturbing food chain, and affecting marine habitats and biodiversity, particularly for shrimps and crabs. Releasing of the rest of fishing materials, such as synthetic nets, contribute to marine pollution and killing of other marine species.

**C.2. Actions (potential voluntary commitments)**

Potential voluntary commitments can be derived from positive impact practices that hold a positive impact on fisheries/biodiversity conservation. Creating a positive impact on conservation requires involvement of coastal communities on environmental education and participatory management; on appropriate, practices and fishing methods, on the key roles of surrounding environment (e.g. Mangroves ecosystem, corals habitat), on fishing prohibition period schemes and understanding of the existing fishing laws; ecosystem or habitat recovery program such as mangrove reforestation; other economic actions like aquaculture and improving the value chain.

**C.2.1 Actions involved in minimizing/reducing Overfishing, catching juveniles, and using destructive fishing practices**

- Educating and raising awareness among coastal communities on the role of mangroves in biodiversity conservation.
- Using selective fishing gears and setting minimal fishing size.
- Enforcing fishing prohibition periods.
- Promoting mangrove replanting and restoration.
- Controlling the number of licensed fishermen.
- Creating local community-based organizations.
- Fostering social responsibility among coastal companies.
- Promoting infrastructures construction across the value chain to increase employment opportunities.
- Adopting participatory management.
- Implementing aquaculture.

**C.2.2 Shrimps/Crabs value chain**

- Mangrove restoration programs coordinated by the government and non-governmental institutions.
- Engaging and subsidizing communities for adoption of best fishing practices.
- Community adoption of aquaculture.
- Promotion and diffusion of prohibition fishing period diffusion.
- Implementation of fishery law and fishery management plan.
- International cooperation programs and projects for strengthening fishing sector capabilities.

**C.3. Opportunities for implementing voluntarily commitments in favour of biodiversity**

- Overall, the most important aspect identified in this work is that all interviewed actors (e.g. Fishermen, fishermen associations, CCP, private companies, public sector) are happy to make volunteer commitments which may reduce the pressure on biodiversity but also improve their livelihoods.
- Mozambique possesses a comprehensive national legislation that favours biodiversity conservation grouped as fishery law, Sea law covering regulation for marine fishery, inland water fishery, and aquaculture among others.

**C.4. Challenges for implementing voluntarily commitments in favour of biodiversity**

- Implementation strategies of the legal framework need to be defined.
- The fishery law should be updated to clearly include biodiversity conservation issues.
- Multi-sector coordination for legislation implementation is required.

**Recommendations to overcome challenges*****Crab***

- The Sector of the Sea, Inland Waters and Fisheries should create a specialized program with actions plan for subsidizing fishermen for selling crabs of normal commercial size to companies; subsidize alternative fishermen activity during prohibition period; provide environmental education for protection of Mangroves habitat.
- The government through ministries associated to food production should create education programs for consumers sourcing small animals from irresponsible fishermen and try to improve purchasing power of Mozambican consumers.

***Shrimp fishery***

- The fisheries sector should implement similar inland small scale aquaculture projects to coastal communities.
  - Semi-industrial and industrial should also consider adopting shrimp farming projects.
  - The fisheries sector and international private investors should promote financial support for coastal communities' small scale aquaculture projects, and set up aquaculture companies.
  - The fisheries sector should promote improvement and/or investment on infrastructure for processing and technology to raise the product quality to meet market requirements.
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## 1. Introduction

### 1.1. Mainstreaming biodiversity into key economic sector

8. This report presents the situational analysis process for mainstreaming biodiversity into key economic sectors in Mozambique. The situational analysis focus on examining the opportunities, constraints and scenarios of engagement of actors in the agricultural commercial crops, extractive, and fisheries sectors to reduce their pressures on biodiversity in Mozambique.
9. The report is structured by economic sectors, and within each sector the information is organized in six main sections, as follows: the first section presents the sectors' major characteristics and challenges including opportunities and constraint's for the engagement of the sectors in favour of biodiversity; the second section maps the actors, their interests, motivations and appetites, and suggest possible accountability mechanisms; the third section describes the pressures triggered by the sectors on biodiversity and impact.
10. The fourth section presents the best practices of the sectors and inspiring models, aligned with low level, medium level, and high level of ambitions scenarios" of SMART voluntary commitments highlighting their underlying logic in a synthetic way (i.e. problem addressed, extent of expected change, practices to be implemented to achieve such a change, SMART indicators, i.e. specific, measurable, accurate, relevant, and time-bound for measuring the effect obtained by implementing the proposed practices/actions implied in the VC, and possible milestones on a 10-year trajectory).
11. The fifth section focus on strengthening the transformative role of the national framework towards a sustainable economic sectors, including a strategy for mobilizing stakeholders in the sectors for the dialogue phase to obtain the most ambitious SMART (Specific, Measurable, Achievable & Ambitious, Realistic, Time-bound) voluntary commitments.

### 1.2. Background and purpose of the situation analysis for identifying, options, opportunities and challenges for future commitments of economic actors in favour of biodiversity in Mozambique

12. Recent scientific knowledge points to the acceleration of the loss and decline of biodiversity and ecosystem services, globally. The health of the ecosystems on which we depend, and on which all other species depend, is degrading today at an unprecedented rate. This situation weakens livelihoods, food security, health and quality of life worldwide and poses economic and financial risks. The poorest and vulnerable populations are increasingly at risk to be exposed to disasters, and to the consequences of a loss of natural capital on which they depend for their subsistence and resilience. Altogether, this underlines the more than ever plausible risk of mass extinction of species in the next few decades, if urgent measures are not taken globally and within states.
13. In Mozambique, IUCN in close collaboration with the Ministry of Environment is implementing a two-year BIODEV2030 project, a pilot initiative funded by the French Development Agency (AFD), coordinated by Expertise France and implemented by IUCN in eight countries and by World Wild Fund (WWF) in other 8 countries.
14. The goal of the BIODEV2030 project is to create the conditions for a national dialogue involving stakeholders around strategic economic sectors, relevant to the country economy and biodiversity. This dialogue will aim to catalyse concrete national and sectoral voluntary commitments to reduce pressures on biodiversity over the next decade. Such voluntary contributions will be a big step towards building ambitious common goals to halt the decline in biodiversity by 2030 and restore bio-

diversity by 2050.

15. In the first step of the project, a national biodiversity threat assessment based on scientific data identified, for Mozambique, the main threats with the greatest impacts to national biodiversity and the related economic sectors. Results of the assessment were reviewed and discussed by the Advisory Committee and national stakeholders who identified 3 sectors for the “dialogue” phase of the project: the agriculture, mining and O&G and, fisheries sectors.
16. This situational analysis of the identified economic (sub) sectors, is part of the second step of the project BIODEV2030. Based on the inception report the following scope were validated by IUCN after consultation with the BIODEV2030 advisory committee: (i) Agriculture sector with focus on commercial crops soybeans and sugar cane as a priority crops; (ii) Extractive sector with focus on the PSA (SPM) project, a Sasol’s project under development phase, and Kenmare Heavy sands project; and (iii) Fisheries sector with focus on prawns, and crabs.
17. The purpose of the situational analysis is to identify the opportunities, constraints and possible scenarios of engagement of actors in the agricultural commercial crops, extractive and fisheries sectors to reduce their pressures on biodiversity in Mozambique. The analysis presents the options and trajectories needed to reverse the erosion of biodiversity and achieve National Biodiversity Strategic Action Plan (NBSAPs) and objectives of the post-2020 global framework, towards the 2050 vision (humans living in harmony with nature).

## 2. Methodology

18. The study adopted an iterative, consultative, inclusive and transparent approach, and involved the consultation of all relevant stakeholders, during the study, particularly with regard to the design of the study, data collection, discussion of findings and recommendations.
19. The methodology section is structured in 5 (five) sub-sections: (i) Conceptual Framework consisting of major concepts and theories guiding the situational analyses, namely Mitigation “Hierarchy” sequence, Voluntary Commitment, DPSIR model representing the structure and causal relationships between economic sector and the environment, and the relationship between the actions to respond/address pressures on biodiversity, and Typology of mitigation measures; (ii) Study sites and Selected Value Chains; (iii) Data Collection Methods and Tools; (iv) Data analysis; and (v) Limitations and risks.

### 2.1. Conceptual Framework

#### *Mitigation “Hierarchy” sequence*

20. Stakeholders in the economic sectors can decide, voluntarily, to implement one or more of the following of measures in the “Mitigation Hierarchy” sequence: (i) preventive measures for avoiding negative impact on biodiversity; (ii) measures to reduce (minimize) the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity; (iii) measures to rehabilitate/restore as far as possible; and/or Biodiversity Offsets for counterbalancing the “significant residual adverse biodiversity impacts” on the environment; and philanthropic initiatives related to corporate responsibility e.g. towards biodiversity conservation.
21. “Biodiversity offsets” (i.e. compensating a biodiversity loss with a biodiversity gain) can be considered, in general terms, as mitigation measures since are the last step in the “Mitigation Hierarchy” (first avoid, then minimize, and then finally restore/offset negative impacts) to counterbalance

the “significant residual adverse biodiversity impacts” from planned projects or developments. Biodiversity offsets are an integral part of the mitigation hierarchy and their success in terms of no net loss relies on the adherence to the mitigation hierarchy, i.e., proper implementation of the precedent steps. While biodiversity offsets have risen from regulatory requirements in a number of countries, their increasing popularity is mainly bound to a new trend toward the promotion of voluntary biodiversity offsets, which has started in the early 2000s (Darbi, 2020).

22. The term “biodiversity offsets” provides a general framework, under which, a multitude of compensation approaches are grouped (e.g., compensation, restoration, remediation, habitat banks, impact mitigation, environmental offsets, biodiversity banking, and wetland mitigation). Nevertheless, the term “compensation” has many different meanings and connotations and may refer to financial compensation for social inequalities rather than for environmental degradation. Therefore, the biodiversity offsets” or “biodiversity offsetting” is becoming the dominant term for environmental degradation (Darbi, 2020).
23. Benefits of biodiversity offsets for business include (i) License to operate (access to land and resources, speeding up approval processes and avoiding costly delays); (ii) New markets (innovators advantage); (iii) Reputation (improved relationship with the local population and decision makers); (iv) Access to capital (increased demands and standards of international financial institutions and donors); (v) Efficiency (management of risks and liability obligations (Darbi 2020, citing Kate (2005) and Howard (2007))).

#### *Voluntary commitment*

24. Voluntary commitment is an umbrella term for different forms of decision making that results in voluntary, charitable action aimed at contributing to the public welfare/ another’s good that the individual has chosen freely (Darbi, 2020). In general terms and using a dichotomy based classification (Darbi, 2020), (i.e. a pole of mandatory actions based on legislation and another pole of voluntary actions), voluntary commitments encompass both, good practices that can surpass government or mandatory actions (from legislations) and good practices that are totally new and independent of legislation. The goal of voluntary commitment is oriented towards public matters and thus can be distinguished from actions merely or mostly oriented towards private benefit) (Darbi, 2020, citing, Priller 2008).
25. This study uses the definition of Voluntary Commitment (VC) as presented by BIODEV2030: Guidelines and criteria for robust “voluntary commitments”. In accordance with these Guidelines, a voluntary commitment is defined as “a set of forward-looking, strategic, shared and science-based actions that lead to positive and measurable change in biodiversity.” Hence, our focus will be on actions that lead to positive and measurable change in biodiversity, including actions expected to be performed by actors in accordance with legal/policy instruments or truly voluntary commitments that are driven by altruistic motivation to make a positive impact. The guidelines also underline that a VC is explicitly stated with reference to the DPSIR (Driver, Pressure, State, Impact, and Response) framework. ([Annex 1](#) draft note on “voluntary commitments”).

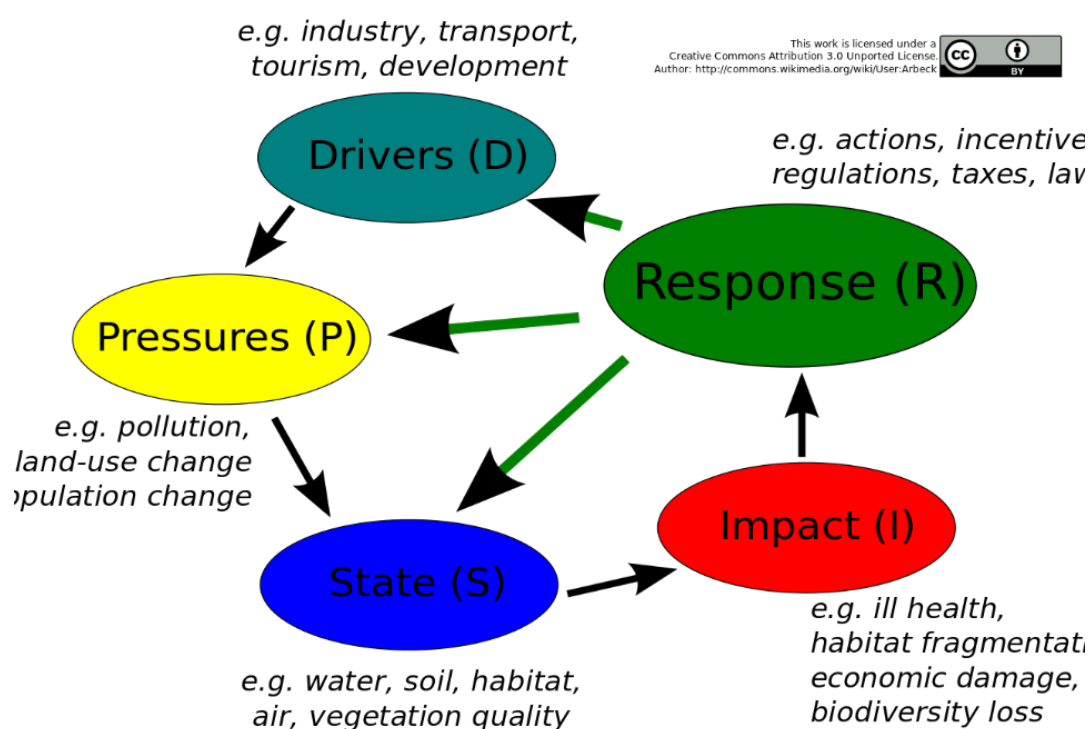
#### *DPSIR-Model*

26. The DPSIR is a causal framework (Figure 1) for describing the interactions between society and the environment: Human impact on the environment and vice versa because of the interdependence



of the components (<https://en.wikipedia.org/wiki/DPSIR>). Following Maxim, Spangenberg and O'Connor (2009) driving forces consist of economic sectors that engender pressure on ecosystems, that is, agriculture, extractive and fisheries sectors are driving forces.

27. Pressures refer to actions that induce changes in the status of environment such as release of substances (emissions), physical and biological agents, the use of resources and the use of land; change of state in affected areas refer to change of abiotic condition of soil, air and water, as well as biotic condition (biodiversity) at ecosystem/habitat, species/community, and genetic level; impact refers to effects on living beings and no living beings compartments of ecosystems (aquatic, terrestrial, atmospheric) including changes in environmental functioning.
28. Responses refer to decisions or actions by groups for controlling driving forces, or pressures (prevention, mitigation), or maintain or restore the state of the environment, or to help accommodate the impacts (adaptation) (Maxim, Spangenberg and O'Connor, 2009).
29. In the context of DPSIR model, the Drivers, agriculture, mining, O&G, and fisheries sectors and corresponding activities exert pressures such as emissions, waste that induce changes on the state of biodiversity that leads to the impacts that voluntary commitments can respond with mitigation, adaptive or curative actions, that will influence the sectors, reduce the biodiversity pressure eventually improving the state of biodiversity, reducing the impact.



**Figure 1 DPSIR Causal Framework**

Source: <https://en.wikipedia.org/wiki/DPSIR#/media/File:DPSIR.svg>

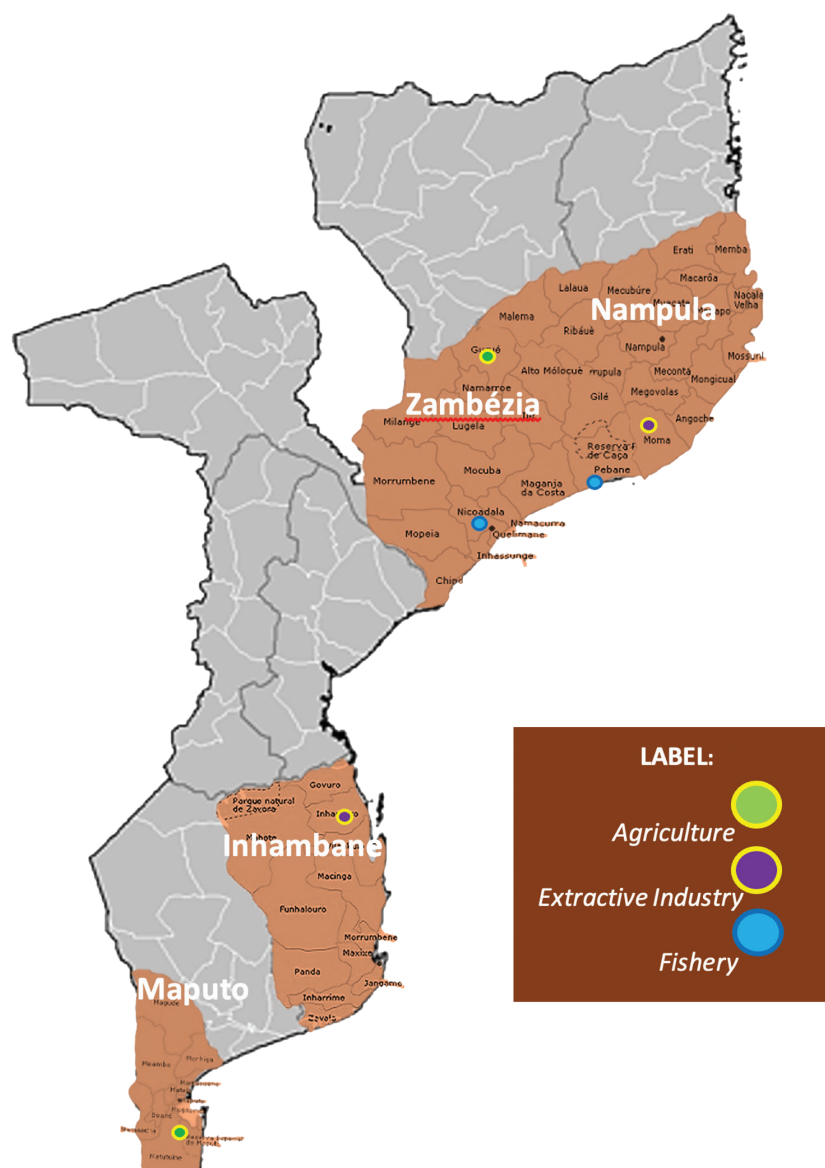


### *Typology of mitigation measures*

30. Based on motivation and the source/agent of measures, Darbi (2020) developed a comprehensive typology of biodiversity mitigating offsets/measures, which represents actual practice and reveals the existence of a whole range of biodiversity mitigating measures/offsets between two poles: a high degree of regulation on the one side and a high degree of voluntary commitment on the other, and the different types of biodiversity mitigating measures can be grouped into 7 categories (Darbi, 2020).
31. The first six categories of biodiversity mitigating measures (Regulatory, Conditional, and Enabled, Sector, Corporate and Local biodiversity measures) are driven or at least influenced by some pressures or incentives. But since the project proponent makes a free and wilful choice, these categories qualify as different forms of voluntary mitigating/offsets measures. The seventh category, the altruistic biodiversity mitigating measures/offsets are exempt from any major influence and thus probably the most ideal representation of true voluntary biodiversity offsets, representing clear additionality.
32. The seven categories of biodiversity mitigating measures, are described as following (Darbi, 2020):
  - (1) Regulatory biodiversity measures:** required by law and enforced to mitigate for impacts on biodiversity and the natural environment arising from development activities. Enforcement is crucial and builds on significant administrative/enforcement capacity. In case of weak enforcement, the government can push towards the implementation of mitigating measures through guidance and pilot projects (Darbi, 2020).
  - (2) Conditional biodiversity measures:** required by financial institutions. Public and private financial institutions such as the World Bank, the IFC, the European Bank for Reconstruction and Development, and the European Investment Bank (EIB) are making biodiversity mitigating measures part of their standards and practices (Darbi, 2020).
  - (3) Enabled biodiversity measures:** (e.g. policies, guidelines and incentives) fostered by governments and NGOs through pilot schemes, guidance.
  - (4) Sectoral biodiversity measures:** taking part in a voluntary self-commitment of a sector (e.g., mining, agriculture and fisheries). These measures are primarily driven by sectoral requirements or guidance on mitigating measures.
  - (5) Corporate biodiversity measures:** resulting from a voluntary self-commitment of a corporation. They represent the most direct exertion of the business case for biodiversity offsets/measures. Their high visibility is clearly linked to a business' or corporation's motivations to implement offsets, in particular as a tool for reputation and risk management.
  - (6) Local biodiversity measures:** Large-scale development projects that are imposed from the outside will inevitably lead to local conflicts and thus in economic losses for the developer. The concerns or support of local stakeholders can significantly affect the success or efficiency of a project. Therefore, capacity building and participation are common tools to engage local stakeholders. In this context, offsets/measures are used by developers to respond to environmental concerns and to negotiate (social) license to operate.
  - (7) Altruistic biodiversity measures:** truly voluntary measures that are driven by the altruistic motivation to make a positive impact.

## 2.2. Study sites and Selected Value Chains

33. The study was conducted in Maputo City, Maputo Province, Zambézia and Inhambane provinces (Figure 2).



**Figure 2 Study areas**

The selected value chains are presented in Table 1.

### Selection criteria

- ### Table 2 Qualitative assessment of the commercial major crops

[illegible]

Source: Ministério de Agricultura e Desenvolvimento Rural (MADER), 2021. Inquérito Agrário Integrado (IAI), 2020.

Description:

- <sup>1</sup> Size of cultivated area in 2020
- <sup>2</sup> This indicates locations where cultivated crops have caused major habitat loss or conversion
- <sup>3</sup> Indicates the name/category of producing agricultural enterprise
- <sup>4</sup> Indicates the degree of mechanization of crop production operations
- <sup>5</sup> Indicates the degree of use of Fertilizer, Pesticides or Herbicides for crop production.
- <sup>6</sup> Indicates the degree of use of slash and burn practice and cultivation of monoculture.
- <sup>7</sup> Indicates provinces which threats have a high impact on species groups and if abated make significant contributions to improving species survival. It also indicates the potential contribution from site based restoration of a habitat could make to improving species survival.
- <sup>8</sup> Indicates the weight of the crop relatively to the approximate agricultural income at national level.

**Table 3 Site selection criteria's**

Projects		Project Location	Project phase		Project phase	Project phase
ID	Projects	Project Location	KBA zone (Yes/No)	Potential Impact biodiversity	Economic Relevance	Project Status
1	SPT	Pande and Temane Deposit (Inhambane)	Yes	High	Medium	Production
2	SPM	Pande and Temane Block (Inhambane)	Yes	High	Medium	Development
3	EEA/MRV	Area 4 (Cabo Delgado)	Yes	High	High	Exploration/Development
4	AMA 1/TEPMA1	Area 1 (Cabo Delgado)	Yes	High	High	Development
5	Buzi Hidricarbons	Buzi block (Sofala)	No	Low	Medium	Exploration
6	Exxon Mobil	Area A5B Mozambique Basin (Nampula)	No	Low	TBE	Exploration
7	Exxon Mobil	Area Z5D Mozambique Basin (Nampula)	No	Low	TBE	Exploration
8	Exxon Mobil	Area Z5C Mozambique Basin (Nampula)	No	Low	TBE	Exploration
9	Sasol Petro Moz	Mozambique Basin PT5 - C Area (Inhambane)	No	Low	TBE	Exploration
10	Sasol petroleum Sofala	Block 16&19 (Inhambane)	Yes	High	TBE	Exploration
11	ENI Mozambico	Area A5A Mozambique Basin (Nampula)	No	Low	TBE	Exploration
12	ROMPCO	Pipeline from Temane (Inhambane) to Secunda (RSA)	No	Low	Medium	Operational
13	MGC	Pipeline from Ressano Garcia to Matola	No	Low	Medium	Operational

**Table 4 Fisheries resources**

Group	Artisanal Production (tons)	Income (10 <sup>3</sup> MTS)	Coverage Sectors	Fishing gear
Lobster	1.058	197.745	Industrial, Semi- industrial and artisanal fishing	Beach seine; Bottom drag;
Crab	3.587	277.754	Industrial, Semi- industrial and artisanal fishing	Beach seine; Bottom drag;
Marine fish	191.469	12.780.536	Semi-industrial and artisanal fishing	Beach seine; Bottom drag; Surface and Background gillnet
Freshwater fish	90.052	6.010.962	Semi-industrial and artisanal fishing	Cast net; Line; surface gillnet, Cages
Tuna and related species	6.299	331.889	Industrial, Semi- industrial and artisanal fishing	Beach seine; Line; Longline; Surface and Background gillnet
Shrimp	6.295	1.008.497	Industrial, Semi- industrial and artisanal fishing	Beach seine;
Acetes	3.533	47.164	Artisanal fishing	Beach seine;
Cephalods and Molluscs	4.125	275.343	Industrial, Semi- industrial and artisanal fishing	Pots; Beach seine;
Shark	1.969	131.430	Industrial, Semi- industrial and artisanal fishing	Beach seine; surface and Background gillnet
Others	4.381	58.482	Industrial, Semi-industrial and artisanal fishing	Beach seine; Line; longline; Surface and Background gillnet
Use of by-catch	1.703	22.734	Artisanal fishing	Beachseine; Surface and Bottom gillnet

### 2.3. Data Collection Methods and Tools

*The Situational Analysis used the following methods:*

38. Review of Documents. The Consultant Team performed a detailed analysis of all identified relevant documents and reports. All documents of a political or strategic nature were also analysed, including National Plans, Intervention Strategies or International Agreements that frame the BIODEV2030 initiative. This method was essentially used for answering and framing the results of the situational analysis questions, in particular for the following objectives: conducting preliminary analysis for major commercial crops; identifying the direct and indirect pressures on biodiversity associated with the 3 target sectors (type, geographical area) that the commitments should aim to reduce; and Mapping the actors, their institutional context and their interactions. The list of documents analysed is presented in [Annex 2](#).
39. Semi-Structured Interviews (SSI). This method was used for collecting primary data on all questions and objectives of the situational analysis, with focus on “production practices” of the economic ac-

tors producing and impacting the ecosystems and their biodiversity, associated with strategic value chains of the 3 target economic sectors (type, geographical area) that the commitments should aim to reduce.

40. The team produced interview guides ([Annex 3](#)) that captured the key data to address the specific objectives. Each interview guide addressed specific categories of stakeholders and included a brief introduction to the BIODIV2030 project and to the consultancy on Situational Analysis, followed by main questions and a number of sub-questions for the interviewees. The interviews lasted on average 1.5 hour and were recorded.
41. Focus Groups Discussion (FGD). FGDs were used to capture the perceptions and experiences, on production practices by the 3 economic sectors, of key informants from public institutions, research and academic institutions strategic partners, trade associations, civil society organizations (CSOS), local leaders and other key Stakeholders. The team focused on understanding, and describing possible 3 (three) contrasted (low, medium and high level of ambition) scenarios of voluntary commitments in each sub-sector.
42. A total of 160 participants were interviewed ([Annex 4](#)) including members of public institutions, research and academic institutions, producers' associations and civil society organizations (CSOS). For agriculture sector the consultants conducted 15 individual interviews and 6 focus groups, covering total of 34 participants. For the fisheries sector consultants conducted 16 individual interviews and 9 focus groups, covering a total of 85 participants. And for the extractive industry the consultants conducted 3 individual interviews and 3 focus groups, covering a total of 41 participants.
43. SWOT analysis. The Consultant Team used SWOT analysis to identify opportunities, that is, the factors and practices external and internal to the companies of the three sectors which are favourable to their voluntary commitment in favour of biodiversity; and the constraints, that is, the external and internal factors that are unfavourable to the engagement of the sectors in favour of biodiversity. This was organized with public sector stakeholders and private sector stakeholders (producing companies). SWOT analysis was also used to suggest scenarios of stakeholders' commitments. Potential voluntary commitments were based on the best scientific knowledge available that favour biodiversity conservation including plants, herpetofauna, mammals and birds taxonomic groups.
44. The commitments took the form of Biodiversity conservations approaches and best practices adopted worldwide and other more site-specific practices used by the stakeholders, as noted by the assessment that are to result on reduction on pressures on biodiversity over the next decade. Some of these practices included: threat reduction and restoration; alignment of agricultural activities to regimes and rules governing protected areas; restoration activities for sites of importance for biodiversity conservation; following the prescribed measures for species conservation status for threatened species (Vulnerable, Endangered species, critically endangered species) and endemic species; development and implementation of Environmental and Social Management Plans (PGAS); pursuing conservation-friendly agriculture inside and outside conservation areas; and supporting scientific research that promote the improvement of best practices that favour biodiversity conservation.

#### **2.4. Data Analysis**

45. Upon completion of data collection all interviews were transcribed and saved in one file, and a file was created to save all the documentation reviewed. Data from the interviews, were cleaned and
-

identifying elements removed, ensuring that all data used is anonymous. Content analysis of the interviews and reviewed documentation was performed based on the structure of the situational analysis' interview guides.

46. A preliminary analysis of the data was conducted and preliminary report presented and verified with the IUCN. The findings were subject to further validation by the advisory committee, IUCN and at the multi-stakeholder workshop. The comments and recommendations, from these stakeholders, were subsequently incorporated, and a final report produced and submitted to IUCN.

## **2.5. Limitations and risks**

47. The main limitation was related to the long process required for approval of the interview with Xinavane's managers on environmental issues. The few general insights about the company were obtained during preparatory talks with company's contact person, who indicated that the company perceives environmental issues as being sensitive and decisions regarding provision of environmental information have to be taken at headquarters in Durban, South Africa.
48. Until the submission of this report the decision was not made. Therefore, for the sugar cane value chain the consultants used basic information provided by the contact person at Xinavane Sugar Company, and the existing research on sugar industry in Mozambique in general, and on Xinavane Sugar Company in particular. The consultants recommend IUCN to conduct a follow-up meeting for awareness on biodiversity conservation and data collection of current sugar cane production practices.
49. Regarding the possibility of upscaling the results of this situational analysis to other similar values chains, research indicates that successful projects of sustainable intensification of use of natural resources, including agriculture, are very specific. By definition, they fit solutions to local needs and contexts. Hence, preliminary work should be conducted before implementing the proposed Voluntary Commitments to other places and contexts with similar value chains.

## **3. Findings**

### **3.1. Agriculture in Mozambique – a situational analysis**

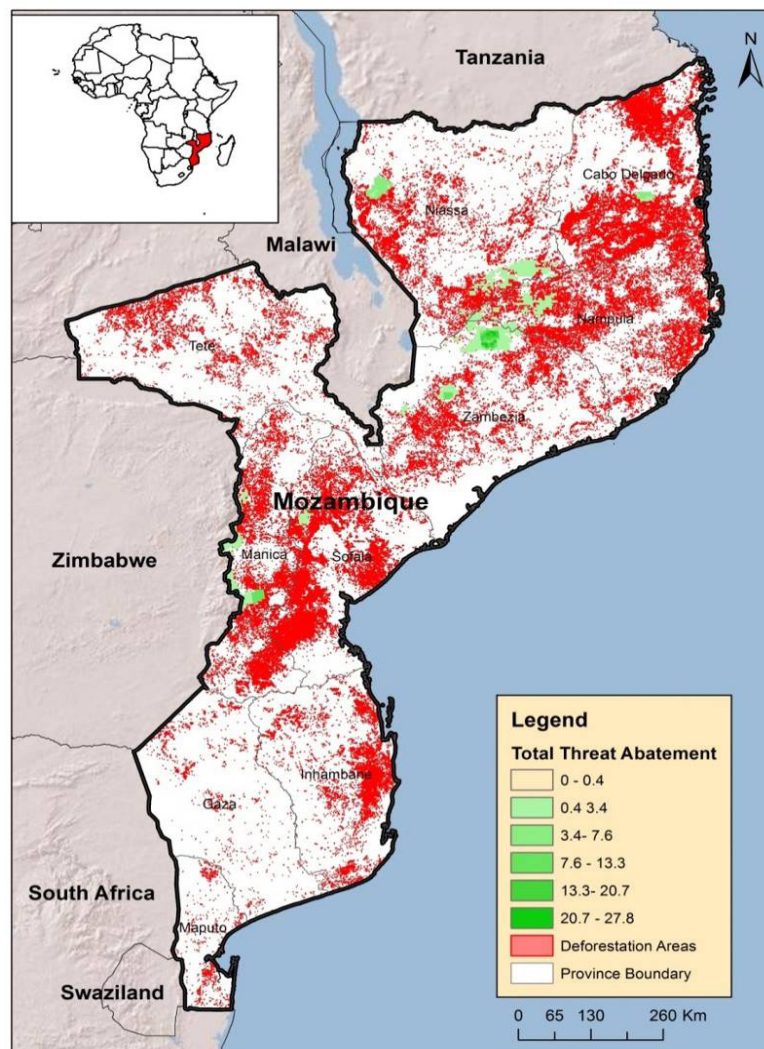
#### **Major Characteristics and challenges**

50. The agricultural sector is a critical pillar of Mozambique's economy, contributing with approximately 24% of the country's GDP, and the MADER is the central organ of the state, which directs, plans and ensure the execution of legislation and policies of the agricultural sector. The sector provides employment for 80% of the total workforce and generates 80% of the income of rural households (USAID, 2021).
51. Poverty reduction is the most pressing economic and social issue in Mozambique. Poverty remains high, more than 46% of the rural population living below the national poverty line. National averages crop yields are low (<1ton/ha) for the majority of food crops. This has contributed to chronic food insecurity, which is exacerbated by climate shocks and natural disasters such as floods, droughts and cyclones (USAID, 2021).
52. Low agricultural productivity is due, largely, to limited access and use of improved inputs and poor agronomic practices. MADER (2021) reports low levels (below 10%) of use of improved technologies by small and medium farmers, irrigation (9.1%), inorganic fertilizer (7.8%); pesticides (5.5%);



herbicides (1.8%); manure (8.8%); and improved seed of maize (9.7%), rice (4.9%) and sorghum (2.7%). Limited access to financial resources is major constraint to the use of improved agricultural technologies. MADER (2021) reports that only 0.6% had access to credit in 2020. Hence, increased access to extension, research, finance, and adoption of improved production technologies to improve productivity is key for reducing poverty and improving the wellbeing of the population.

53. The main environmental challenge for the agricultural sector is reducing deforestation, practiced for converting land to agriculture. IUCN (2021) reports that in Mozambique, slash and burning shifting cultivation combined with cultivation of annual and perennial non-timber crops are top severity threats to terrestrial ecosystems, herpetofauna and birds taxonomic groups; and contribute about 86% of annual deforestation, mainly in the provinces of Nampula, Zambézia and Manica (Figure 3).



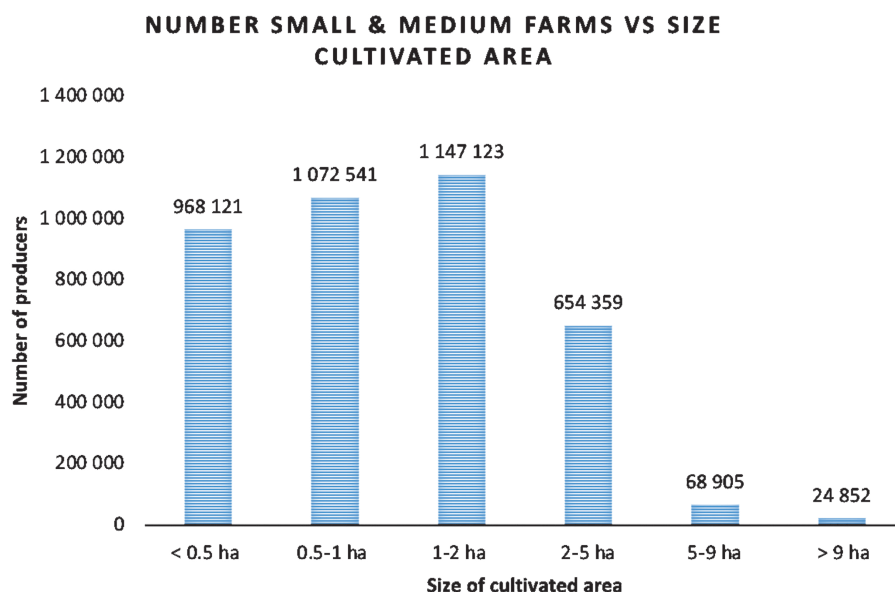
**Figure 3 Deforestation areas of Mozambique**

Source: IUCN



### Agricultural development perspective

54. Mozambique has more than 36 million hectares of arable land (PEDSA 2011-2020). In 2020, the total cultivated area was approximately 5,655,381 ha (about 16% of total arable land), of which 98.7% (5,579,116 ha) was cultivated by small and medium enterprises together, and 1.3% (76,265 ha) was under cultivation by large agricultural enterprises (MADER, 2021). Figure 4 presents the distribution of land according to the size of properties of small and medium enterprises.



**Figure 4 Cultivated area by small and medium farmers**  
**Source: Ministry of Agriculture and Rural Development (MADER), 2021**

55. Smallholder farmers cultivate small plots (0.5-2ha) and are the overwhelming majority and they practice slash and burn, removal and burning of crop residues, and deforestation, which affect soil fertility and cause land degradation. Hence, smallholder farmers should adopt improved farming techniques and move to more intensive cropping systems, based on sustainable practices.
56. The strategic objective pursued by the MADER is to “contribute for food security, nutrition and farmer’s income in a competitive and sustainable manner that guarantees gender and social equity” (PEDSA, 2011-2020, pag.45). This objective is being pursued through a value chain approach under SUSTENTA, a 5 (five) years World Bank funded national program (2020-2024) for the integration of family farming in productive value chains.
57. The goal of SUSTENTA is to improve the wellbeing of rural households through the promotion of sustainable (social, economic and environmental) intensification of agriculture. SUSTENTA’s actions are in accordance with the 5 (five) major guiding priorities of the MADER: (i) Food security; (ii) Family Income; (iii) Job creation; (iv) Social inclusion; and (v) Production and productivity. Table 5 presents the Strategic Nacional Value Chains promoted under SUSTENTA.

**Table 5 Strategic value chains promoted under SUSTENTA program (Crops Only)**

Provinces	Strategic value chains						
	Rice	Maize	Beans	Soy	Sunflower	Sesame	Cotton
Niassa		•	•	•	•	•	•
Cabo-Delgado	•	•	•	•	•	•	•
Nampula	•	•	•	•	•	•	•
Zambézia	•	•	•	•	•	•	•
Tete		•	•	•	•	•	•
Manica		•	•	•	•	•	•
Sofala	•	•	•		•	•	•
Inhambane			•		•		
Gaza	•		•				
Maputo P	•		•				
Maputo C			•				

Source: Ministry of Agriculture and Rural Development (MADER), 2020.

58. Primary actors and beneficiaries are Small Farmers (PA) or INTEGRATED, Small Commercial Emergent Farmers (PACE) or INTEGRATOR and Anchor Companies involved with processing and marketing of produce. Expected impacts from SUSTENTA include: *Impact on Family Income*, increase in the average family income from 36,600Meticais to 73500 Meticaïs per year after program implementation. *Impact on employment*, at least one third of family production (surplus) is dedicated to marketing after guaranteeing the family's food security reserve. *Impact on Productivity and Production*, the growth of the agricultural sector with the implementation of SUSTENTA will increase from the current 2.6% per year to around 8% per year and will generate a marketable agricultural surplus of about 92 thousand millions meticaïs against the current 34 thousand millions meticaïs (MADER, 2020).
59. MADER's Social and Environmental Safeguards Office (GSA) is responsible for designing and implementing social and environmental safeguard policies and strategies to prevent or minimize any adverse social or environmental impact on activities carried out in the agrarian sector. Currently GSA is conducting environmental screening of SUSTENTA' beneficiaries (PACES)' business plans, based on World Bank's environmental assessment operational policy adopted by FNDs (Table 6)

**Table 6 Example of Small Commercial Emergent Farmer (PACE's) business plan biodiversity screening for environmental impacts**

Potential environmental and social risks	Yes	No	Comments	Date of Significance
ENVIRONMENTAL ISSUES – biodiversity				
Will there be any loss of vegetation during the subproject implementation?	X		The area as a whole will suffer little impact. Vegetation may be partially removed by opening new production areas. The felling of local forest species must be avoided, which leads us to assist the safeguards in the preparation of the Field. PACE must be guided by Good Environmental and Social Practices, including the adoption of appropriate techniques for soil preparation and sowing. The Protocol to Prevent the Conversion of Critical Habitats should be considered to avoid cutting sensitive species as a result of the opening of agricultural fields.	LOW NEGATIVE
The subproject will impact endemic, rare, vulnerable species (eg IUCN Red List of Species/Conservation Areas) and/or ecological resources and components.		X	The subproject does not pose a threat of impacting endemic, rare, vulnerable species as it will be implemented in an area semi-transformed by human activity and located 05km from the nearest river bank. However, educational measures will be adopted to protect the above mentioned species that occur in riparian forests; as the awareness of PACE and PA's not to practice agriculture along the rivers, that is, to respect the separation distance of up to 50 meters between the river bank and the machamba (farmland).	NEGLIGIBLE
Are there any areas of environmental or ecological sensitivity that could be adversely affected by the subproject?		X	Although the project's area of influence has some forest foci with native species, it does not configure any type of critical natural habitat, it does not have riverine and mountain forests, wetlands, inselbergs, among other critical habitats. However, as the area is located 5 km from the river, it is known that these areas are critical natural habitats for many species of flora and fauna. Management measures should be provided for in the Guide to Good Practices for Agriculture and Forestry Systems	NEGLIGIBLE
Are there any sensitive and/or protected species that could be adversely affected by the subproject?		X		NEGLIGIBLE

Source: MADER, GSA, 2022

60. For forestry subsector, in 2007, Mozambique had 54.8 million hectares of forest (about 9.8 times the cultivated area) corresponding to about 70% of the country's surface. It is important to note that, forests have been severely degraded over the years, hence Mozambique is implementing the REDD+ program since 2019 to help reduce deforestation and forest degradation, while improving the lives of rural populations in the Zambézia Province. Currently the program covers nine districts of the Zambézia Province: Alto Molocue, Gile, Gurue, Ile, Maganja da Costa, Mocuba, Mocubela, Mulevala and Pebane.
61. According to the WB (2021) The Forest Carbon Partnership Facility (FCPF) paid Mozambique \$USD6.4 million for reducing 1.28 million tons of carbon emissions since 2019. The payment is the first of four under the country's Emission Reductions Payment Agreement (ERPA) with the FCPF that could unlock up to \$USD50 million for reducing up to 10 million tons of CO<sub>2</sub> emissions in Mozambique's Zambézia Province by the end of 2024.
62. Mozambique's REDD+ program, is an example of an opportunity to voluntary commitment by the stakeholders. A benefit sharing plan is being prepared with local actors and communities that have contributed to the results, to ensure that they receive the majority of the benefits. This will allow the stakeholders to continue promoting community management of natural resources and restoration of degraded areas, while stimulating conservation-friendly, nutrition-sensitive, and climate-smart farming models.

### 3.2. Mapping of actors and stakeholders of agricultural sector

#### *Institutional actors*

63. The **Ministry of Agriculture and Rural Development (MADER)** is the central organ of the state, which directs, plans and ensure the execution of legislation and policies of the agricultural sector. The **Ministry of Land and Environment (MTA)** oversees the design and implementation of policies for land management and Geomatics, Forests and Wildlife, Environment, Climate Change and Conservation Areas. MTA's National Directorate for the Environment (DINAB) is in charge of environment and biodiversity. DINAB is responsible for defining and enforcing policies on biodiversity, including marine-coastal space, endangered species, erosion and drought, policies and action plans to reduce pressure on biodiversity; and issuing environmental license of economic activities including agriculture, for the whole country.
64. MADER's directorates and offices relevant for the identification of potential voluntary commitments in favour of biodiversity are the National Directorate for Development of Family Agriculture (DNDAF), National Directorate for Assistance to Family Agriculture (DNAF), National Directorate for Promotion of Commercial Agriculture (DNPAC), and the Social and Environmental Safeguards Office (GSA).
65. MADER's National Directorate for the Development of Family Agriculture (DNDAF), ensures the planning and monitoring of the production of strategic crops by the family sector; designs mechanization packages for the family sector in the different agro-ecological regions of the country; designs and promotes technological/thematic maps of crops suitable for agro-ecological regions. The National Directorate for Assistance to Family Agriculture (DNAF) is responsible for designing and implementing the national policy to assist in the transformation of subsistence agriculture to market-oriented agriculture; disseminates and transfers appropriate agricultural technologies to family sector producers; and facilitates the adoption of technologies by family sector producers.

66. The National Directorate for the Promotion of Commercial Agriculture (DNPAC) is responsible for designing and implementing policies and strategies for the promotion and development of commercial agriculture; defines strategic value chains and designs development plans for the agricultural and forestry private sectors as well as the producer organizations. And the Social and Environmental Safeguards Office (GSA) designs and implements social and environmental safeguard policies and strategies to prevent or to minimize any adverse social or environmental impact on biodiversity, by activities carried out in the agrarian sector. At provincial and district levels MADER is represented by the Direção Provincial de Agricultura e Pescas (DPAP) and Serviços Distritais de Actividades Económicas (SDAEs).
67. Mozambique has about 4,261,758 **agricultural enterprises**, which are structured into three categories, small (97.8%), medium (2.19%) and large enterprises (0.02%). In 2020, farmers produced basic food crops and cash crops. Basic food crops included corn, rice and sorghum and millet which are mostly used for human consumption. Cash crops are those intended for sale (commercial agriculture) and, as a rule, undergo industrial processing or are for export. Cash crops included tea, cotton, sugar cane, copra, macadamia, soybeans and sesame (MADER, 2021).
68. Small and medium farmers are mainly involved in the production of basic food crops, and they sell between 3-20.2 % of their production. Maize has the major percentage (20.2%) of farmer's participation in the market. Small and medium farmers also produce cash crops, tobacco, cotton, sunflower and soybeans. Large farmers are more concentrated in the production of sugar cane, banana, and tea with large plantations of more than 100ha in monoculture cropping system, with intensive use of mechanization and agrochemicals, and high capital investment requirements. Large farmers are also involved in rice production in Gaza province in southern Mozambique.
69. The Faculty of Agronomy and Forestry Engineering (FAEF) of Eduardo of UEM is one of the public higher education institutions that conduct research in the area of biodiversity. FAEF's research interests and activities include (i) research on land use and land cover change due to agriculture and its impact on biodiversity, as well as the impact of harvest of forest products, such as firewood and charcoal on biodiversity; and (ii) biodiversity mapping.
70. There are other high education institutions and national research institutes conducting research on biodiversity. For example, Unilúrio is implementing "A FARMING SYSTEM APPROACH TO MAINSTREAM BIODIVERSITY IN THE AGRICULTURE AND PLANNING SECTORS (FARSYMABI)" project to integrate biodiversity into agricultural policies. Universidade Pedagógica (UP), Uni-Zambezi, Mozambique Agriculture Research Institute (IIAM) are also conducting research on biodiversity, and deserve further exploration for details on the methodologies used and main research findings achieved.

#### ***Actors in the value chains and their business models and practices***

##### **Soybean value chain**

71. The value chain for soybean production consists of two parts: soybean value chain for small and medium farmers, and soybean value chain for large farmers. The value chain for small and medium farmers is summarised in Figure 5, and the key players are:
  - *Seed providers*: Seeds are provided by non-profit, social oriented ONGs (such as CLUSA, World Vision) or purchased from local seed providers such as AGRICOM.
  - *Seed multiplication agents*: Seed Co (seed provider based in Zimbabwe) trained and hired COPAZA to multiply seeds and supply to the local seed provider AGRICOM for resale. Some associations purchase

seeds from COPAZA for multiplication and use in their own fields.

- *Soybean production:* Farmers in the small or medium commercial sectors produce soybean on individual plots or in the field of the cooperative/association. For instance, the members of the COPAZA cooperative use their individual fields for production of soybean. This justifies for the inexistence of large continuous blocks of soybean production. The fields of soybean production are intermingled among other crops.
  - *Processing:* Processing of soybean consists of threshing the pods and selection of the seeds into different grades (sizes). The processing is done either by the farmer or at the COPAZA plant by the Sociedade de Beneficamento de Sementes (SBS), which major function in the value chain is purchasing harvested seed and grains from small and Medium farmers and others; cleaning calibrating/grading, treating, cooling and packaging it, then make it available to small and Medium farmers network and others to sell directly to Small Commercial farmers that sell to internal and external customers. The essential role of aggregators is volume consolidation to achieve lower logistics unit costs, however their pressure (if any) on biodiversity is negligible. The processing at the COPAZA plant costs 25 MZN/kg which is considered unaffordable for the small farmers.
  - *Local processing for soybean derivatives.* There is an incipient initiative by NOSSARA, a women's cooperative, which promotes processing and local use of soybean derivatives. Selected women from the cooperatives/associations have been trained through the TECHNOSERV programs implemented in the past aiming to explore soybean derivatives for local use. The soybean derivatives are used as milk, for baking (cakes, biscuits), for enriching porridge, etc. The initiative is also replicated at the level of the associations. According to the members of the associations, the soybean derivatives have been used to resolve and reduce malnutrition cases on children from the villages. But these initiatives are still at micro scale. Up-scaling is needed to be able to develop current soybean markets and add value to soybean products.
  - *Potential market of soybean is emerging from local and regional industry initiatives such as:* Abilio Antunes Farmers from Manica province; A Unit of feedstuff processing (UP2) in Gurue (under construction); and The SAN oil refineries from Cuamba (under trial). It is expected that the development of these industries will not just boost the production and use of the derivatives at local/regional levels but it will add value on soybean from Gurue.
  - *Local commercialization (local aggregators):* Local businessmen (local aggregators), among nationals or Bengalis buy soybean grain from the small and medium commercial farmers and supply to the large traders.
  - *Large traders:* The local businessmen supply soybean to large traders which can be local or from outside the province. The commonly cited large trader during the interviews and discussion groups is the Royal Group from Nacala, Nampula Province who purchases bulk quantities of soybean grain for export.
  - *Export:* The large traders are responsible for export of the soybean produce to countries such as India and China.
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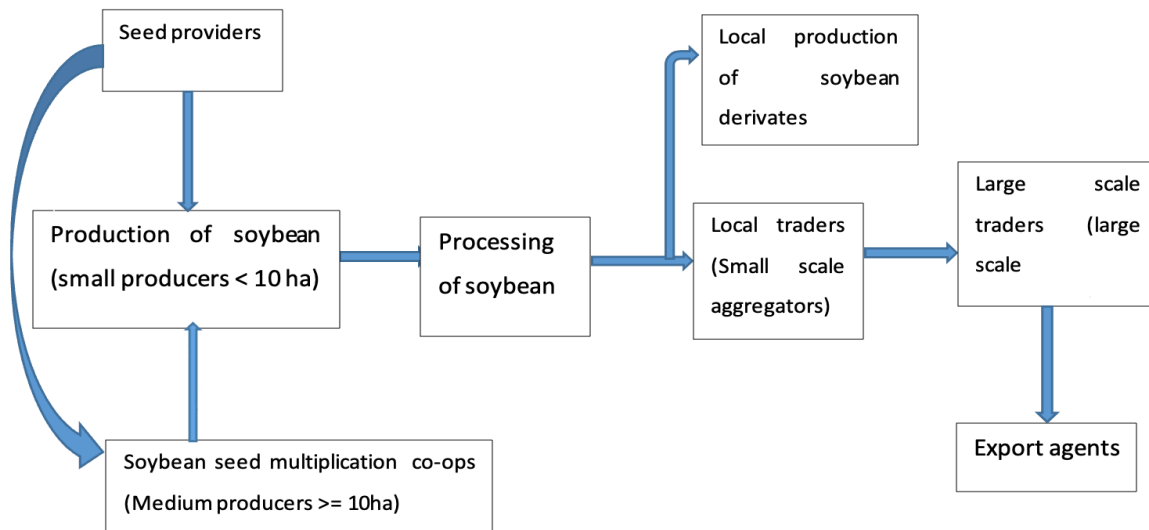


Figure 5 Overview of the Value Chain of soybean for the small/cooperative sectors in the Gurue

72. The soybean value chain for the commercial sector was drawn based on Hoyo agribusiness experience (Figure 6). Here, soybean production, and processing operations are undertaken by the enterprise. The enterprise does not buy grain from the local farmers, i.e. outside its operations because they aim to maintain quality standard of fully mechanized soybean production although, as reported by the company, the existing market does not impose certification as a prerequisite for export.

- Seed/ matrices purchased from Argentina, South Africa and Brazil. Exceptionally, in 2022, they purchased seed from Seed co. because of the COVID-19 crisis.
- Seed multiplication
- Soybean production
- Processing
- Commercialization
- Export

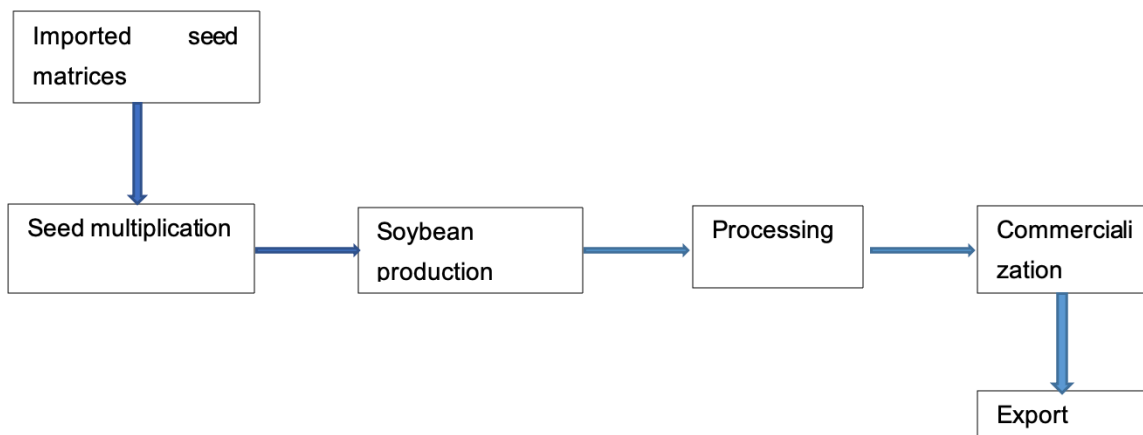


Figure 6 Overview of the soybean value chain for the commercial sector in the Gurue district



**Sugar Cane Value Chain**

73. Mozambique is considered a country with comparative advantages in sugar production. The country has favourable agronomic and climate conditions for sugar cane production including, rivers to satisfy irrigation needs, and large pool of unskilled labour. The total area of plantations is over 52,000 hectares and about 60% is irrigated (EU, 1999).
  74. The Xinavanes' sugar estate is one of six estates and mills of Mozambique's sugar industry. It is located in the southern province of Maputo. By 1999, Xinavane had a total area of 7000ha, 100% irrigated, installed capacity daily milling for 2,400 ton of cane and installed capacity annual production of 40000 tons of sugar (EU, 1999). Shareholders are the South African Company Tongaat Hullet (88%) and the government of Mozambique (12%) (CEPAGRI, 2014).
  75. Figure 7 presents the Xinavane Sugar Value Chain with main actors. The company (Xinavane) is the major player in the sugar value chain. Xinavane's sugar value chain consists of two production lines. The line whose production is directly carried out by the company in its own fields. The second production line takes place on the producers' fields, which totals more than 1300ha, in an outgrower scheme in which the producers sell the cane to the Xinavane's factory. This production line is made up of private producers who produce in 10-200ha fields using their own inputs, and supply the product (cane) to the Xinavane's factory; and small-scale independent producers individually or organized in associations, who receive from the company inputs including seed, NPK and urea fertilizers, pesticides, equipment, uniforms and technical advice, and comply with a defined schedule of agricultural operations to produce and sell to the factory. The associations recruit the workers needed for agricultural operations including irrigation, weeding and cleaning of fields. The hiring of workers and their payment, as well as the transport of the sugarcane to the factory are carried out by the company. At the end of the season, the sugar mill determines the sucrose content of the crop and subtracts the cost of inputs, labour and amortizes the initial investment (Tese Mabui, 2016).
  76. Most commercially produced sugar cane is directly channelled to the mill while the remaining is treated and used as seed. Sugar cane is processed under fairly capital-intensive technologies, and is an activity characterized by significant economies of scale (EU, 1999). Once produced, the sugar is channelled to the National Sugar Distributor (DNA) for distribution in the domestic and international market. The two by-products of sugar- molasses and bagasse- have various applications. Molasses can be fermented to make rum or applied in the preparation of cattle feed. Bagasse is generally used to supply energy to the mill and its surrounding areas. In some countries bagasse is also used in the manufacturing of paper, board, and high value-added chemical products. Expansion of sugar consumption in developing countries has been slowing down as a result of increased competition from alternative sweeteners as well as consumers' growing health concerns (EU, 1999).
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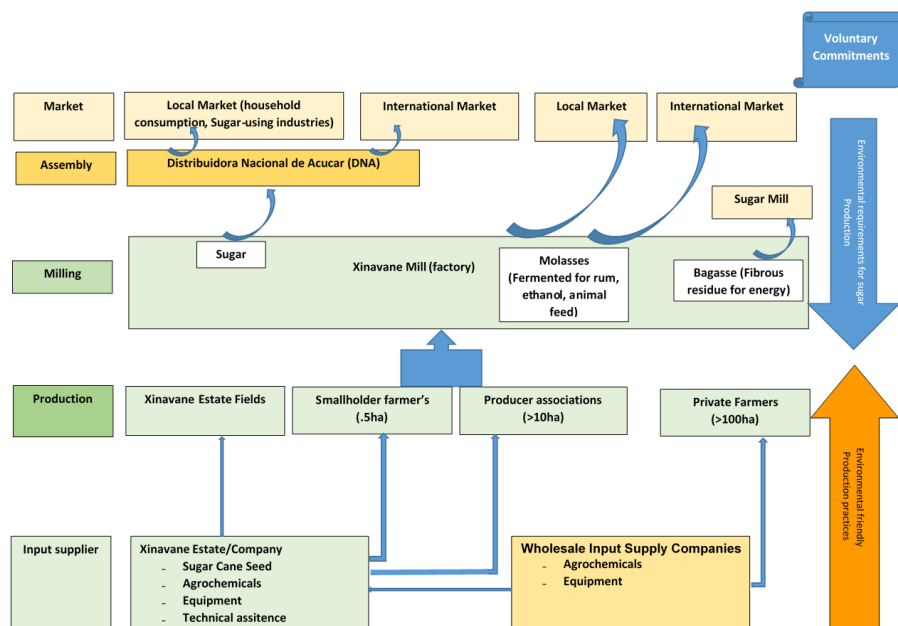


Figure 7 Xinavane Sugar Value Chain

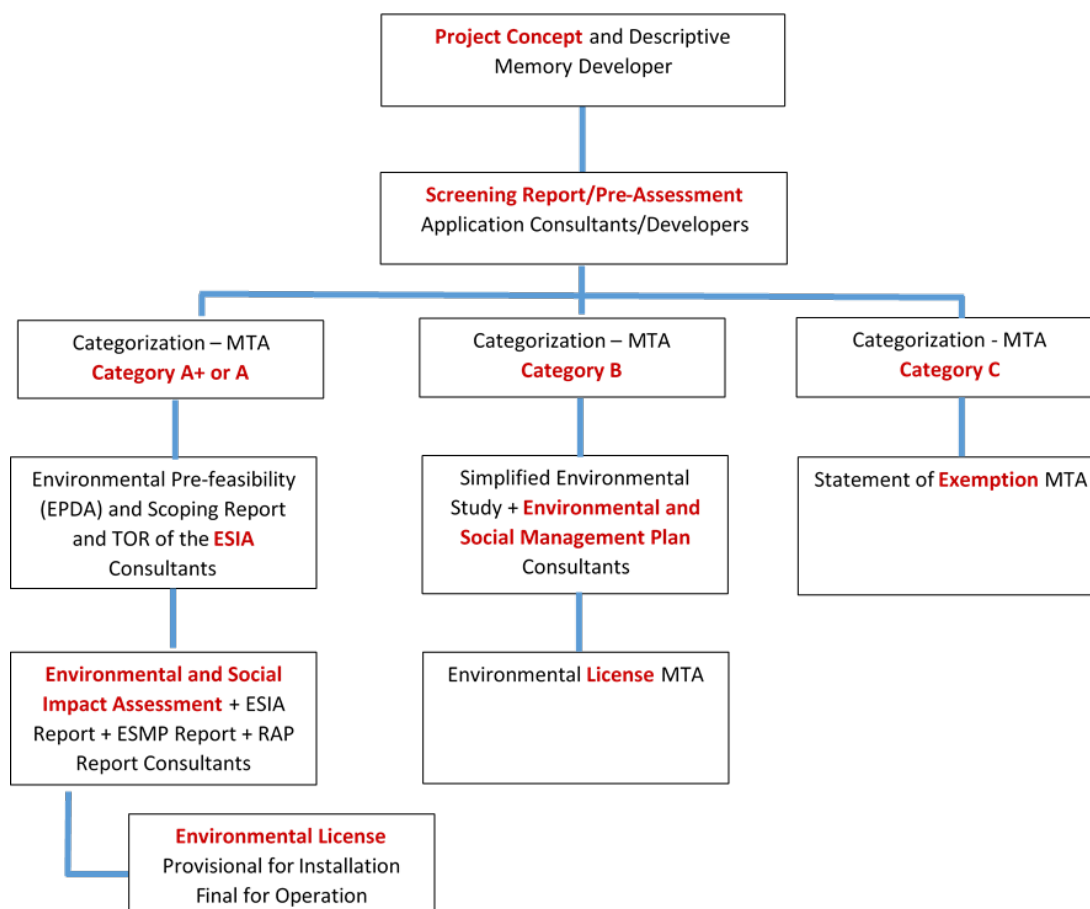
### Actors interests, motivations and appetites

77. Actors' interests, motivations and appetites are consistent with biodiversity conservation and promotion of sustainable agricultural intensification. **MTA's interest** is economic actor's compliance with requirements for environmental licensing of agricultural projects. The National Biodiversity Strategic Action Plan (NBSAP) 2015-2035 is composed by 20 national targets. The following targets are relevant for the agricultural sector: (i) Target MN2 that deals with promotion of research on integrated sustainable agricultural practices for biodiversity conservation and climate change adaptation to support decision making. (ii) Target MN3 that deals with legal aspects for preventing biodiversity degradation, also implemented through the Decree n° 54/2015 of 31<sup>st</sup> of December (*Regulamento sobre o processo de Avaliação do Impacto Ambiental*). (iii) Target MN4 that deals with promotion of sustainable use practices, aiming at reducing biodiversity pressure, taking into account ecological carrying capacity. Target MN7 that deals with promotion of multi-sector sustainable management including agricultural sector, and with definition of zones for biodiversity conservation where agricultural activities are developed. Target MN 17 that calls all sectors involved in biodiversity issues to establish sectoral targets, develop and implement corresponding plans.
78. **DINAB** promotes biodiversity conservation through Policy incentives, including elaboration, implementation and supervision of the following policies, laws and regulations: (i) Biodiversity Conservation Policy; (ii) Law No 16/2014 of 20 June, (iii) Regulation for Environmental Impact Assessment (EIA); (iv) the recently published Ministerial Diploma n°55 /2022 of May 19 which regulates offsetting measures; (v) Action Plan and Strategy for the Conservation of Biological Diversity in Mozambique (2015-2035); (vi) Regulation on access and sharing of Benefits; Neutrality of Degradation of Dry Lands / desertification); (vii) Biosafety Regulation (Genetically Modified Organisms-GMOs).
79. The MTA has focal points, in the various Economic Sectors, including Agriculture Sector, who are

involved in the definition of the action plan of the biodiversity strategy, to harmonize the actions for the biodiversity conservation component according to the “Mitigation Hierarchy” sequence. However, the guiding instruments, including laws and regulations, available in the country cover the previous mitigation measures (Avoid, Minimize and Restore) and the balance sheet. The offsetting measures are still recent, and at the time of the interview, MTA officials were still awaiting for the decree publication. Fortunately, the publication process was completed, and now the decree has been published as Ministerial Diploma n°55 /2022 of May 19. Therefore, the country has now a comprehensive guiding instrument for the high level ambition of voluntary commitments. It should be stressed that, the ministerial diploma was viewed at the time of interview as a key instrument for the implementation of no-net loss principle as explained by MTA, with these words

“Under our competence of environmental licensing, we have to see how each of the projects will impact on biodiversity (...) but there was no instrument directing how this loss of biodiversity could then be compensated/counterbalanced (...), only said that it would be mitigated. If destroying the mangrove, the operator had to implement measures to minimize such impact. We are now working with the press and believe that in the coming days the ministerial diploma on biodiversity counterbalance will be published (checklist with around 200 items). The idea is that a development project does not just destroy, but apply a measurement methodology, to see how this will be compensated (no-net-loss). The exercise will be carried out first at the level of conservation areas and at the community level.”  
(MTA, 2022)

80. According to MTA, Commercial Agriculture is subject to environmental licensing (Figure 8) that goes through: (i) Preparation of a baseline assessment that culminates in the categorization of the project into A+, A or B. A+ projects are subject to an Environmental Impact Assessment (EIA) while B projects lack the elaboration of good practice measures; (ii) The EIA report is distributed to the sectors directly involved/interested for analysis and production of technical opinions. Based on the technical opinions of the different sectors, the MTA approves, rejects or forwards the project to another level when the impact is very high.



**Figure 8 Environmental and Social Impact Assessment (EISA) process in Mozambique**

Source: adapted from environmental and social management framework (ESMF), MITADER, 2019

81. **MADER** is interested in farmers' application of sustainable agricultural intensification practices, namely the use of mechanization, improved seeds and agrochemicals ("land sparing option") and good agricultural practices for restoration of degraded areas identified through the environmental screenings of farmers' business plans. MADER, through SUSTENTA, promotes the intensification of agriculture by small and medium-sized producers, in particular producers of out growers scheme' crops (tobacco and cotton), through the use of mechanization and technological packages (seeds, NPK and other agrochemicals accepted in the protocol of use of chemical products in use by the FNDS), with a view of reducing the areas of forest burned and cut for agriculture; and increasing productivity, production, and biodiversity conservation. Nevertheless, even with the promotion of the use of agrochemicals through technology packages, Mozambique is the country in SADAC with a very low average rate of fertilizer use of 15kg/ha, when SADC has an average rate of 50kg/ha.
82. Other reported sustainable agricultural practices disseminated to smallholders are: soil management practices, fire management and use of drought tolerant crop varieties. Extension services (public) teach communities conservation agriculture practices, agro-forestry systems, fire management (cold

fires, teach when to set fires), use of drought-tolerant and short-cycle crop varieties, including maize and cassava varieties.

83. Expected impacts from SUSTENTA include: *Impact on Family Income*, increase in the average family income from 36,600 Meticaïs to 73 500 Meticaïs per year after program implementation. *Impact on employment*, at least one third of family production (surplus) is dedicated to marketing after guaranteeing the family's food security reserve. *Impact on Productivity and Production*, the growth of the agricultural sector with the implementation of SUSTENTA will increase from the current 2.6% per year to around 8% per year and will generate a marketable agricultural surplus of about 92 thousand millions meticaïs against the current 34 thousand millions meticaïs (MADER, 2020).
84. **Soybean producers and sugar cane producers** are interested in obtaining a license to operate (access to land and resources, speeding up approval processes and avoiding costly delays) subject to the observance of environmental requirements and standards set by MTA, MADER and the World Bank/FNDS. Sustainable increase of volume of production and sales is expected to be achieved through increased access to improved technologies including certified seeds, agricultural conservation techniques and approved agrochemicals, participation in environmental education programs, development and implementation of environmental management plans, and supporting and funding environmental research. They would also be interested in gaining new markets (first move advantage) and Access to capital (increased demands and standards of international financial institutions and donors).
85. **FAEF's research interests** are land use and land cover change due to agriculture and its impact on biodiversity, as well as the impact of harvest of forest products, such as firewood and charcoal, on biodiversity; and biodiversity mapping. These interests are being met through various studies. Currently FAEF is conducting a study on the economic feasibility of conserving forests and their biodiversity, in the provinces of Zambézia and Manica, in the central region of Mozambique. The aim of this study is to understand what is gained and what is lost with the conversion of forests into agriculture. Preliminary results indicate that between the individual taking care of the forest and converting this forest to agriculture, the individual gains money and/or food security by converting the land to agriculture. These gains, in a scenario where ecosystem services are not paid, can limit the individual's will to conserve the forest.
86. FAEF also conducts surveys and mapping of biodiversity. As part of this type of investigation, FAEF conducted a study for the Mapping of Critical Habitats for BIOFUND based on the IFC criteria. This study served to guide the elaboration of the ministerial diploma on biodiversity offset (checklist with around 200 items).

#### **Possible accountability mechanisms**

#### **Monitoring implementation of Environmental Management Plan (EMP) and annual performance sectoral report**

87. The impact of environmental policies on agriculture is assessed through the annual monitoring of the Environmental Management Plan (EMP) implementation approved by the MTA (included in the REIA) of a Commercial Agriculture Project. The annual monitoring is carried out by the Agency for Environmental Quality Control (AQUA), an autonomous entity within the MTA, and the internal monitoring of the annual performance is carried out by the Agriculture Sector. As explained by the MTA.

“Approved/licensed projects are subject to an annual audit to see the evolution, and are obliged to submit a report on their environmental performance to the sector, taking into account that the biodiversity components are covered in the Environmental Management Plan (EMP) (...).”

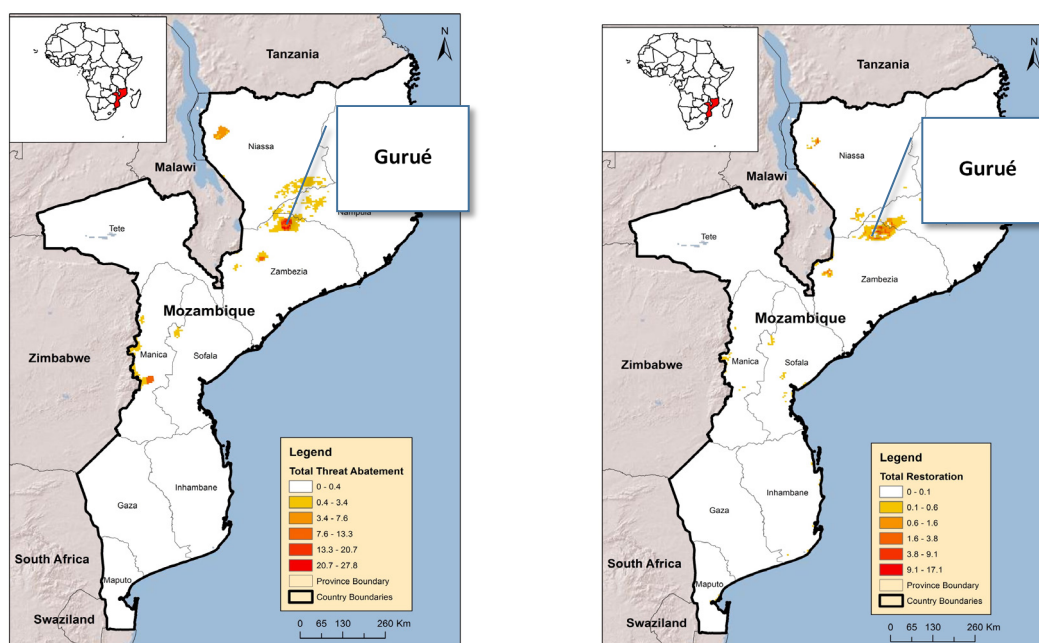
#### **Environmental metrics’/ indicators in PEDSA II 2021-2030**

88. At impact level, under the result area resilience and sustainability, MADER’s promotes the use of renewable sources of energy of low carbon and reduction of emission of greenhouse gases in the agricultural sector. The sector is committed to reduce 13.0% MtCO<sub>2</sub> in (2025) and 9.8% (2030) with respect to 2021. MADER’s objective: Improved Management of Natural Resources, will be monitored through the indicator % of production areas using sustainable management practices including conservation agriculture practices.
89. MADER’s strategic targets by 2030 include at least 30% of arable land benefits of sustainable management and climate resilient practices; and at least 0.05% of forests are to be restored. In addition MADER is developing an Environmental Impact Assessment (EIA) database to be used for the following:
  - a. monitoring and evaluating agriculture policies;
  - b. providing a snapshot of the current state and trends of environmental conditions in agriculture that may require policy responses;
  - c. highlighting where new environmental challenges are emerging;
  - d. comparing trends in performance across time and between provinces, especially to assist policy makers in meeting environmental targets, threshold levels and standards.

### **3.3. Pressures triggered by agricultural sector on biodiversity and impact**

#### *Current state of biodiversity and desired state in activity zones of the sector*

90. Zambézia is the province with the largest cultivated area to soybean (52% or 33, 949ha) and the major producer of soybean in the country (43% or 29,082 ton). Gurué district is the second (33%) major producer of soybean in the Zambézia Province. The recorded soybean production in the season 2020/2021 for the district was 9,473 ton (MADER, 2021). This produce is a contribution by the smallholder and medium farmers. Additional quantities of soybean (6,300ton) were produced by Hoyo-Hoyo private company, in an additional area of approximately (2,360ha).
91. IUCN (2021) indicates that, the surrounding area of Gurué has a potential for threat reduction and restoration. Threats have a high impact on species groups and if abated make significant contributions to improving species survival. It also indicates the potential contribution, from site based restoration of a habitat, to improving species survival. (Figure 9).



**Figure 9 Mapped STAR Scores for Mozambique showing threat scores per grid cell (left) and restoration scores per grid cell (right) at the 10 km resolution**

Source: IUCN, 2021

92. Soybean production in Gurué occurs away from any KBA or conservation area and there is no evidence of the area being part of a natural biological corridor or habitat for any species of concern. The surrounding landscape environment has been impacted by continuous fields of monoculture crops (e.g. tea and macadamia). The nearest KBAs are located away from Gurué and it is less likely that the production of soybean has direct impact to those KBA areas. However, the effects of forest conversion, habitat loss and degradation may have widespread negative impacts which can pose indirect pressure on the KBAs.

#### Direct and indirect pressures

93. The production of soybean involves deforestation, slash and burn practices, mechanization, use of pesticides, herbicides and fertilizers, which contribute to forest conversion, habitat loss and degradation. The soybean production requires that all trees are removed from the field to avoid competition for resources (e.g. light). The area used for soybean production has been deforested and the natural vegetation converted into continuous single farmlands ('*machambas*'). The remnant natural vegetation around the farmlands of soybean consist of small isolated patches on graveyards or as vegetated strips along the riverbanks (Figure 10). According to local people interviewed during the fieldwork, the tree cover of the area has changed since the introduction of soybean in 2015.
94. The removal of natural vegetation has affected the habitat quality with impacts on the diversity of fauna. Local people acknowledge that most of the areas used for soybean production were once habitat for a diversity of wildlife including mammals, herpetofauna, birds, among others. Presently, only small rodents, reptiles and some birds occur. These findings are concurrent with the earlier



report by IUCN (2021) which attribute monoculture production (such as soybean) to demand for extensive uninterrupted single field, intensive use of mechanization and fertilizers/agrochemicals contribute for habitat loss and land cover changes with high degree of threat to plants, herpetofauna, birds and mammals.



**Figure 10 The landscape of typical soybean production areas showing vast areas of once natural forest now converted into farmland**

95. The middle and large soybean producers use intensive mechanization, herbicides for weed control and pesticides for pest control in the process of production of soybean. The use of mechanization contributes to soil compaction and reduces the rate of water infiltration into the soil which may change the soil moisture status and accelerate surface water runoff and erosion which may pollute watercourses. The use of mechanical power increases unburned hydrocarbons and carbon monoxide emitted into the air. Intensive use of pesticides and herbicides also contaminates groundwater and kills other organisms besides the target specific pests and weeds.

#### **Risks and impacts for the sector and the country**

96. The forest conversion, habitat loss and degradation may contribute to the alteration of the biogeochemical cycle with impact on global biodiversity. The alteration of biogeochemical cycles is known to contribute for climate change with direct impacts to economic sectors such as agriculture. Variations on the frequency and intensity of rain affect negatively the agricultural sector. Moreover, climate variability creates conditions for the outbreak of pests imposing intensive use of pesticides in agriculture (Logan et al., 2003) with impacts on biodiversity.
97. All people interviewed acknowledge that the production of soybean in the present season (2021/2022) has been affected negatively because the rain started too late and its distribution along the season was not regular for adequate development of the soybean crop. To illustrate that, *Hoyo - Hoyo* agribusiness in Gurue lost about 600 ha of soybean due to rainfall variability. Additionally, the soybean production has recorded incidence of pests for which the farmers had to acquire and



apply insecticides (Figure 11). The intensive use of pesticides and herbicides may contaminate surface and ground water with impacts on biodiversity and health of the local people. Therefore, the engagement of the economic sectors enhancing the status of biodiversity through voluntary commitments may help reduce alteration of biogeochemical cycles with benefits to the biodiversity and local economies.



**Figure 11 The use if insecticide for pest control in commercial sector (A) and small/medium commercial sector (B)**

98. By 1999, Xinavanes' sugar estate had a total area of 7000ha, 100% irrigated, installed capacity daily milling for 2,400 ton of cane and installed capacity annual production of 40000 tons of sugar (EU, 1999). Sugar cane crop, is purely monoculture, and demand an extensive uninterrupted single field, intensive use of mechanization and fertilizers/agrochemicals which makes them major contributors for habitat loss and land cover changes with high degree of threat to plants, herpetofauna, birds and mammals (IUCN, 2021).
99. As in the case of large soybeans producing companies, sugar cane production demands intensive use of mechanization (excessive number of trips over the field) contributes to soil compaction and reduces the rate of water infiltration into the soil which may change the soil moisture status and accelerate surface runoff and spoil erosion. The use of mechanical power increases unburned hydrocarbons and carbon monoxide emitted into the air. Intensive use fertilizers, pesticides and herbicides also contaminates groundwater and kills other organisms besides the target specific pests and weeds. The application of chemical fertilizers is likely to upset the balance of nature, and to pollute surface or ground waters with nitrogen, phosphorous and pesticides<sup>3</sup>.

### 3.4. Best practices of the agricultural sector and inspiring models

#### *Existing sectoral best practices in Mozambique*

100. The agriculture sector work with national and international partners who help to address the environmental issues including threat abatement and restoration of degraded agricultural areas. Table 7 presents the main best practices in agricultural sector based on the analysis of major environmental policies and practices used for soybean and sugar cane production.

<sup>3</sup> Pesticides can lead to injury of non-targeted species, by movement of pesticides to land adjacent to treated areas, pesticide residues in foods, and sediment from increased row crop. Pesticide management is complicated due to large amount of pests and number of registered commercial pesticides.

**Table 7 Agricultural Sector Best Practices and the corresponding type of mitigation measure**

Type of mitigation measure	Agricultural Sector Best Practices
<b>Regulatory biodiversity measures</b>	<b>MTA:</b> Produced a new decree on offsetting, including 200 items which will serve as detailed guidelines for implementing offsetting measures. This has high potential of being Mozambique's good practice towards voluntary commitments in favour of biodiversity.
<b>Conditional biodiversity measures</b>	<b>SUSTENTA</b> Program: MADER undertake environmental screenings of beneficiaries' business plans based on World Bank's environmental assessment operational policy adopted by FNDS.
<b>Enabled biodiversity measures:</b>	<b>SUSTENTA</b> Program: Started by providing Eucalyptus for the farmers involved in soybean production to plant around their fields. The project was suspended due to lack of seedlings. A new model of this project is being drafted and according to the district extension personnel valuable plant species will be used. The species to be selected will be those valued by local people. Potential limitation is the provision of enough seedlings to cover all farmers.
<b>Enabled biodiversity measures</b>	<b>MOZFIP</b> Project: Project activities include establishment of Agroforestry systems in the communities. Upscaling the initiative can be a challenge due to potential limitation in terms of material (seedling) to cover the needs.
<b>Enabled biodiversity measures</b>	<b>CLUSA:</b> Through its Conservation Agriculture Program (PROMAC I and II) CLUSA has been promoting conservation agriculture with emphasis on agriculture techniques resilient to climate change. Some of the people interviewed claim that the COVAJO is appropriate for small areas. Labour and funding would be needed to cover large extensions of land like those used to produce soybean. The RIPER is still incipient and not yet adopted by the majority due to shortage of equipment.
<b>Enabled biodiversity measures</b>	<b>NITIDAE</b> Project: Involved with promotion of agriculture practices which are resilient to climate change.
<b>Sectoral biodiversity measures</b>	<b>MADER:</b> Developed environmental metrics'/ indicators in PEDSA II 2021-2030. The agricultural sector is committed to reduce %MtCO <sub>2</sub> in 13.0% (2025) and 9.8% (2030). Other MADER's strategic targets by 2030 include: at least 30% of arable land benefits of sustainable management and climate resilient practices; and at least 0.05% of forests are restored.
<b>Local biodiversity measures</b>	<b>Xinavane sugar cane company:</b> Xinavane's company has hired an environmental specialist with the responsibility to ensure that company complies with the environmental requirements.

Source: Adapted from Darbi (2020).

### 3.5. Strengthen the transformative role of the national framework towards a sustainable agricultural sector

101. In general, Mozambique has designed legal and policy instruments aimed at strengthening the transformative role of national framework towards a sustainable market oriented agricultural sector, to improve rural household incomes and food security. This section presents the policy and legal instruments supporting biodiversity conservation and sustainable agricultural intensification, as well as the government institutions responsible for the implementation of the national framework.

#### **Ministry of Land and Environment (Legal framework)**

102. The MTA oversees the design and implementation of policies for land management and Geomatics,

Forests and Wildlife, Environment, Climate Change and Conservation Areas. Main environmental laws and regulations include: **Resolution No. 5/95 Environmental Policy**. Establishes the basis for all environmental legislation. According to Article 2.1, the main aim of this policy is to ensure sustainable development in order to maintain an acceptable balance between the socioeconomic development and environmental protection.

103. **Law 20/97 Environmental Law**. It defines the legal basis for the proper use and management of the environment and its components. It applies to all public and private activities that directly or indirectly may influence environmental components. In its Article 9 it outlaws any form of pollution and environmental degradation. **Decree No. 54/2015 Regulation on the Environmental Impact Assessment Process**. It establishes the rules to be followed for environmental licensing of any activity to be carried out on national territory. **Decree No. 25/2011 Regulation of the Environmental Audit Process**. Highlights the importance of environmental audit as a tool for an impartial and documented management process to ensure the protection of the environment. It establishes procedures for evaluating the operational and working processes in relation to the requirements of the environmental management plan, including environmental legal requirements approved for a project.
104. **Decree No. 11/2006 Regulation on environmental inspection**. Aimed at supervising, monitoring and making regular verification of compliance with environmental protection standards at national level. **Decree No. 18/2004 Regulation on environmental quality standards and waste emissions**. Provides parameters for the maintenance of air quality; standards for emissions of gaseous pollutants from various industries, including mobile sources. Also emphasizes prevention and control of water pollution and soil protection. **Decree No. 67/2010**. Proposes Changes to Decree No 18/2004. It amends and adds new standards for environmental quality to be considered in any activity in the country. **Decree 54/2015 Regulation on the Environmental Impact Assessment Process**. It establishes the rules to be followed for environmental licensing of any activity to be carried out on national territory. The decree categorizes the economic activities into A+, A, B and C graded on their extension and potential impact to the environment. Agriculture activities covering an area over 1000ha non-irrigated or 350 ha irrigated is categorized as A. The projects under Category A must undertake an Environmental Impact Assessment before licensing (Figure 8) (ESMF), MITADER (2019).
105. **Decree 6/2009** of 31 March aims to assure that all processes concerned with working or handling of pesticides are realized without jeopardizing the public, animal, and environmental health. The decree approves the fines and environmental compensations should any entity violate the establishment of safety aspects or environmental degradation. **Decree 11/2013** of 10 Abril states the management measures for fertilizers without putting in danger the protection of public, animal and environmental health. **Decree 12/2013** of 10 Abril establishes the procedures for registration of new varieties, production, storage, transport, commercialization, import, export quality control and certification of seeds as well as the measures for their sustainable use. **Resolution 02/2016** creates the AQUA and approves its institutional structure. AQUA is responsible for monitoring the quality of environment.
106. The recently published **Ministerial Diploma N° 55 /2022 of May 19**, creates the biodiversity counterbalance directive that regulates the implementation of biodiversity counterbalance within the context of the article 2, of the decree n° 54/2015 of December 31 on environmental impact assessment. The diploma obliges all category A+, or A projects subject to environmental licensing

that potentially might have a significant residual negative impact on biodiversity to hold an approved counterbalance management plan. The diploma provides details on counterbalance procedures, including the responsibilities of the Environmental Impact Assessment Authority and its supporting unity the Technical and Scientific Unity for the support of biodiversity counterbalance, among other important entities at all levels.

107. MTA also coordinates various environmental and social international and regional treaties ratified by Mozambique, including the UN Convention on Biodiversity ratified by Resolution nº 2/94, of 24 of August. Resolution nº 21/81, of 30 of December, by the Cabinet that turns Mozambique into an IUCN member.

### **Ministry of agriculture (Sustainable agriculture development policies)**

108. The strategic objective pursued by the MADER is to “contribute for food security, nutrition and farmer’s income in a competitive and sustainable manner that guarantees gender and social equity” (PEDSA, 2011-2020, pag.45). This objective is being pursued through a value chain approach under SUSTENTA, a 5 (five) years World Bank funded national program (2020-2024) for the integration of family farming in productive value chains. The goal of SUSTENTA is to improve the wellbeing of rural households through the promotion of sustainable (social, economic and environmental) intensification of agriculture.
109. **PEDSA II 2021-2030 include environmental metrics’/ indicators.** At impact level, under the result area: resilience and sustainability MADER’s promotes the use of renewable sources of energy of low carbon and reducing de emission of greenhouse gases in the agricultural sector. The sector is committed to reduce 13.0% MtCO<sub>2</sub> emissions in (2025) and 9.8% (2030), with respect to 2021. The MADER’s objective: “Improved Management of Natural Resources”, will be monitored through the indicator % of production areas using sustainable management practices including conservation agriculture practices. MADER’s strategic targets by 2030 include: at least 30% of arable land benefits of sustainable management and climate resilient practices; and at least 0.05% of forests are restored, with respect to 2021.

### **3.5.1. Aspects of the framework in favour of environment and sustainable development**

#### *Promotion of regulatory, conditional and enabled mitigation measures*

110. The government (MADER, MTA) and public research institutions (FAEF/UEM) promote regulatory (required by law and enforced), conditional (required by the World Bank/FNDS) and enabled (policies, guidelines and incentives fostered by the governments) mitigation measures to minimize the negative impact of project activities and restorations measures to improve degraded ecosystem/habitat or removed ecological functions after exposure to negative impacts that could not be avoided or minimized.

#### *Research on biodiversity – Faculty of Agronomy and Forestry Engineering (FAEF)*

111. Research in the area of biodiversity in general, and on the impacts of economic activities on biodiversity in particular, is essential in providing evidence for: (i) supporting policy-makers in decision-making on investments for the exploitation of natural resources; (ii) strengthening the transparency of the negotiation processes of these investments; and (iii) informing economic sectors/operators in decision-making on the level of ambition for the implementation of voluntary commitments in favour of biodiversity.

### **3.5.2. Aspects of the framework preventing the transition towards sustainable and responsible practices and possible measures to alleviate them**

#### *Weak capacity for policy enforcement and weak climate adaption capacity*

112. In general, the perception of the MTA is that environmental policies are not yet delivering the desired effect on commercial agriculture, as there is little knowledge/evidence about the level of use of sustainable agriculture practices as well as the effects of pesticide use and inorganic fertilizers in the ecosystems exploited by this sub-sector. This highlights the continuing need for research and strengthening of monitoring capacity in terms of human resources, materials and data collection and analysis tools. According to the MTA, commercial agriculture has a major impact on biodiversity. The operationalization of environmental policies is not very evident. The way in which agriculture is carried out continues to be responsible for the devastation of natural habitats and leads to the loss of biodiversity. As explained by MTA,

“(…) we explore land that often does not have many inputs for production or if there are, these inputs (pesticides and others) they will somehow influence biodiversity. Therefore, we think that agriculture should be thought of, as we could make agriculture more profitable/sustainable, more productive, given the extensions of land we have” (MTA, 2022).

113. MTA's perception is that sustainable agricultural practices disseminated to smallholders are limited/incipient in two ways. First in terms of its scaling up and adoption, probably due to lack of knowledge, dissemination and experimentation by the producer to inform his adoption decision. This suggests considering Farmer Field Schools (FFS) methodology, which allows experimenting innovations, to increase producer's knowledge on sustainable agriculture. Second, the perception that these practices do not, fully, respond to the growing need to adapt to the frequent extreme events (droughts and floods) associated with climate change, suggests that sustainable practices should include more appropriate climate adaptation measures means which can be identified and tested through participatory technology development. The MTA explained

“The level of adoption of these practices, in general, is very limited. I think the problem is knowledge, the dissemination of these practices, sometimes we want to see to believe, but there is a lack of experimentation. I believe that we could probably be successful if we had other water containment measures, we are now in the rainy season we complain that it floods here, but soon when the rains stop everything will be dry, so what are we doing! We have vulnerable people, but if on one side in February or March it is flooded with water, in April and in May there is a lack of food because it is dry. It's the same place that suffers both events, so what has to be done? How is it to be done?” (MTA, 2022).

114. Budget constraints contribute to the weak evidence of the effects of practices used by commercial agriculture. AQUA lacks resources to effectively monitor project activities on the ground. Coordination between the monitoring carried out by the agriculture sector (MADER) and AQUA, which could reduce the negative effect of budget constraints, is still deficient. As explained by the MTA,

“AQUA is subject to the state budget and often this budget does not allow for field visits as required. This may not help bring up the Environmental Management Plan implementation rate.”

“It should be verified how the internal monitoring of the ministry of agriculture correlates with AQUA to see if the information from the sector complements/adds to that of AQUA and

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thus reduce the pressure and the number of field visits by AQUA ( ...)"

115. **Possible alleviating measures.** Monitoring activities are crucial for effective implementation of the Environmental Management Plan. Therefore, MTA & MADER should look for funding for projects aimed at enforcing environmental regulation including biodiversity offsetting guidelines, in agriculture and other economic activities with significant residual adverse biodiversity impacts. This may include adding conservation areas, whenever necessary, to offset the devastation of biodiversity.

*Weak capacity for conducting research and adoption of improved technologies*

116. MADER also pointed the following constraints for commitment favouring biodiversity: limited financial resources for conducting good quality research including systematic soil tests that can serve to improve soil fertility management as a foundation for technology recommendations on specific fertilizer rates, instead of "one size fits all" (NPK-12-24-12); weak capacity of farmers to adopt new technologies such as the plantation of nitrogen fixing trees/crops; lack of institutionalization and use of a multidimensional (environmental, economic and social) perspective of sustainable agriculture, which takes into account farmer's interest, incentives for adoption of technologies and their capacity to implement environmental conservation actions; and scarcity of financial incentives, certification and access to fair trade, to leverage the impact of conservation agriculture interventions on improvement of farmers' income and living conditions (personal communication with DNDAP, 2021).
117. Complexity of supervising biodiversity offsetting - The idea of offsetting can be understood as free access conditioned to compensation with another place. To prevent this from happening, the exercise of offsets must be accompanied by a strong system of supervision. As questioned by FAEF, "How do you ensure that your counterbalance is actually going to be a counterbalance to what you destroyed? How to ensure that this site will be protected? Who can guarantee that the part you are going to do the offsetting doesn't come up with an investor and say this is the part I want?" (FAEF, 2022).
118. **Possible alleviating measures.** MADER should look for funding for applied research on biodiversity and knowledge generation to deal with complexity of biodiversity offsetting measures and supervision. Funding should also be used for promoting adoption of Smart Climate Agricultural practices through provision of subsidies for conservation of biodiversity.

*Profit goal oriented economic actors and weak transparency of Investment negotiations*

119. Financial Return on Investment - Since commercial farming is primarily focused on profit on investment, any innovation has to ensure that it does not bring additional costs and loss of income to your business.
120. **Possible alleviating measures:** MADER and FAEF (including other research institutions) should collaborate and look for funding for applied research on feasibility of biodiversity mitigation measures for commercial agriculture.
121. Weak Compliance with Procedures - Mozambique has several guiding instruments, including an agro-ecological zoning study that was done, in part, to guide viable sites for certain crops. There are also detailed land use development plans at district level to guide investments especially in the agriculture sector, but in practice they have never been used.
122. **Possible alleviating measures.** MTA should collaborate with MADER for funding specific projects aimed at strengthening capacity for reinforcing regulations and procedures.

*Land tenure issues*

123. Hoyo-Hoyo is facing challenges in relation to safety of its premises in Ruace. The fence delimitating their agricultural field has been violated and some members of the local community claim rights over the land used by the company. Hoyo-Hoyo is engaged with local communities through the implementation of community social responsibility actions such as helping with the preparation of *machambas* (farm plots), and provide also technical assistance and seeds. A community committee has been established to help with community sensibilization, but all these efforts have rendered to create good environment between the company and the local communities.
124. **Possible alleviating measures.** Voluntary Commitments will provide space for other actors (Government or NGOs) to work with communities for building up trust and good relationships with Hoyo-Hoyo's company, and help to mitigate the conflict between the parts.

### 3.5.3. Opportunities and challenges to voluntary commitment

125. Tables 8, 9 and 10 present SWOT analysis for public sector, soybeans and sugar cane producers indicating opportunities and challenges to voluntary commitments in favour of biodiversity. For the public sector and research institutions the major strength is the legal and policy framework. This includes MADER's Office of Social and Environmental Safeguards, Public sector extension workers trained in sustainable agriculture practices, MTA's focal points at various economic sectors including agriculture, involved in defining the biodiversity strategy action plan; Biodiversity Conservation Policy, Law No 16/2014 of 20 June, Regulation for Environmental Impact Assessment (EIA), Action Plan Strategy for the Conservation of Biological Diversity in Mozambique (2015-2035), Ministerial Diploma n°55 /2022 of May 19.
126. The major weakness is the weak capacity for action research and to promote adoption practices of sustainable intensification, including to investigate and monitor the implementation (weak enforcement) of agricultural operators, Environmental Management Plans (PGAs); and scaling up of sustainable agriculture practices, probably due to lack of knowledge, dissemination and experimentation by the producer.
127. Major opportunities are regarded to the country's vast natural resources, including fertile land, and the recently launched organic production initiatives such as the commercial organic production of tea in Gurue district, Zambézia province (Central Mozambique), organic sugar in Moamba district, Maputo province, and production of coconut oil in various districts of Inhambane province (Southern Mozambique).
128. Threats include budget constraints limiting action research and production of evidence on the effects of practices used by commercial agriculture. Weak emphasis on multidimensional (economic, social and environmental) perspective of sustainability, contributes for conservation agriculture initiatives (promoted by other organizations with focus on environment) to pay less attention to improvement of producers' income. Land tenure conflicts and complexity regarding implementation and supervision of biodiversity Offsets' were also mentioned as threats by the stakeholders.
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**Table 8 Public Sector and research institutions SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity**

Public Sector and research institutions SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Policy and legal and framework and research institutions.</li> </ul>	<ul style="list-style-type: none"> <li>Weak capacity for action research and to promote adoption practices of sustainable intensification.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>Country's vast natural resources. Fertile land.</li> <li>Organic production initiatives.</li> </ul>	<ul style="list-style-type: none"> <li>Budget constraints limit action research and production of evidence on the effects of practices used by commercial agriculture.</li> <li>Weak emphasis on multidimensional perspective of sustainability.</li> <li>Complexity of implementation and Supervision of biodiversity Offsets.</li> </ul>

#### Opportunities and challenges to voluntary commitment for Soybean Production

129. Table 9 present SWOT of soybean cane value chain. Major strengths are the Economic value of soybean and perceived deterioration of forest and its ecosystem services. These include soybean being perceived by farmers as cash crop with enormous local economic value including its potential for poverty eradication; availability of land available for soybean production with potential for the implementation of Voluntary Commitment measures; and local people acknowledgement that the vegetation cover has deteriorated since the soybean production started in 2015, experienced shortage of supply of timber products for local uses (e.g. firewood), and the general opinion that implementation of VC can help resolve the shortage of these products.
130. Moreover, some of production practices are favourable to biodiversity conservation and include small producers 'limited use of herbicides, fertilizers and pesticides; some farmers have been trained to produce homemade biological fertilizers prepared from a mixture of papaya dried and crushed leaves with ash; the use of intercropping soybeans with maize and/or pigeon peas. Medium soybean commercial farmers use certified seeds and "inoculant" to treat seeds and introduce bradyrhizobia for nitrogenous fixation.
131. Large farmers use zero tillage techniques and precision farming techniques. Soil samples are taken from representative soil types for analysis. The analysis determine on which soil should be undertaken the replenishment of which nutrients. The mostly used nutrients are Nitrogen and phosphates. The stubbles of soybean from the previous production year are left on the soil surface helping for the soil nutrient enrichment.
132. Weaknesses include low adoption rates of sustainable agriculture practices by the farmers, and the fact that soybean production is not structured in out grower scheme whereby a crop promoter is responsible for the production. In the absence of a promotor, it can difficult to find an appropriate structure for the implementation of VCs in S&M farmers subsectors in Gurue. Evidence of low adoption rates of sustainable agriculture practices include the slash and burning practices for land preparation and lack of access to certified seeds; also there is no practice of land preservation due to its biodiversity value. However, local cultural sites (such as graves yards), the river banks and steep

areas are avoided during soybean cultivation.

133. According to COPAZA, the use of the COVAJO technique (for conservation agriculture) is not feasible because it is laborious and would require funding to employ people who can mobilise enough crop residues to cover the soil. The RIPER technique is still incipient, there are about five machines equipped with the technology for the whole district. The average productivity ranges from 2.0 to 2.3 ton/ha. Moreover, large farmers use (intensive) aerial pulverization for crop nurturing (*"adubos foliares"*) and organophosphates for pest control.
134. Opportunities include the vast array of legal instruments in favour of biodiversity conservation, global and local interest in the conservation of biodiversity among politicians, NGOs (e.g. IUCN, WWF), academia, etc., and the global market (demand) of soybean.
135. Major threats include lack of provision of certified seeds, the market not being legally regulated and soybean price is not stable, demand variability dictated by the market. Most of the farmers produce soybean without knowing the price this may demotivate them to adopt the VC. And lack of research on silvicultural aspects of native trees may hamper their use in the Agroforestry systems in the soybean production.

**Table 9 Soybean SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity**

Soybean SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>○ Soybeans is a high value crop.</li> <li>○ Land availability.</li> <li>○ Perceived deterioration of vegetation cover.</li> </ul>	<ul style="list-style-type: none"> <li>○ Soybean is not under an out grower scheme</li> <li>○ Low adoption rates of sustainable agriculture practices by the farmers</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>○ Legal instruments in favour of biodiversity conservation.</li> <li>○ Global and local interest in the conservation of biodiversity.</li> <li>○ The global market (demand) of soybean is rising and the growing interest for green products in the international market</li> </ul>	<ul style="list-style-type: none"> <li>○ Lack of provision of certified seeds.</li> <li>○ Soybean price is very unstable</li> <li>○ Lack of research on silvicultural aspects of native trees.</li> </ul>
<ul style="list-style-type: none"> <li>○ Linking the soybean production and non-timber forest products (e.g. honey) can add value on honey, as VC initiative</li> </ul>	

#### **Opportunities and challenges to voluntary commitment for Sugar Cane Production**

136. Table 10 present (inductive) SWOT of sugar cane value chain. A major strength of the Xinavane Company, to facilitate voluntary commitments in favour of biodiversity, rests on its organizational structure that includes an environmental division. This division is equipped with a hired environmental specialist with the responsibility of ensuring that company complies with the environmental requirements.

137. Yet, a major weakness is the centralized decision making on environmental issues. Environmental issues are perceived as complex, sensitive or threatening area for the business. Therefore, providing information on environmental practices demands clearance from company's headquarters. Consequently, for the sugar cane value chain, the team could not collect primary data, through interviews, on current production practices, because the decision was not made until the submission of this report. The few general insights about the company were obtained during preparatory talks with company's contact person. Hence, data on the following specific production and management practices is missing:

- Whether producers are informed about the MADER and MTA standards for environmental practices;
- The list of approved agro-chemicals used by producers;
- Avoidance of negative impacts on protected areas and in areas with high conservation values within or outside the farms or production areas, including implementation of the provisions of the Pest Management Plan;
- Exclusive use of approved pesticides;
- Adequate disposal of obsolete pesticides;
- Compliance with prescribed doses of pesticides;
- Control of the periods of pesticide application;
- Promoting the use of organic manure.
- Training of producers on the use of agro-chemical inputs.
- Observance of recommendations for the use of fertilizers and pesticide.
- Rational use of fertilizers and pesticides; and
- Contour line farming in order to avoid erosion.

138. For the follow-up, the consultants recommend IUCN to organize a biodiversity conservation awareness raising meeting with the company, and facilitate reflection on producers' perceptions and use of the above practices favouring biodiversity including and use of MADER and MTA standards for environmental practices and collect primary data on specific production practices.

139. Opportunities include IUCN to raise awareness on voluntary commitments; MADER and MTA to educate, inform and reinforce environmental requirements; and environmental Legislation. Another opportunity would be to set a premium price for sugar produced following environmental friendly practices, and increase levy for sugar imports.

140. Sugar is the most widely produce and also the most heavily protected agricultural commodity in the world (EU, 1999). Hence, possible threats include perceived high costs for implementing environmental friendly practices, and meeting the quality specification for premium price in the world market.

**Table 10 Sugar Cane SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity**

Sugar Cane SWOT analysis to make voluntary commitments to implement measures in favour of biodiversity

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>○ Division with the responsibility to ensure that company complies with the environmental requirements</li> </ul>	<ul style="list-style-type: none"> <li>○ Very long (centralized) decision making process on environmental issues. Environmental issues are perceived as complex, sensitive or treating area for the business. Therefore talking/providing information on environmental practices demands clearance from company's headquarters.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>○ IUCN to raise awareness on voluntary commitments</li> <li>○ MADER and MTA to educate and inform of environmental requirements</li> <li>○ Environmental Legislation</li> <li>○ Premium price for sugar produced following environmental friendly practices.</li> </ul>	<ul style="list-style-type: none"> <li>○ Perceived high costs for implementing environmental friendly practices, and meeting the quality specification for premium price in the world market.</li> </ul>

### 3.6. Recommendations: scenarios of commitments for agricultural sector

141. To address the conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs, Sustainable Agricultural Intensification practices are recommended, with aim of producing more output from the same area of land while reducing the negative environmental impacts, and at the same time increasing contributions to natural capital and the flow of environmental services.
142. Sustainable Agricultural Intensification practices are presented separately for soybean and sugar cane production, and are preceded by a brief introductions of the current production practices associated with conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs, as presented below.

#### *Soybean Value Chain*

##### *Small (<10ha) and medium producers (>=10ha)*

143. Typically, Small & Medium soybean producers practice slash and burning agriculture that consists in burning the forest to create more fertile field capable of supporting agriculture on average between 3-5 years period, after which another field must be created by burning more forest land, i.e. shifting cultivation.
144. This practice result in deforestation and habitat loss. The effects of forest conversion, habitat loss and degradation have widespread negative impacts which can pose indirect pressure on the KBAs. In addition, burning trees is an inefficient way for fertilizing farmland's soils. Therefore, for this category of farmers (including district and local leadership) the following is recommended to address conversion (deforestation) of natural habitats into cultivated fields (i.e. practices to tackle rapid expansion of deforestation to surrounding areas, and to increase land productivity):
  - Making efficient use of fertilizer both from natural and artificial sources to replace the use of

burning the trees to create fertile fields in the forest for agriculture and to limit the shifting cultivation practice.

- Construction of small dams to enable the production of soybean twice a year on the same field.
- Planting high yielding varieties.
- Implementing no till or reduced till for improving soil structure and fertility.
- Strengthening local structures for controlling the use of practices such as fires which contribute for habitat loss and degradation (community based natural resource management). For example, the local leadership in Gurue are known to have influential power which could help in the mobilisation/awareness raising of local people to avoid bush fires.
- Conducting action research, including participatory technology development and adaptive testing, to add and adopt adequate mitigation measures.
- Avoiding or replacing the practice of slash and burning agriculture by using other economic alternatives, such as selective logging /cutting-of trees for marketing and then using money for buying fertilizers.
- When opening new soybean fields, introducing biological corridors consisting of a stand of continuous native vegetation between singular fields to allow movement of species and to minimize the impact of deforestation.
- Agro-ecological training (including development of agro-ecological manuals and other learning materials), awareness raising and training on “wild-life friendly techniques” for KBAs, and conservation areas.
- In already established soybeans farmland, planting of valuable trees around the edges of the soybean fields to replenish the vegetation (tree) cover.
- Conversion from arable cropping to agroforestry and woodland with native species (Land-use change).
- Dissemination of environmental legislation/standards, in particular the new Ministerial Diploma n°55/2022 on biodiversity offsetting.
- Conducting Action research to evaluate comparative advantages of the “wild-life friendly techniques” including tree based innovations, wild fruit production and bee keeping options versus land-sparing options (use of high yielding varieties) in the areas of rich biodiversity
- Conducting risk-assessment framework to predict effects of the ongoing/proposed mitigation measures on biodiversity.

#### ***Large soybean producers (>100ha)***

145. Large soybean producers use intensive mechanization, fertilization, herbicides for weed control and pesticides for pest control in the process of production of soybean. High fertiliser rates increases the likelihood of pollution and eutrophication in watercourse that may affect birds and mammals numbers. High rates of herbicides and pesticides may negatively affect soil biota levels. Therefore, for large soybean producers (including district and local leadership) the following is recommended to reduce excessive use of agrochemical input (i.e. practices to enhance nitrogen-use efficiency and crop resistance to pest and diseases)

- Use of inoculant for soybean to improve N fixation. For places where soybean has not been growing before, soybeans seeds should be treated with inoculant to introduce the

bradyrhizobia bacteria for nitrogen fixation.

- Use crop varieties adapted to low soil N resulting in lower N<sub>2</sub>O emissions.
- Use precision farming to match inputs and practices to localized conditions within the field. The cost of producing the crop in that area can be reduced and the risk of environmental pollution from agrochemicals applied at levels greater than those required by the crop can be reduced, reducing Green House Gases (GHG) emissions from crop production.
- Conduct routine soil analyses to identify the nutrient demand of the crops, and reduce over-fertilization of crops and needless fertilizer production, which significantly reduces total GHG emissions.
- Use disease resistant crop varieties to reduce amount of application of pesticides.
- Use of IPM, where physical mechanical and chemical methods are optimized for weed and pest control, including biological controls through introduction of natural enemies, such as predators and parasitoids, into a geographic area where do not exist, to limit the use of synthetic and harmful pesticides.
- Use genetically-modified crops (Biotechnology). Herbicide-resistant and pest-resistant crops reduce the number of herbicide/pesticide applications required with positive impact on biodiversity richness and abundance. Nevertheless, genetically-modified crops, before released/used, must be assessed for environment (including gene flow concerns) and food safety according to National biosecurity regulations and relevant bodies.
- Conduct risk-assessment framework to predict (rebound) effects of the ongoing/proposed mitigation measures on biodiversity.

146. Note that, although Small (<10ha) and medium farmers (≥10ha) use limited amount of agrochemicals, it is important to advance some measures to maintain or minimize current amounts of agrochemicals. Hence, the following practices are recommended.

- Use of legumes (cover crops) help fix nitrogen in soils, thus reducing the need for inorganic fertilizer on subsequent crops. They can also provide cover for many farmland bird and insect species.
- Use of inoculant for soybean to improve N fixation.
- Use crop varieties adapted to low soil N resulting in lower N<sub>2</sub>O emissions.
- Use intercropping and crop rotation to reduce the intensity of pest infestations/damage and consequently reduce the demand for pesticides.

#### ***Sugar cane value chain***

##### ***Large producers (>100ha)***

147. Similar to large soybean producers, sugar cane producers are engaged with *intensive* use of mechanization, fertilizers and pesticides, and water in large extension of farmland. For example *Xinavane* Company produces sugar cane in more than 7000 hectares.

148. The nature of the problem of intensive use of mechanization, fertilization, herbicides for weed control and pesticides for pest control in the process of production, has been described above for the large soybean production. The mitigation measures were also already detailed above for soy bean large farmers, with exception of the practice related to the use of inoculant for soybean to improve N fixation, a practice that is recommended for soybean producers.

***Low and high levels scenarios of ambition of commitments to reduce pressures on biodiversity***

149. The recommended sustainable agricultural intensification practices, to address the conversion of natural habitats into cultivated fields and excessive use of agrochemical inputs, are grouped into two action-based scenarios, low and high levels of ambition of engagement of actors in the agricultural sector to reduce their pressures on biodiversity represented in Tables 11 and 12. The scenarios are based on the “Mitigation Hierarchy” sequence: (i) preventive measures for avoiding negative impact on biodiversity; (ii) measures to reduce (minimize) the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity; (iii) measures to rehabilitate/restore as far as possible.
150. The content of the scenarios follow the logic of DSPIR model, and the scenarios are proposed to be implemented sequentially in periods of about four (4) and five (5) years per scenario articulated in such way that higher level ambition scenarios automatically include the actions from the lower ambition scenario(s). The scenarios will serve to stimulate agriculture sector multi stakeholder’s dialogue with focus on these two value chains and will be facilitated by IUCN MADER, MTA and Research Institutions.



**Table 11 Potential voluntary commitments and low level of ambition for biodiversity (2022-20)**

Value Chain+A1:160	Category of Producers	High level of ambition (Y5-Y10) Reduce conversion of forests to cultivated fields by 30% Adopt (80% of the operators' land) efficient soil nutrient management practices and pest and disease control				
		Pressure: Problem addressed	State	Impact	VC-Response	Actors/Region
Soybeans	Small and medium farmers producers	Conversion (deforestation) of natural habitats into cultivated fields through slash and burning shifting cultivation	Deforestation, habitat loss and land cover changes. High degree of threat to plants, herpetofauna, birds and mammals. Potential air and freshwater pollution	Converting or clearing forest for cash-crop agriculture or timber means the loss of ecosystems services such as wild food, water for drinking irrigation, firewood and building materials, along with recycling of wastes into nutrients	Reduce by 10% in 2030 the number of hectares of forest converted to farmland compared to what happened between 2000-2020.	SDAE and NGOs to provide technical support farmers regarding selection, production and dissemination of the technologies including the trees to be used.
					Reduction of the number of hectares of forest converted to farmland	Number of hectares of forest converted to farmland per year
					Avoid or replace the practice of slash and burning agriculture by other alternatives, such as Selective logging /cutting-of trees, using the sell of lumber for buying fertilizers	Increased abandoned agricultural area, with forestry recovering, increased productivity
					Plant and manage vegetation strips and hedges in fields and at field borders;	Number of hectares that used selective logging and fertilizers

[illegible]

[illegible]

# FINAL REPORT || ANALYSIS TO IDENTIFY OPTIONS, OPPORTUNITIES AND CHALLENGES FOR FUTURE COMMITMENTS OF ECONOMIC ACTORS IN FAVOUR OF BIODIVERSITY IN MOZAMBIQUE

			availability of wild sources of food	Introduce <b>genetically modified crops</b> , specially herbicide resistant and pest resistant crops		Reduced use of pesticides and herbicides	Number of hectares with planted herbicide resistant and pest resistant crops
	KBAs and conservation areas are distant from farmlands, but there is potential for farmlands to approach these areas in the future. Weak conservation regulations to discourage expansion of farmland to KBA, and lack of awareness of farmers about conservation regulations, can facilitate the expansion of farmlands to these areas	Threatened Biodiversity on KBA and conservation areas	Decreased benefits to communities of services provided by the forests to communities, decreased economic and recreational value	<b>Add of semi-natural habitats</b> within soybean fields and <b>conduct action research</b> to ensure careful position of this type of conversion in order to achieve full biodiversity potential	The Private sector should promote and support community forestry initiatives implemented by local communities, schools, etc. aiming to raise their awareness to the need for forest resource management and conservation.	Increased area of semi-natural habitat, extended corridor for wild life	Number of hectares reforested within soybean farmlands
				<b>Convert arable cropping</b> to agroforestry and woodland	Private sector should support the establishment of tree nurseries for production of local valuable tree species;		Number of hectares of soybean farmland converted to agroforestry and woodland
				<b>Raise local community awareness of environmental conservation</b> through financing	Promote tree planting campaigns involving local communities.		
							Number of biodiversity conservation projects

[illegible]

							effects of mitigation measures on biodiversity						Ethical, equitable distribution and spiritual concerns are taken into account when conducting permissible activities	Number of appropriate measures adopted	
															Number of operators using adequate mitigation measures as well as risk-assessment framework to predict effects of mitigation measures on biodiversity

### **3.7. Extractive industry – Mining and Oil and Gas sector in Mozambique – a situational analysis**

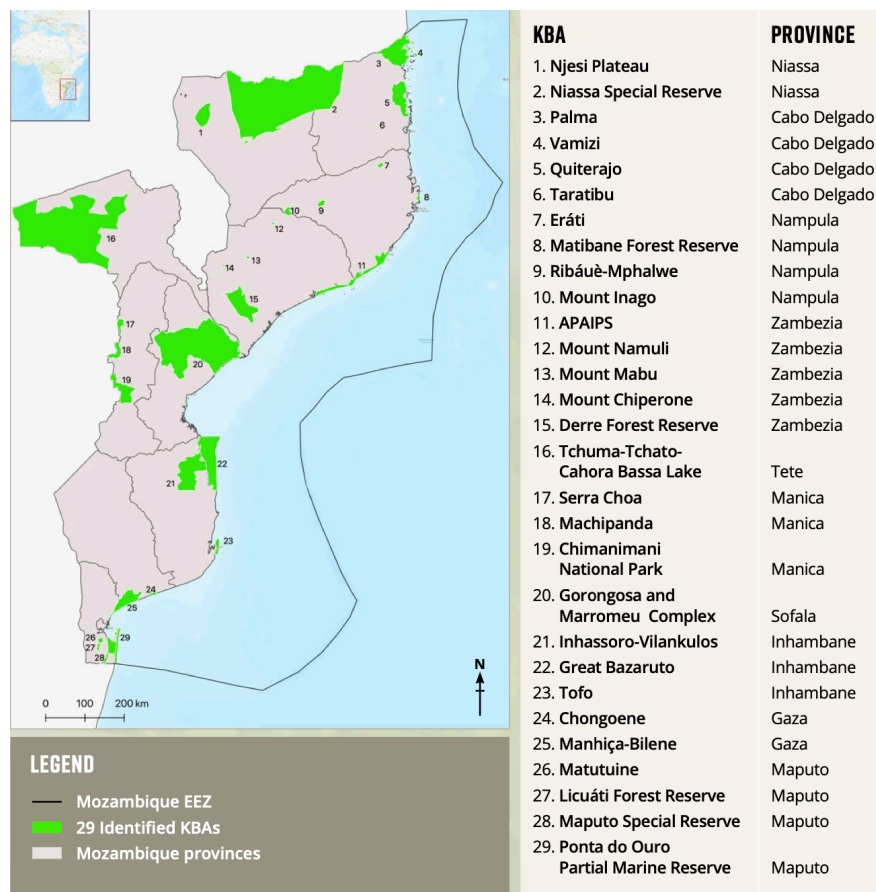
#### **Major Characteristics and challenges**

1. Mozambique is well-endowed with mining and oil and gas resources. In addition to its gas resources estimated to be in excess of 170 trillion cubic feet (Tcf) of recoverable gas in both area 1 and area 4 of the Rovuma basin and a Pande and Temane area in the south, it has large reserves of coal in Tete province, estimated at 3 billion tons, and renewable energy resources that include the potential for 23 terra watts (TW) of solar and 19 Mega Watt (MW) of hydro. At 463 kWh per capita, average electricity consumption is only 15% of the world average. In 2016, 26% of the population had access to electricity, up from a mere 8% in 2006 – Mozambique is targeting 50% by 2023 and 100% by 2030 with most of its generation coming from gas-fired plants.
  2. Mozambique's GDP Growth is expected to be driven by the dynamic extractive industries sector due to the discovery of huge reserves of natural gas in the North of the country, in Cabo Delgado. Despite already playing a significant role in the global production of several minerals, Mozambique's mining sector is still only considered to be at an early stage of development. Its potential is largely untapped, including gold deposits in the provinces of Niassa, Tete, and Manica. Mozambique holds some of the world's largest coal deposits, as well as commercially important deposits of graphite, iron ore, titanium, apatite, marble, bentonite, bauxite, kaolin, copper, and tantalum.
  3. The government has 28 projects with concessionaries, 54% for mining and the remaining for Oil & Gas. Out of the 28 projects, 14 are under production phase; 9 under exploration; 3 being developed towards production; and 2 operational midstream projects (pipelines). The majority being for mining and 14 still under exploration phase.
  4. The sector contributes with 30% to exports, 3.5% to GDP and 6% to tax revenue collected (ITIE, 2019). It is indeed an important source of revenues and foreign currency to the country. The sector contributed with 10 873 registered jobs in 2019 (ITIE, 2019) of which 9 983 in mining and 890 in the Oil and Gas sector in the formal sector. However, it is estimated to have more than 100.000 people informally including seasonal workers. The extraction of gold and gemstones has been serving as an economic buffer, being one of the few activities providing immediate cash income for the poorer Mozambicans. For most of them, mining is a part-time activity undertaken in parallel with subsistence agriculture, being an intimate part of rural societies, traditional village structures and their economies.
  5. Extractive industry activities can power economic growth and development but inherently impact the landscape. The key is to anticipate impacts to prevent, mitigate, offset, and weigh them against development goals. Direct and indirect impacts can result in severe environmental pollution caused by oil residues or spilled oil; the burning of associated gases contributes significantly to the greenhouse effect; the extraction of oil sands requires a lot of resources and far-reaching interventions to the landscape; landscapes and endangered species are affected by seismic surveys and the construction of mines, pipelines, roads, and other infrastructure.
  6. Cumulative impacts of multiple activities and secondary developments from land colonization can create cascading effects from localized impacts. These become greater than a single activity impact when effects of different types of development exacerbate other impacts well beyond the project area. The remedy of which is at the core of moral concerns for more sustainability.
  7. The greatest potential for biodiversity impacts occurs through cumulative effects of multiple projects across different sectors in prospective regions, including indirect impacts from regional development; these are best managed by strategic assessments that consider whole-of-region development in the
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long term. Thus, a regional approach is more likely to attain sustainable results.

8. Unavoidable impacts on biodiversity can be partially compensated for (or ‘offset’) through activities that provide conservation benefits elsewhere. Given the wealth created, there are opportunities for mining and Oil and Gas to leave a positive legacy for biodiversity conservation in the broader region. Oil and gas projects located in Palma (KBA#3 – Key Biodiversity Area) and Inhassoro (KBA#21) are also located in identified KBA’s.



**Figure 12 Key Biodiversity areas in Mozambique**

Source: KBA's Vol. II (2021:8)

### Regulatory biodiversity measures

9. The country has approved three main “umbrella” legal framework to mitigate the environmental risks associated with the exploitation of mining and Oil and Gas resources, namely:
  - a. Decree No. 26/2004 of 20 August 2004 approving the Environmental Regulation for Mining Activities, the purpose of which is to establish rules to prevent, control, mitigate, rehabilitate, and compensate for the adverse effects that mining activity may have on the environment to provide for the sustainable development of mining activity.

- b. Decree 56/2010, of 22 November Environmental Operations, which defines the procedures for the Environmental Impact Assessment Authority.
- c. The Parliamentary Resolution No 13/2016 of 10 August 2016 - with the aim of ensuring environmental quality control through this legal mechanism - was attributed to AQUA

### ***Conditional biodiversity measures***

10. Mining and Oil & Gas projects are usually capital intensive thus requiring large some of funds to develop. Due to the country limited financial resources to develop its natural resources coupled with inherent country risk profile, most of the projects need the intervention of World Bank agencies such as International Finance Corporation (IFC) and/or Multilateral Insurance Guarantee Agency (MIGA) as credit enhancement to allow other technical and financial institutions to participate into the projects.
11. The IFC have eight (8) Performance Standards<sup>4</sup> that clients MUST meet throughout the life of a project funded by the IFC. Performance Standard n°6 (PS6) – Biodiversity Conservation and Sustainable Management of Living Natural resources, which recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and managing living natural resources adequately are fundamental to sustainable development. Those standards were later in 2016 approved by the World Bank group board<sup>5</sup> to be used as a framework – Environmental and social Framework (ESF) applied to all investment policy financing (IBRD/IDA funding) since then, including preparatory works for projects that might later be equity majority participated by private sector (IFC eligible projects).
12. To better coordinate and facilitate the approach on biodiversity guidelines, Multilateral Finance Institutions (MFI) established a platform called “The Multilateral Finance Institutions Working Group on the Environment (MFI-WGE)” composed by various MFI’s, multilateral agencies (UNEP-FI; WHO, UNDP) and bilateral agencies (JICA, AFD) and export credit agencies, to set policy developments at the various member institutions regarding environmental and social safeguards (including biodiversity).
13. Other financial institutions are encouraged to join existing initiatives, such as UNEP FI Biodiversity and Ecosystem Services Work Stream, Principles of Responsible Investment, and Equator Principles, and to address biodiversity in their investment strategies.
14. The following recommendations were elaborated by UNEP FI for financial institutions to address biodiversity and ecosystem services in their investment strategies. Actions for the financial sector as a whole:
  - a. Clarify and make consistent lending and investment requirements.
  - b. Clearly define and articulate the financial risks and opportunities associated with biodiversity and ecosystem services.
  - c. Do not include labour conditions
  - d. World bank has safeguards in natural habitats
  - e. Safeguard for water resource management
  - f. Split into pollution and toxic and hazardous substances

<sup>4</sup> IFC’s Environmental and Social Performance Standards (2012)

<sup>5</sup> Only became effective in October 2018

**Table 13 Benchmark between Financial institutions E&S framework**

ID	Areas	WB	IFC	EBRD	EIB	IADB	AsDB	AfDB	MFI-WGE
1	Risk management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Labor	Yes <sup>a</sup>	Yes	Yes	Yes	Yes <sup>a</sup>	Yes	Yes	Yes
3	Resource efficiency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Community	No	Yes	Yes	Yes	No	Yes	Yes	Yes
5	Land Resettlement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Biodiversity	Yes <sup>b</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes <sup>d</sup>
7	Indigenous people	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Cultural Heritage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Environmental flows</b>	<b>Yes<sup>c</sup></b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>Yes</b>	<b>No</b>

Source: adapted from IfDB integrated safeguard system, Safeguard, and sustainability series (1: Dec 2013)

#### **Enabled biodiversity measures**

- The extractive sector has attracted best practices for supplier chain. Hence, several initiatives aiming to enhance local enterprises management, majority of them small and medium (SME's) and to improve their competitiveness in accessing opportunities offered by the industry, such as Mozambique LNG program supported by Total; the Pronacer program (supported by FAN – Foundation for business environment improvement) to mention a few, have prompted the adoption of best practices among the SME's.

#### **Sectorial biodiversity measures**

- Mining and Oil & Gas sectors have several initiatives towards protecting the environment such as Net Zero by 2050 initiative promoted by the International Council on Mining and Metals; compliance of the euro mines (European organization on metals and mining industry) on the 2030 Development goals set by the UN and own guidelines towards preserving biodiversity; International Petroleum Industry Environmental Conservation Association (IPIECA); OGP (International Association of Oil and Gas Producers); WPC (world Petroleum Council); IGU (International Gas Union), etc all have their own requirements for the members tackling biodiversity sustainability.

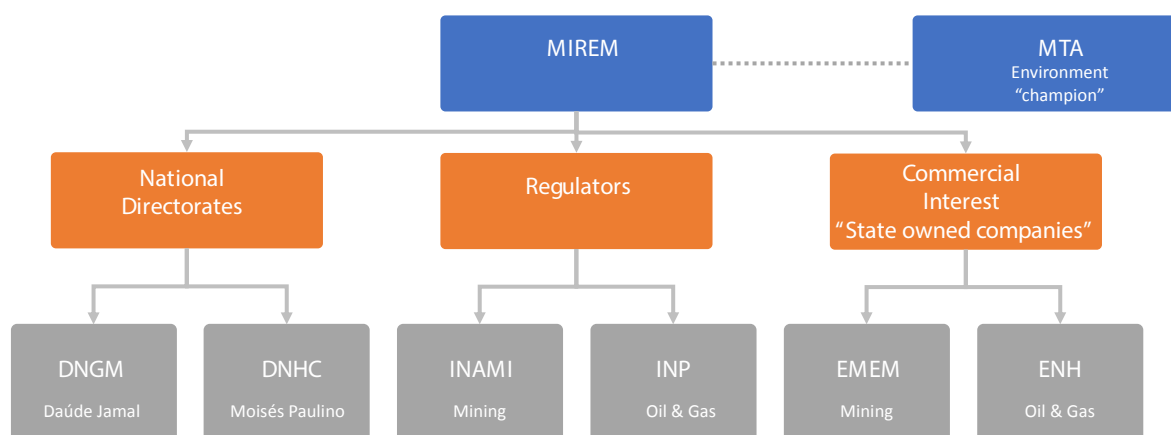
#### **Corporate biodiversity measures**

- International Mining and Oil & Gas companies have their own set of requirements – Health and Safety and environmental safeguards, prone to address offsets preserving company's reputation.
- Local biodiversity measures and Altruistic biodiversity measures as well as enabled biodiversity measures are examples of voluntary commitments opportunities within the mining and Oil & Gas industry due to specific characteristic of this value chains: "Big Players", members of sectorial organizations with clear biodiversity commitments/guidelines; capital intensiveness require involvement of banks who also developed credit criteria to tap biodiversity.
- Those commitments might be needed to address the development of SME's as well as tapping into indirect biodiversity risks linked to resettlement.

### 3.8. Mapping of actors and stakeholders of mining and Oil & Gas sectors

#### *Institutional actors*

20. The Ministry of Mineral Resources and Energy (MIREM) is the government institution overseeing the sector with three regulatory bodies for each, namely: INP (National Institute of Petroleum) - Oil and Gas sector; INAMI (National Institute of Mining) - Mining sector; and ARENE (Energy Regulator Authority) – Energy sector. INAMI promotes environmental quality control actions aimed at conserving and protecting biodiversity and other environmental components, to carry out pilot projects for the development, testing, and application of technologies for mining processing, and to improve and prevent environmental degradation. In the Oil and Gas sector, INP is responsible for ensuring compliance with Emergency and Contingency, Safety and Environmental Protection requirements. Despite having specific regulators controlling the environmental aspects of the projects, the MTA is the government responsible entity for the environment issues.
21. For both mining and Oil & Gas sectors, the state has the right to commercially participate in the projects. Hence, two State owned entities, EMEM and ENH, respectively hold state interest in the mining and Oil & Gas projects under a Carry throughout exploration period. However, EMEM is under a liquidation process. State participation on the mining projects is directly managed by MIREME.



**Figure 13 Institutional Actors.**  
Source: Actors

#### *Private Companies*

##### *Mining*

22. According with ITIE (2019), the country has 15 mining concessions (ITIE, 2019) of which 9 for coal, 4 Heavy Sands, 1 for Iron ore and Graphite all under production phase except the Heavy sands from Chibuto and Quissico which still in exploration phase.

**Table 14 Mining concessions in Mozambique**

	Concessionaries	Project	Project stage
1	Vale Mozambique	Coal Mining in Moatize (Tete)	Production
2	Kenmare Moma Mining, Ltd	Heavy sands mining in Moma (Nampula)	Production
3	Riversdale Moçambique, Lda	Coal Mining in Moatize (Tete)	Production
4	Rio Tinto Zambeze, Lda	Coal Mining in Moatize (Tete)	Production
5	Minas Moatize	Coal Mining in Moatize (Tete)	Production
6	Eta Star Moçambique	Coal Mining in Moatize (Tete)	Production
7	Minas de Revuboé, Ida	Coal Mining in Moatize (Tete)	Production
8	ENRC, Lda	Coal mining in Cahora Bassa and Chitima (Tete)	Production
9	Consórcio Anhui Foreign Economic Construction (Grupo) Co., Lda and Yunnan Xinli Nonferrous Metals Co., Lda	Heavy sands export in Chibuto (Gaza)	Exploration
10	Sol Mineração	Coal mining in Mutarara (Tete)	Production
11	Twigg Exploration & Mining, Lda	Graphite exploration in Balama (Cabo Delgado)	Production
12	Capital resources, Lda	Exploration of iron, titanium, vanadium and limestone in Zobuè Kazula and Moatize (Tete)	Production
13	Sofala Mining (MRG Metals)	Heavy sands in Quissico (Inhambane)	Exploration
14	Highlands African Mining Company, Lda	Heavy sands - Tantalite exploration in Upper Molocue (Zambezia)	Production
15	JSPL, Lda	Coal Mining in Moatize (Tete)	Production

Source: compiled from <https://inami.gov.mz/index.php/projectos>

23. The sector's formal contribution to the economy is currently less than 2% of GDP (ITIE, 2019) but may formally or informally employ some 50,000 people nationally, or 100,000 if seasonal workers and farmers were included. Fiscal revenues are estimated to be about US\$ 3-5 million annually.
24. The depicted table 15 of exports highlights the importance of Coal, Ruby, Graphite and Heavy Sands to the overall export values. Hence, they account to 92% of total export value of USD1, 2billion in 2019.

**Table 15 Mineral production exports, 2019 (values in USD)**

Products			U.M.	Quantities	Amount (USD)
<b>Metallic minerals</b>					
Gold			Kg	211	9 630 462
Tantalite			Ton	115 530	2 888 250
Ilmelite			Ton	872 452	105 566 680
Zircon			Ton	70 689	74 010 860
Rutile			Ton	7 997	5 166 862
				<b>Sub total (1)</b>	<b>197 263 113</b>
<b>Non-Metallic Minerals</b>					
Graphite			Ton	146 793	149 288 481
Diatomite			Ton	330	38 610
Limestone			Ton	1 574	113 335
				<b>Sub total (2)</b>	<b>149 440 426</b>
<b>Precious and Semi-precious stines</b>					
Facetable Grenade			Kg	33 000	528 000
Ruby			Ct	504 123	265 327 790
				<b>Sub total (3)</b>	<b>265 855 790</b>
Coal					
Coal (Coke)			Ton	3 003 670	420 513 772
Coal (burning)			Ton	2 837 494	226 999 544
				<b>Sub total (4)</b>	<b>647 513 316</b>
<b>Total</b>					<b>1 260 072 645</b>
<b>Hydrocarbons</b>					
Natural Gas			Gj	141 413 482	138 585 213
Condesate			Bbl	303 773	10 808 251
				<b>Sub total (1)</b>	<b>149 393 463</b>
<b>Total</b>					<b>149 393 463</b>

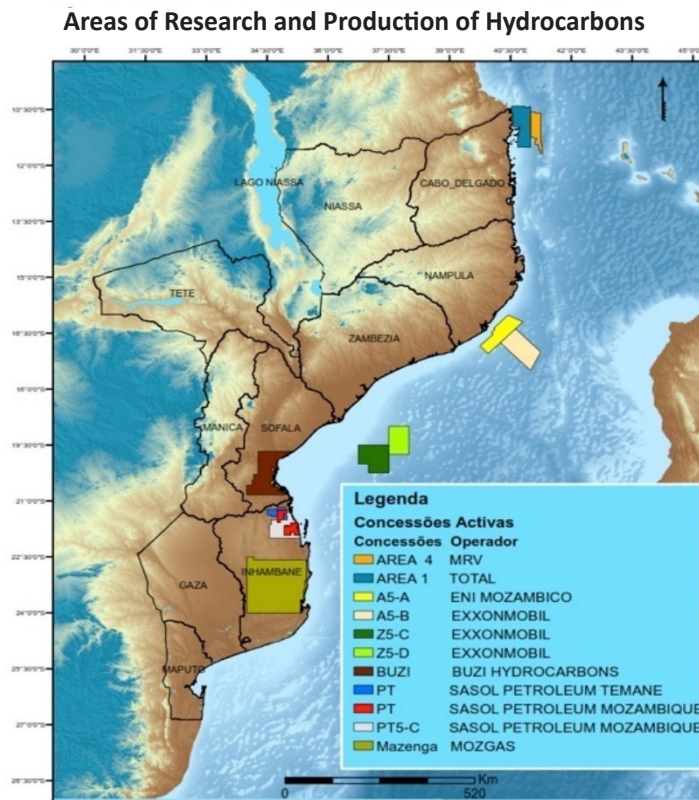
Source: ITIE (2019:92)

## Oil & Gas

25. Mozambique is home to Africa's third largest confirmed reserves of natural gas. Estimated to be to the excess of 160Tcf in the Rovuma Basin alone, Mozambique's natural wealth has attracted the attention of oil supermajors ERNI, ExxonMobil and Total. The scale of the resources dwarfs the country's existing economy. Current GDP is about \$US13 billion whilst LNG projects exports could

reach \$US50 billion in foreign investment. The government expects to earn \$US95 billion in gas revenues over the next 25 years.

26. Although the large oil and gas investments can create opportunities for links to the local economy and can have a remarkable development impact in the country, these investments are not expected in themselves to generate enough direct employment opportunities. Hence, effectively using the resources generated by the gas investments and sustainable exploration as well as providing further linkages upstream, downstream, and through consumption will be critical.
27. There are currently 11 upstream Oil and Gas contracts in Mozambique and 2 midstream (pipelines) contracts. Contracts differ by the legislation used and by the contractual model applied. Thus, two contracts concluded under the Petroleum Law 3/81 of October 3, 1981 are in force, four contracts concluded in the light of the Petroleum Law 3/2001 of 21 February, and 4 contracts concluded in the light of Law 25/2014 of 23 September.



**Figure 14 Existing upstream concession contracts**  
Source: Website from National Petroleum Institute ([www.inp.co.mz](http://www.inp.co.mz))

28. The country currently produces and exports energy from a few smaller natural gas pockets (Pande and Temane fields) in the south of the country (Inhassoro). However, optimism around natural gas production and growth revolves around the timeline for construction and production of the larger deposits in the Rovuma basin area (Areas 1 and 4).



29. The most recent review of natural gas plans projects that gas planned Floating Liquid Natural Gas (FLNG) come online in 2022. However, uncertainty surrounding the so-called terrorist attacks and delays in final investment decisions (FIDs) have thrown the 2024/25 area 1 and area 4 onshore projects timeline into flux.

**Table 16 Existing Oil & Gas concessions and Players**

Projects	Projects description	Project phase
SPT	Pande and Temane Deposit (Inhambane)	Production
SPM	Pande and Temane Block (Inhambane)	Development
EEA/MRV	Area 4 (Cabo Delgado)	Development
AMA 1/TEPMA1	Area 1 (Cabo Delgado)	Development
Buzi Hidricarbons	Buzi block (Sofala)	Exploration
Exxon Mobil	Area A5B Mozambique Basin (Nampula)	Exploration
Exxon Mobil	Area Z5D Mozambique Basin (Nampula)	Exploration
Exxon Mobil	Area Z5C Mozambique Basin (Nampula)	Exploration
Sasol Petro Moz	Mozambique Basin PT5 - C Area (Inhambane)	Exploration
Sasol petroleum Sofala	Block 16&19 (Inhambane)	Exploration
ENI Mozambico	Area A5A Mozambique Basin (Nampula)	Exploration
ROMPCO	Pipeline from Temane (Inhambane) to Secunda (RSA)	Operational
MGC	Pipeline from Ressano Garcia to Matola	Operational

Source: compiled from <http://www.inp.gov.mz/pt/Pesquisa-producao/Concessoes-em-vigor>

30. The government has launched the 6<sup>th</sup> international licencing round for the concession of areas for oil and gas exploration and production in the country, with 16 new blocks identified for the purpose. Five of these blocks are in the offshore Rovuma Basin; seven in Angoche; two in the Zambezi Delta; and two in Save. (<https://mozambique6thround.com>)

*Non-Governmental agencies – civil society organization (CSO)*

31. The Mozambican civil society is still characterized by many informal organizations. While no up-to-date official data are available, the number of CSOs in Mozambique is thought to be around 10,000 (Civil Society Sustainability Index for Mozambique, 2019). The largest proportion of organizations engage in education, health care, social development, governance, and public policy.
32. Although the vast number of CSO, some have, in the last years, been involved in mining and Oil & Gas projects with relatively more intensity than others. This has been confirmed by local authorities in Moma and Vilankulo during our interviews.

**Actors in the value chain and their business models and practices**

33. This is the “entry gate” for the second section. It describes both Kenmare and Sasol business and operational model as well as project stage and commercial structure aiming to elucidate and highlight possible factors (internal and/or external) contributing to reduction of pressure. The section also provides a glimpse overview of best practices in mining and oil & gas towards biodiversity safeguarding.

**Selection of value chains**

34. The selection process followed a simple approach, described below:

- (i) identifying where the project is located and based on the existing and potential KBA's excluding the ones which are not in the KBA's;
- (ii) it's considered to highly impacting biodiversity as they are located in the KBA's (potential or existing);
- (iii) classifying the projects, i.e., indicating whether the project is relevant or not based on objective indicators such as impact on GDP (for Oil and Gas projects this come along with estimated reserves. The higher the reserves the higher the impact or potential impact on the GDP regardless the fiscal regime);
- (iv) excluding projects that are under exploration phase (it's not part of this report scope of work).

**Table 18 Site selection criteria's**

Projects		Project Location	Project phase			
ID	Projects	Project Location	KBA zone (Yes/No)	Potential Impact biodiversity	Economic Relevance	Project Status
1	SPT	Pande and Temane Deposit (Inhambane)	Yes	High	Medium	Production
2	SPM	Pande and Temane Block (Inhambane)	Yes	High	Medium	Development
3	EEA/MRV	Area 4 (Cabo Delgado)	Yes	High	High	Exploration/Development
4	AMA 1/TEPMA1	Area 1 (Cabo Delgado)	Yes	High	High	Development
5	Buzi Hidricarbons	Buzi block (Sofala)	No	Low	Medium	Exploration
6	Exxon Mobil	Area ASB Mozambique Basin (Nampula)	No	Low	TBE	Exploration
7	Exxon Mobil	Area ZSD Mozambique Basin (Nampula)	No	Low	TBE	Exploration
8	Exxon Mobil	Area ZSC Mozambique Basin (Nampula)	No	Low	TBE	Exploration
9	Sasol Petro Moz	Mozambique Basin PT5 - C Area (Inhambane)	No	Low	TBE	Exploration
10	Sasol petroleum Sofala	Block 16&19 (Inhambane)	Yes	High	TBE	Exploration
11	ENI Mozambico	Area ASA Mozambique Basin (Nampula)	No	Low	TBE	Exploration
12	ROMPCO	Pipeline from Temane (Inhambane) to Secunda (RSA)	No	Low	Medium	Operational
13	MGC	Pipeline from Ressano Garcia to Matola	No	Low	Medium	Operational

Source: Adapted by the author

35. Based on the above table, the following projects fall under the "eligibility" criteria's: Pande and Temane projects (PSA and PPA); Area 4 FLNG project; Area 1 Onshore; and Block 16/19 as they are all located in potential KBA's or in the vicinities therefore having high potential impact on biodiversity; have had their projects approved by the government so are in development phase or production.
36. Nevertheless, due to current terrorist attack which halts the ability to conduct focus group discussions on project sites, it is suggested to withdraw all Rovuma projects. Hence remaining projects related to Sasol developments namely PSA (SPM) and PPA (SPT) as well as Block 16/19. Between the three only SPM is under development phase therefore should be the one being used as the project selected for further analysis.
37. All mining projects are outside the KBA'or potential KBA's as per KBA's (2021), although having substantial potential impact on biodiversity. Hence, economic criteria and convenience weighed the most selecting the site. Therefore, Kenmare Heavy sand project due to the convenience and possibility to get enough information for the study was the one selected despite having other two mining activities with higher economic contribution to the GDP (Vale and Ruby mining). Vale, the coal project sponsor, is under a M&A process and initial contacts led to understand that they have other priorities at this stage. The Ruby mining project is in Montepuez, Cabo Delgado province which for the same reason alluded for the Rovuma projects it's proposed to be excluded.

**Actor (Value chain) 1: Kenmare**

38. Kenmare is an established mining company that operates the Moma Titanium Minerals Mine on the northeast coast of Mozambique. They are one of the world's largest producers of mineral sands products, key raw materials ultimately consumed in everyday quality-of-life items such as paints, plastics, and ceramic tiles. Mining process is mainly using dredges that float in artificial ponds, removing 3-5% of material mined, and separate it into its constituent minerals. The company then progressively rehabilitates the mined land before it is handed back to the local community. Once the minerals are separated, they transport the final products to ocean-going vessels from port facility. The company is known to be the most transparent in the extractive sector (Extractive Industry Transparency index: 2021) providing information regarding operations, revenues and environmental related metrics.
39. The Moma Project involves deposits containing the titanium minerals, ilmenite and rutile and the zirconium mineral, zircon located on the coast of north-eastern Mozambique. These deposits are held under licence issued by the Government of Mozambique covering an area of 43,867 hectares. Kenmare Moma Mining Limited, a fully owned subsidiary of Kenmare, holds sole title to develop and mine.
40. Kenmare's involvement in the Moma Project began in the 1980s with a medium-sized deposit at Congolone. Subsequent drilling has greatly expanded the known mineralisation such that it now covers 3 coastal mineralised zones: Moma (comprising the Namalope and Tupuito/Tebani deposits), the Congolone deposit and the Quinga area. Kenmare's original exploration drilling was on the Congolone zone and resulted in a Proved Reserve of 167 million tonnes of ore (3.3% heavy minerals) which contains a recoverable 4 million tonnes of ilmenite. From 1993 to 1999, BHP participated in the development of the Moma Project as a joint venture partner, during which period BHP expenditure of approximately US\$10 million and grid drilling of over 10,000 metres identified new deposits of heavy minerals at Moma, 80km to the south of Congolone. Following an internal restructuring undertaken by BHP, which included their exit from the titanium minerals industry, the joint venture arrangement was dissolved in April 1999 without any ceding of equity interest to BHP.
41. Total Mineral Resources, of Measured and Indicated categorisation, in the Moma Project area are 1.1 billion tonnes of ore, containing 34.9 million tonnes of ilmenite. As set out in the Definitive Feasibility Study completed by GRD Minproc Limited, the Namalope/Tupuito zone includes a Proved and Probable Reserve of 407 million tonnes of ore grading 4.33% THM (3.5% ilmenite) containing 14.4 million tonnes of ilmenite, 0.41 million tonnes of rutile, and 0.86 million tonnes of zircon. This Proved and Probable Reserve (of which 256.5 million tonnes of ore is Proved and 151 million tonnes of ore is Probable), which is a sub-set of the Measured and Indicated Resources has been used for the purposes of the Moma mine and production plan.

**Project Implementation**

42. The Moma Project entails the dredge mining of titanium-bearing sands, the production of Heavy Mineral Concentrate (HMC) in a floating concentrator plant (wet concentrator plant - WCP) and the pumping of the HMC to a mineral separation plant for separation (magnetic, gravity and electrostatic separation) into final products. These products will then be stored at the mine and conveyed to the coast for exportation via a custom-built barge trough a transshipment vessel to offshore bulk carriers.
  43. Infrastructure development included design and construction of power lines and a power station and construction of storage facilities, the product conveyor, jetty and barge, improvement of access roads and an accommodation village erected.
  44. An environmental impact assessment on the Moma Project was conducted in 2001 and, concluded inter alia, that the ecological issues arising from the Moma Project did not represent a fatal flaw to
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its operation. This assessment has been accepted by the Government of Mozambique.

45. An environmental management plan is in place to manage and/or mitigate against certain environmental and social impacts of the Moma Project.

### **Mining regime**

46. Mining at Moma will be governed by the terms of a Mineral Licensing Agreement covering an initial period of 25 years of mining and renewable thereafter.
47. A further key agreement with the Government of Mozambique in relation to Moma is the Implementation Agreement which governs the operation of an Industrial Free Zone covering the processing and exporting aspects of the Moma Project and ensuring favourable tax treatment.

### **Marketing Plan**

48. The Moma Project produces approximately 625,000 tonnes per annum of ilmenite. Kenmare has off-take agreements with number of major pigment producers. The contracts have fixed term (from commencement of production) and fixed price off-take contracts for a substantial part of its ilmenite product.
49. Rutile and zircon production of approximately 12,500 tonnes per annum and 24,000 tonnes per annum respectively are also sold under contract.

### **Investment and Financing Plan**

50. The total development costs of the Moma Project, including capital costs, escalation, working capital, initial operating deficit, interest during construction and other financing fees and expenses, were financed with a combination of third-party senior and subordinated debt, and equity subscription by Shareholders (existing and new). Considering Kenmare's contributions to date to project implementation, such as the purchase of the Mineral Separation Plant (MSP) and Mineral Concentration Plant (MCP) on very competitive terms, the Directors currently estimate that the cost of project implementation is up to US\$255 million.

### **Actor (Value chain) 2: Sasol**

51. Sasol is a South African Energy conglomerate acting in coal, gas and refinery business. In Mozambique they got a concession in 2000 for their first block Pande and Temane through two contracts: a Petroleum Production Agreement (PPA) and a Profit-Sharing Agreement (PSA).
52. The project is therefore integrated. It includes the production and processing – upstream; the transport of gas to Secunda (South Africa) and Maputo (Mozambique) – Midstream; and sale of gas in South Africa and Mozambique – downstream.
53. The upstream and central processing facility are owned by Sasol in 70% and ENH initially had 30% subsequently diluted for equity raising purposes in favour of IFC (5%) and the remaining 25% is managed through its subsidiary – CMH. The midstream (pipeline) has Sasol with 50% and Igas and CMG with both 25% each. Last year Sasol decided to sell 50% of its participation to the other shareholders (equally). Total Upstream investment was deemed to be circa USD1,2 billion; Pipeline costed USD2 billion.
54. Sasol value chains encompass the entire project life cycle with emphasis to current stage – production. Hence, during exploration phase, Sasol main activities were related to G&G (drilling, seismic, to mention a few) and debushing which triggered the need to have discussions with local communities to explain about the project and possible development scenarios. This is the phase where the company spent the majority of the time accessing the BSE baseline.

55. Development phase is the period where the company concentrates lot of its energy building infrastructure and evaluating several development options. As such, during that period is when resettlement plan must be agreed and implemented. Also, all infrastructure must be preceded by a thorough EISHA.
56. The development of infrastructure is usually a reason for grievances between the operator and affected community. For Sasol project, these grievances remain until today as described by the Pambara 4 community when interviewed:

“We have witnessed the inauguration of the CTM (Central Termica de Temane) construction inception. We expect that this time around we will also be considered as we still using charcoal for cooking and petrol for illumination despite the gas being exported under our nose to other countries. We don’t benefit from the development of gas project in Mozambique”.

### **3.9. External and internal factors and practices of the actors (public and private institutions and companies) favourable to the reduction of pressure and their commitments in favour of biodiversity**

#### **Kenmare heavy sands project**

57. To better understand the pressures, below is the described Kenmare’s production cycle

#### **Phase 1: Mining**

- a. Dredging: Dredging takes place in three artificial ponds, where four dredges feed three Wet Concentrator Plants (WCP) (A, B and C). The dredges cut into the ore at the pond’s base, causing the mineralised sand to slump into the pond where it is pumped to a WCP. Kenmare also has three dry mining operations to supplement ore feed to WCP A and WCP B.
- b. Wet Concentration Plant: The first processing stage at the WCPs consists of rejecting oversize material. Next, the ore feed is passed over progressive stages of gravity spirals, which separate the Heavy Mineral Concentrate (HMC) from tailings (silica sand and clay).
- c. Dune Rehabilitation: Tailings are deposited into a series of settling ponds, dried and re-contoured, with the previously removed topsoil redeposited. Rehabilitation is completed by planting a variety of vegetation as well as food crops. The area is then transferred back to the local communities.
- d. Heavy mineral concentrate: HMC is pumped to the Mineral Separation Plant (MSP), where it is stockpiled prior to further processing. HMC consists of valuable heavy minerals (ilmenite, rutile, zircon and monazite, which is sold as part of our concentrates product stream), other heavy minerals and a small amount of other minerals (the bulk of which is silica sand).

#### **Phase 2: Processing**

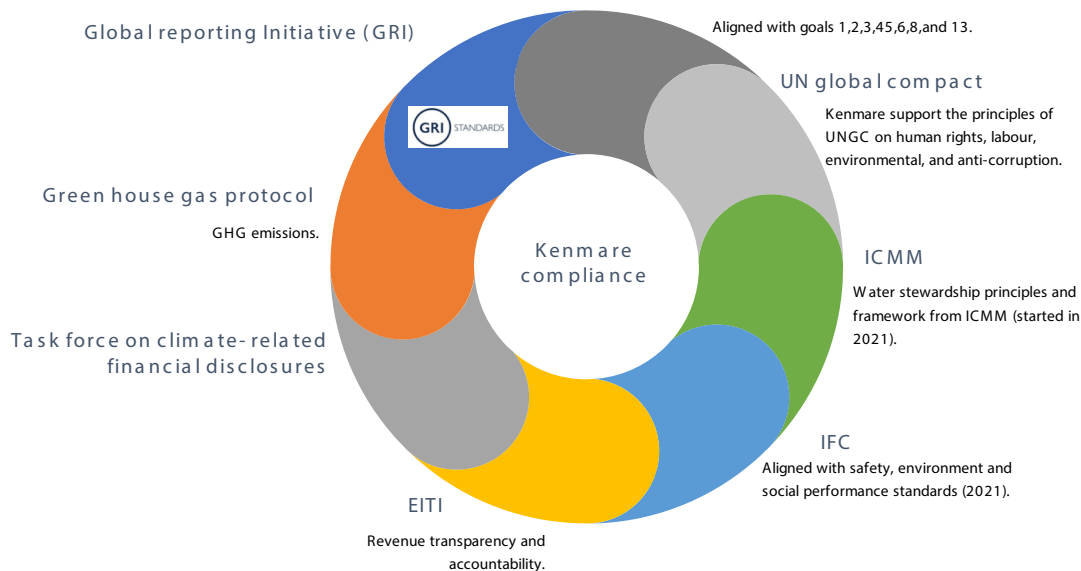
- a. Wet High Intensity Magnetic Separation: HMC is transferred from stockpiles by front-end loaders and fed to the Wet High Intensity Magnetic Separation (WHIMS) plant to separate magnetic from non- magnetic fractions.
  - b. Magnetic Gravity and electrostatic separation: The MSP use magnetic, gravity and electrostatic circuits to separate the valuable minerals of ilmenite, rutile, zircon and monazite into individual products. The magnetic fraction of WHIMS output is dried and processed by electrostatic separation to produce ilmenite products. The non-magnetic fraction
-

### Phase 3: Storage and export

- a. Product storage warehouse: Ilmenite and rutile are stored in a 185,000-tonne capacity warehouse, which also contains an enclosed area to store the mineral sands concentrate product (containing monazite). Zircon is stored in a separate 35,000 tonne capacity warehouse to reduce the potential for cross- contamination. The warehouses load the products onto a 2.4 km- long overland conveyor.
- b. Conveyor and jetty: The conveyor transports product to the end of a 400-metre-long jetty, where product is loaded onto transshipment vessels, at a rate of 850 tonnes per hour. Kenmare owns and operates two transshipment vessels, the Bronagh J and the Peg.
- c. Ocean-going bulk carrier: The vessels transport the products to a deep-water transshipment point 10 km offshore, where they self- discharge into customer bulk carrier vessels. These vessels then transport the final products to multiple destinations around the world.

### Enabling infrastructure:

58. Other infrastructure on site includes a 170km 110kV power transmission line, a sub-station, a leased 9.6 MW diesel generator plant, an accommodation village, offices, a laboratory, an airstrip, water supply and sewage treatment plants.
59. Kenmare's commitment can be resumed to be compliant to the following standards and principles:



**Figure 15 Kenmare's compliance. Source: adapted from Kenmare sustainability report (2021)**

60. Kenmare adopt, develop, and promote good environmental practices across the business in line with the environmental laws and standards of Mozambique, and IFC Performance Guidelines (2012) in a manner appropriate to their operations. Kenmare's environmental policy outlines the Company's environmental management objectives including:



- a. Compliance with applicable environmental legislative requirements guided by good industry standards;
- b. Striving to form partnerships with host communities and stakeholders, promoting environmental awareness and participating in the preservation of their environment, traditions, and values through regular community consultation;
- c. Protecting and conserving biodiversity and sensitive environmental elements by reducing environmental impacts from mining activities.

#### Guiding principles for environmental management – EMS - (NOSA and ISO 14001)

61. The principles of pollution prevention, the precautionary principle, compliance with legal and adopted obligations, and continuous improvement are integrated into planning, management systems and daily activities. Environmental Management System (EMS) provides comprehensive guidance for all personnel on the way the company undertake the work and the processes in place to protect the environment, and is underpinned by:
  - o Conducting regular performance reviews and legal compliance audits, and acting upon the results to ensure compliance with national laws and Company policy;
  - o The provision of adequate resources, staff, and training so that employees at all levels recognise and are able to fulfil their responsibilities
  - o Developing, maintaining, and testing emergency procedures in conjunction with relevant authorities.
62. The EMS sets out the detailed processes for the identification of environmental risks and implementation of action plans to mitigate the impacts of activities. This involves monitoring to verify that applicable standards are observed, and where deviations are encountered, ensuring reporting and mitigation take place promptly. Senior management regularly report to the Sustainability Committee and the Board on the status of compliance with environmental and social obligations, with the aim of ensuring that the EMS is properly implemented and maintained.
63. External assurance schemes add value to operations by verifying continued adherence to best practice. **In 2021, Kenmare were audited by two separate external bodies: EIA Services and the NOSA, a South African-based external risk management company. The EIA Services audit focuses on Kenmare's environmental practices to comply with the EMP and found no reportable incidents and overall significant improvement in environmental management on-site compared to previous years. The report also identified areas for further improvement included better segregation of waste in operational areas; further reduction of hydrocarbon contaminated soils for bioremediation; optimisation of potable water and sewage treatment plants to reduce Mozambican legislation exceedances; and better community liaison to reduce fires within rehabilitated areas.**
64. The NOSA audit saw the Moma Mine retain its five-star status, the highest level, for the sixth consecutive year and the "NOSCAR" certification. In 2021, there were no reportable incidents; however, the Mine did have one loss of control incident relating to a redundant radioactive object, which was deemed to present no environmental or safety risk.

#### Climate change

65. In 2021, Kenmare's Board approved the Company's ambition to **achieve Net Zero** on its Scope 1 and 2 emissions **by 2040**, which they intend to achieve through decarbonisation of operations and offsetting hard to abate residual emissions.



66. Kenmare has also reported in alignment with TCFD's recommendations, and full disclosures are captured in their Climate Strategy Report, developed with oversight from the Board. The Board delegates accountability for decarbonisation and climate risk mitigation to the Executive Committee via appropriate Sustainability/ESG targets, which incentivise performance through remuneration linked KPIs.

## GHG EMISSIONS

67. Kenmare's Scope 1 and 2 emissions for 2021 were 70,437 tCO<sub>2</sub>e, which represented a 18% increase (2020: 59,521 tCO<sub>2</sub>e) largely due to increased diesel consumption associated with higher production and additional reporting of fugitive emissions associated with refrigerant and air conditioning gases as well as petrol and LPG. Diesel consumption was 9% higher in 2021 at 24 million litres of diesel (2020: 22 million litres of diesel) largely due to higher consumption by the MSP delivering a 46% increase in finished products compared to 2020. Carbon intensity, at 0.057 tCO<sub>2</sub>e per tonne of mined product reduced by 20%, demonstrating some efficiencies in the emissions intensity of operations. (Kenmare sustainability report:2021)
68. The company have begun accounting for Scope 3 emissions and currently report against the six categories of: Purchased Goods and Services, Business Travel, Employee Commuting, Upstream and Downstream Transportation, and waste disposal. However, the most significant category of Scope 3 emissions will be from the processing of products downstream, which will begin to be measured this year (2022). In 2021, the Scope 3 emissions were 104,203 tCO<sub>2</sub>e, which compared to 76,903 tCO<sub>2</sub>e in 2020. The increase was due to higher emissions from upstream and downstream transportation, reflecting the higher volumes of product shipped in 2021. (Kenmare Sustainability report:2021)
69. The company made progress on the Rotary Uninterruptable Power Supply (RUPS) and Net Present Value (NPV) positive project delivering security of energy to mineral separation plant as well as associated diesel and carbon emissions savings. RUPS will be commissioned in the first half of 2022. Its full benefit in terms of emissions saving is during the period of December to March each year; therefore, the first full calendar year of emissions savings will be delivered in 2023.
70. When Kenmare considered the development of the RUPS project in 2020, it was anticipated to deliver a 15% reduction in diesel and associated emissions. The fundamentals of the RUPS project have not changed; however, since Kenmare initiated this project, the production profile and associated diesel consumption has grown and therefore the contribution of RUPS to reducing emissions will be 12%, delivered by 2024. Achieving an overall emissions reduction will, however, be dependent on reliable supply of energy by EDM outside of the rainy season.
71. In addition to measures in favour of biodiversity outlined above, Kenmare's financial funding scheme, the original and restructured occurred in 2019, included financial institutions which implement the equator principles biodiversity standards in their credit process. Hence, the company has also to report to the financial institutions regarding their status as per the IFC Standards.

## Oil & Gas sector

### Sasol Project

72. Sasol is a South African Energy conglomerate acting in coal, gas and refinery business. In Mozambique they got a concession in 2000 for their first block Pande and Temane trough two contracts: a Petroleum Production Agreement (PPA) and a Profit-Sharing Agreement (PSA).
73. To develop the PPA, Sasol had to build 865km pipeline form the gas fields to Secunda (sasol petrochemical plant) to make the project feasible. Therefore, Sasol was the producer and the buyer of the gas.

74. PPA development included upstream development (gas fields), the gathering lines and a construction of a central processing facility (CPF). Total investment amounted circa USD1,2 billion and was funded by a multiple set of financiers including IFC.
75. Sasol with 70% interest, develops the project with government commercial entity ENH (30%) who sold 5% to IFC (with a buy back option) to exercise its participation interest.
76. The pipeline is operated by Sasol, now with 25% and having ENH and South African governmental entity I-Gas both with 37,5% as partners. The project has an approximate investment value of USD2 billion.
77. Commercial commissioning date was 2004 and the project has now 18 years of production.
78. The PSA was in place to increase availability of gas from PPA ensuring project feasibility. Today, the PSA is being used to develop a gas-to-power project – “Central termica de Temane” (CTA project), a 450MW developed by Sasol and Moz Power Invest (MPI – EDM, Globeleq and EleQtra). It is a USD760 million project funded by the US International Development Finance Corporation (DFC), OPEC fund for International Development (OFID), IFC, World Bank, Norwegian development fund, AfDB, and the Islamic Development Bank.
79. The wet gas is gathered through in-field flowlines to the Central Processing Facility for cleaning by removing liquids. The liquid generated is collected and put through a three-phase separator, which yields three products (gas, water, and hydrocarbon condensate). The gas that cannot be incorporated back into the processing system or used as fuel gas in the process because it is at a high pressure **is flared, while the water produced is re-injected in the gas fields**. The hydrocarbon condensate is used as a fuel and as an additive during refining of crude oil and sold at the CPF to customers in both countries.
80. The project has been covered by detailed Environmental and Social Impact Assessments (ESIA) for each of its components. Mark Wood Consultants (South Africa) and Impacto (Mozambique) were the team of international experts assigned to carry out specialist studies. All studies were prepared in accordance with the requirements of the Mozambican and South African environmental regulations, and in conformity with international practice and requirements of financial institutions.
81. Environmental impact study considered the following:

**a. Negative impacts**

The negative impacts can be divided into construction and operational impacts of the CPF and the pipeline. Though there were several negative impacts, most of them were LOW to NO significance after mitigation. The proposed river and wetland crossings were all considered acceptable in principle, subject to the implementation of a series of specific management requirements during construction of each crossing. Despite some negative impacts, the expectation of a positive outcome was high. The local community places emphasised on the potential for the project to contribute to development in terms of access to employment, opening of access roads, building of infrastructure, supporting local business and possibly leading to new business opportunities.

The pipeline traversed soils over much of the route that were moderately to highly susceptible to erosion.

Temporary habitat loss during construction were meant to be 0.02 percent with one exception in the first 80km of the route from Ressano Garcia, where the loss could represent 0.18%. The significance of direct habitat loss was considered low because the areas were small in relation to the total area of similar available habitat and most of the transformation was not permanent.

There were, however, significant issues related to sensitive and threatened plant communities that warrant particular attention in the final routing of the pipeline and the management plan. This species

was not threatened plans, but it was an important commercial hardwood in Mozambique and was under local pressure because of harvesting for roofing timber and other purposes. Nonetheless, the direct impact was minimized by small adjustments to the route of the pipeline.

In this regard, Sasol offered to assist the government to improve capacity to manage and monitor hardwood harvesting near the pipeline. Impact on the hydro-dynamics of these systems is possible if the natural sequence of the soils in the pipeline trench is inverted. Careful management of soils and their replacement in the trench can avoid this problem. The risk of pipeline construction to animal species was generally negligible.

**b. Positive Impacts**

The seismic exploration and the pipeline construction were carried out in accordance with international standards and in cooperation with the national office for landmine clearing in Mozambique. The construction work was conducted during the dry season when ephemeral wetlands and pans are most likely to be dry or can be crossed. Water wells were drilled to provide water supply to personnel and following the completion of the seismic and pipeline operations, the wells were equipped with hand pumps and left for use by local inhabitants.

Most of the local socio-economic effects of the project resulted from the **direct impacts** of jobs available during the construction period estimated to have been around 400 workers. Wages earned will strengthened food security for the families of the workers for that period. **Induced impacts**, caused by local spending of income earned directly or indirectly from the project improved the low levels of economic activities in the areas affected. Some goods and services required by the construction were supplied locally notwithstanding the low levels of commercial activity in the affected area. Local entrepreneurs supplied agricultural products and accommodated visitors.

**c. Mitigation Measures**

The most significant mitigating measure has involved rerouting the pipeline where warranted to compromise between environmental, cost and engineering requirements. The risk to threatened plants and animal species, as well as archeological sites, have been avoided by slight adjustments to the route. Issues that are construction-related were addressed by incorporating systematic, comprehensive environmental management practices during the design, tendering, construction, and post-construction phases of the project. An environmental officer was stationed on site for the duration of the construction contract to monitor the compliance of the contractor with the EMP. Overall, with necessary management, all potential risks associated with the project were minimized to levels acceptable by international standards.

**d. Environmental risk management**

The pipe design, routing and construction complied with internationally accepted practice to make use of leading-edge international knowledge and lessons learned and to reduce risks. An impressed current cathodic protection system (CP) was installed to protect pipeline and underground piping systems against internal and external corrosion that would lead to rupture.

Emergency shutdown valves and statutory valve stations were installed along the pipeline, based on risk assessment studies carried out as part of the ESIA. To safeguard the public, employee, and the environment against injury or damage after commissioning of the pipeline, a comprehensive program based on international and South African experience were implemented.

An Abandonment Plan for submission to the regulatory authorities, at least three years ahead of abandonment, had been prepared. The Environmental Management Plan had also provided for risk management programs in the form of various training and awareness programs, emergency preparedness, and environmental accident management. The probability of gas leak is small and ecological risks associated with the failure of the pipeline during operation were considered negligible.

**e. Environmental and social management and monitoring plan**

Environmental Management Plans (EMP) was developed for all project components to ensure that the environmental controls, intended to minimize the negative and enhance the positive out-comes of a project, are implemented at each stage of its development.

The Construction EMPs also contained requirements for compliance **monitoring of the performance of the contractors**. The Commissioning and Operational EMPs provided the tools for managing the operating impacts of specific project components. The plans each deal with individual elements of the plant (e.g.: air pollution management, liquid effluent management, hazardous waste management) and are implemented within the framework of an Environmental Management System such as ISO 14001.

**f. Public consultations**

The broad objective of the Public Involvement Process (PIP) was to provide authorities, as well as interested and affected parties (IAPs) with the opportunity to identify issues, concerns, and opportunities regarding the proposed Natural Gas Project. To ensure that all IAPs were properly informed and consulted, an exhaustive process of public consultation and participation was followed. Documentation on the project and its impact was made available for public perusal and comments at appropriate venues, such as town halls, public libraries, local authority buildings and Sasol offices. This process was supported by public meetings, which were advertised in the local media to ensure a wide attendance base. Concerns raised both at these meetings and written responses to the project documentation, as well as information arising out of this process were used to prepare the final ESIA's. The process has been in accordance with the regulations on ESIA procedures for both countries.

**g. Resettlement and Compensation**

A Resettlement and Compensation Plan (RCP) was established, based on World Bank guidelines, Mozambican and South African law and procedures, and precedents established for other projects in Mozambique and South Africa. The procedure incorporated objective assessment (pre-resettlement and/or compensation investigation and analysis to determine the nature of each case), community-based decisions (consultation with affected person and communities, and post-disruption support (post-resettlement and/or compensation support to ensure sustainability of actions taken). Post-resettlement and/or compensation support to ensure that the actions taken were sustainable was part of the procedure. Such actions included social investment measures and ongoing monitoring and evaluation of the resettlement and/or compensation process.

An estimated 57 rural dwellings were within the 30m wide construction zone where resettlement was required. Most of the affected dwellings were avoided by minor adjustment of the route during detailed planning. Resettlement was undertaken where the affected land use was within the 30m-construction area.

Compensation was paid as result of loss of crops/income-earning potential. The affected party, the tribal authority, the administrative authority, and Sasol determined the damage caused and the value of the loss. This was carried out in accordance with the established resettlement and damage compensation procedure and agreed formulae and price. Resettlement and compensation decisions were made in consultation with community representatives after considering the compensation requirements as identified. Cash compensation, replacement of lost property (including land, livestock and accommodation) and support such as crop starter packages and food support were components of compensation packages. **The success and effectiveness of the implementation of the compensation procedures depended to a considerable degree on the effectiveness of the communication between the project companies, local chiefs, government authorities, project's contractors and involved individuals.**

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82. Sasol reports in accordance with the Global Reporting Initiative (GRI) Standards and can be referenced to Sasol GRI Index. They have also applied the advanced level reporting criteria of the United Nations (UN) Global Compact, meeting 21 advanced criteria.
83. The company apply best in practice global reporting frameworks and continuously evaluate the applicability of other reporting standards. Their evaluation indicates that GRI, Task Force on Climate-related Financial Disclosure (TCFD) and UN Global Compact reporting criteria covers the spectrum of reporting needs. The company also respond to CDP and their submissions are available at [www.sasol.com](http://www.sasol.com).
84. Consistent with Kenmare SHE Policy, they have a custodial responsibility to respect and care for the environment, which includes addressing land and biodiversity matters. Their activities have the potential to result in various biodiversity impacts including:
  - a. Reduction or deterioration in virgin land size;
  - b. Impacts on plants and terrestrial animals; and
  - c. Deterioration of the quality and quantity of river and groundwater.

#### ***Actors interest, motivations, and appetites***

##### Mining and Oil & Gas companies

85. **For companies**, it is no longer enough to see themselves as purely economic actors. Rather, they must learn to assume their new role as active corporate citizens, by engaging in political rule-making processes and constructive public discourse. Sustainability on a global scale requires the companies to understand themselves not simply as rule-takers, but as rule-makers, too. As corporate citizens, they undertake “order responsibility”<sup>6</sup>: they participate in the design of the institutional framework for markets and actively promote binding arrangements that are conducive to value creation.
86. **For civil society organizations**, are ideally suited for undertaking order responsibility and thus to participate in rule-finding discourse and rule-setting processes. As representatives of public concerns, civil society organizations can help companies to orientate their voluntary commitments and provide them with credibility.
87. **For state agencies**, it is no longer enough to limit themselves to first-order regulatory politics. They are faced with the challenge of improving this traditional (self-) understanding. They must learn that governance by law is not necessarily in conflict with New Governance forms of voluntary commitments. In fact, both mechanisms may complement each other. Therefore, state agencies should take care to create an “enabling environment” that invites and supports companies as well as civil society organizations to enter partnerships for sustainable solutions to societal problems at a global scale via regulation by national legislation (first-order politics) can be complemented by second-order politics that initiate and support New Governance forms of voluntary commitments. Both first order a second-order politics aims at setting incentives, but the latter uses an indirect approach: it sets incentives for companies and activates them to set incentives themselves. Second-order politics aims at a regulation that fosters self-regulation. This means that state agencies understand that their new and important role is not to subordinate but to coordinate companies as well as civil society organizations and to promote partnerships that aim at solving urgent sustainability problems at a global scale.
88. **For banks and other financial institutions**, financial institutions are encouraged to join existing initiatives, such as UNEP FI Biodiversity and Ecosystem Services Work Stream, Principles of Responsible Investment, and Equator Principles, and to address biodiversity in their investment strategies.

<sup>6</sup> For an elaboration of the concept of “order responsibility”, cf. Beckmann/Pies (2008).

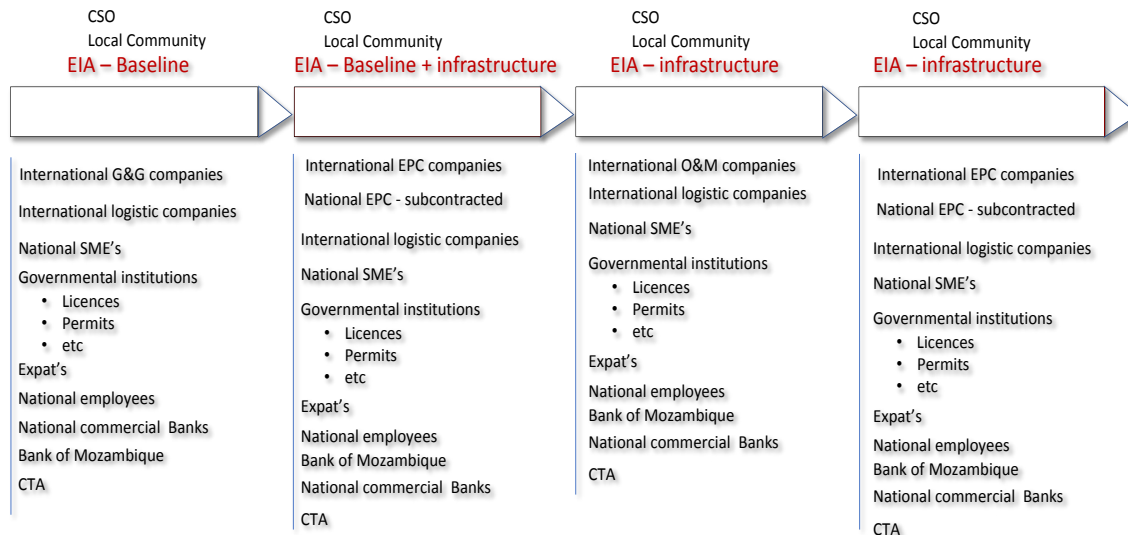
89. Biodiversity business risks (BBR) are one of the major reasons for financial sector businesses to take biodiversity into account. Since biodiversity mainly has an indirect impact on the financial sector, the exact financial figures of these risks are very hard to quantify. However, there are four major categories of biodiversity-related risk for the financial sector:
- a. *Liability risks* – Due to a growing number of initiatives where companies are held directly responsible for environmental damage, investors can be indirectly at risk when a business or a loan becomes subject to this (which results in a reduced return on investment), or directly when an investor itself is held accountable for conduct by the business it invested in. Moreover, biodiversity characteristics are complex and make it difficult to meet conditions for insurability.
  - b. *Legal and social license to operate* – Governments are putting stricter regulations on the use and trade of biodiversity. Financial institutions can be indirectly at risk from this if a company they hold shares in runs into higher costs or directly if the company is forced to screen and report on biodiversity-related issues.
  - c. *Reduced shareholder value* – Over the past few years a shift has taken place and nowadays the shareholder value of a company is not only determined by its financial performance, but also by extra-financial issues; amongst them are biodiversity and environmental issues.
  - d. *Reputational risk* – Recent examples have shown that the loss of reputation due to perceived bad practice towards biodiversity and environmental issues will cause a loss of shareholder and stock value and can even lead to consumers choosing products from other companies.

To manage biodiversity-related risks, the banking sector uses at least four strategies:

- “Red-lining” investments in areas of high biodiversity.
  - Developing sector guidelines for environmentally sensitive sectors.
  - Refraining from financing sectors in which a bank lacks specialist knowledge.
  - Working together with borrowers to improve their environmental performance and mitigate harm through an engagement policy.
90. **SME’s**, local (hosting country) small and medium enterprises are the most interested in having investments into the country. With it they managed to grow their businesses through providing services to the industry. However, most of the SME’s do not have technical neither financial capacity to compete at the same level with international service companies hence ending losing space to the later. If financial capability can and should be dealt with by the financial sector, technical capacity also entails having best management practices to the extent that the companies are certified. This is a huge constrain for the SME’s.
91. **CTA**, the Mozambican confederation of Trade Associations have the responsibility of bargaining with the International Oil and mining companies for a more active procurement role by Mozambican entities – local content. They currently have initiatives to uplift local SME’s by funding the certification endeavour (funded by OIL companies and international organizations). But if those initiatives a not accompanied by a more active explanation of why and how companies must change their core values to include biodiversity as their business process, the entire program might not get the expected results.
92. **Universities**, knowledge recipients and producers. They have the responsibility of spreading the biodiversity book of knowledge throughout the new mining and oil & gas courses. However, the biggest challenge for the universities is to conduct research on how mining and oil & gas project



underway are impacting overall biodiversity. Conversely, must research on how Mozambique can benefit from the available biodiversity awareness funds.



**Figure 16 Example of actors per project stage (Oil & Gas project). Source: authors**

### 3.10. Pressures triggered by mining and Oil & Gas sector on biodiversity and impact

#### **Mining**

93. Mining value chain can be simplified as involving exploration, site preparation and mineral extraction, processing/smelting, and reclamation. The exploration and site preparation and extraction phases are the one carrying the bulk of infrastructure development as such with huge potential impact on direct and indirect effect to the biodiversity. However, during production (extraction) phase, for open field mines, is where some of the dangerous direct impact to biodiversity lie as it involves excavation and processing which altogether poses potential treat to water courses and overall environment.
94. Throughout the life cycle of a mining project, activities affect biodiversity both directly and indirectly. Indirect impacts are usually less readily identified. For example, mining-related infrastructure — such as roads, railways, pipelines, and power lines — attract people either looking for mining work or intending to take advantage of flow-on economic benefits from mining activity. Large-scale biodiversity loss occurs as these people clear land for settlement/farming and pressures increase on local resources as they hunt/poach threatened species, gather wood for fuel, graze their domestic livestock, and litter. Key biodiversity impacts at the main project stages are summarized in the table below.



**Table 17 Key biodiversity impacts at the main project stages**

Mining life cycle	Activities	Potential Impact on biodiversity
<b>Exploration</b>	Geophysical/airborne surveying Drilling/trenching Blasting trenches Developing camps during exploration Building roads	Habitat lost or fragmented Species lost Suspended sediment in surface water increased due to runoff of sediments Breeding/calving seasons of marine animals disturbed or disrupted; local communities disturbed Demand for local water resources increased Fuels and other contaminants spilled Human colonization increased due to road development
<b>Site preparation/mineral extraction</b>	Constructing mines (removing vegetation, stripping soils, etc.) Developing mine infrastructure (power lines, roads, dams, rail lines, ports, etc.) Constructing plants, offices, and other buildings Building mine camps Creating waste rock piles Creating low- and high-grade stockpiles Blasting to release ores	Habitat lost or fragmented Surface and ground water contaminated by chemicals Populations of plant/animal species decreased terrestrial and aquatic plants and animals exposed to toxic substances Landscapes altered Demand for utilities increased Erosion and siltation increased Dust/fumes created by explosives Human colonization increased due to road development
<b>Processing/smelting</b>	Transporting ore to crushers for processing Milling/grinding ore Leaching/concentrating ore using chemicals Smelting/refining ore Transport to final markets Transporting product Re-seeding and replanting vegetation Re-contouring waste piles/pit walls Fencing dangerous areas Monitoring see page	Chemicals and soother waste discharged in surface waters Sulfur dioxide and geavy metals released Disturbing noise created Dust/fumes created from stockpiles Persistent contaminants released into surface and ground water Expensive, long-term water treatment required Organisms exposed to persistent toxicity Original vegetation/biodiversity lost Pits/shafts that pose hazards abandoned Windborne dust created

Source: Adapted from Mining and Critical Ecosystems: Mapping the Risks, World Resource Institute, 2003

95. With large infrastructure requirements, the use of heavy machinery, and the release of toxic chemicals, large-scale mining has the potential to create enormous impacts on the landscape. These impacts may be mitigated or prevented with careful planning and adherence to environmental management systems. While mining companies have an important role to play in ensuring their activities are environmentally sustainable, governments — national, regional, and local — must also create a legislative and regulatory framework that requires, supports, and enforces responsible practices.

#### Oil & Gas

96. Oil and Gas and mining encompass a range of activities and economic sectors involved in the exploration, development, exploitation, processing, treatment, storage, and distribution of oil,

gas, coal, minerals and metals and the generation, distribution, and delivery of energy from fossil resources.

Oil&Gas life cycle	Activities	Potential Impact on Biodiversity
Exploration phase	Onshore	
	Creating access (airstrips, temporary roads, etc.) Setting up/operating camps and fly camps Using resources (water, aggregate, etc.) Storing fuel Using explosives Closing shot holes, mud pits, camps, and access infrastructure Mobilizing drill rig Conducting well testing/flaring offshore	Plants and their habitats disturbed or damaged Animal population subject to increased noise Soils and watercourses disturbed Soil, surface, and groundwater contamination Landscape modified
	Mobilizing/moving vessels Operating vessels that produce emissions and discharges Conducting seismic operations Anchoring on seafloor Using chemicals Discharging mud and cuttings Fuelling/handling fuel	Fish disturbed Breeding/calving seasons of marine plants and animals disturbed or disrupted Sediment and deep-sea organism disturbed Sediment contaminated In event of oil spill/leak, seabirds, coastal habitats, etc., disturbed or damaged
Development Phase	Onshore	
	Setting up/operating construction camps Providing access for construction Using resources (water, timber, aggregate, etc.) Importing heavy equipment and machinery Moving vehicles Moving earth (excavation)/laying foundations Storing/using fuel and construction materials Generating construction wastes Road building Offshore	Temporary and permanent loss of habitat and component ecological populations due to temporary and permanent footprint Soil eroded and agricultural productivity reduced Soil, surface, and groundwater contaminated Cultural heritage damaged
	Mobilizing/moving vessels Using vessels that produce emissions and discharges Anchoring/piling Transshipment of equipment and from vessels	Disturbance to sediment, benthic fauna, and other seabed flora and fauna Loss of seabed habitat Disturbance of marine animals breeding and calving Introduction of invasive species

<b>Production phase</b>	Onshore	
	Establishing a physical footprint and visible presence Importing/exporting materials and products Handling/storing/using products, chemicals, and fuel Using liquid effluent Releasing emissions to atmosphere Creating noise Using artificial light sources Offshore	Long-term landtake effects on ecology Landscape disturbed or damaged Soil and groundwater contaminated Water quality and aquatic ecosystems disturbed or damaged and resource users (such as fishermen) unable to secure customary resources Air quality worsened and human health adversely effected
	Establishing a physical footprint Storing/handling/using chemicals Releasing emissions to atmosphere Using helicopters and standby vessels to transport supplies (which creates noise) Releasing discharges into the sea Using artificial light sources	Loss of seabed habitat Fishing efforts interrupted Breeding/calving seasons of seabirds and marine mammals disturbed or disrupted Water quality worsened and marine ecosystems adversely effected Air quality worsened and global warming increased In event of oil spill, marine and coastal resources disturbed or damaged

Source: Adapted from Shell's draft "Integrated Impact Assessment: Environmental Impact Assessment Module," EP 95-0370 (May 2002) apud USAID

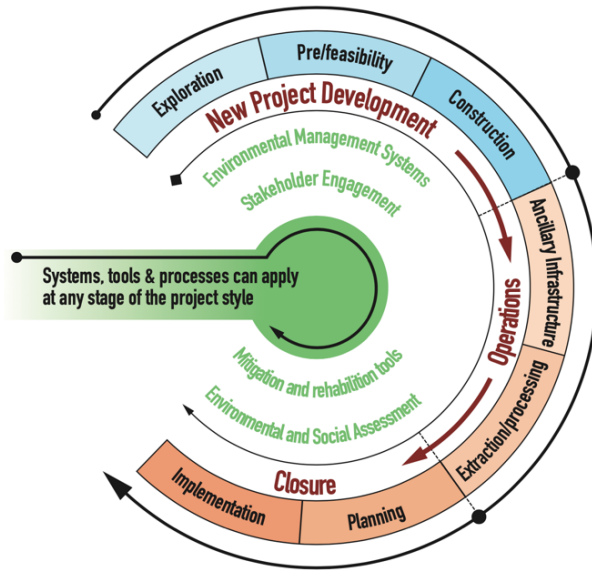
97. All phases of O&G development such as exploration, drilling, and extraction have significant impact on biodiversity. For example, drilling across rock layers may create a subsurface linkage between ground water and oil reserves that can lead to the contamination of the water table. Other impacts include noise from seismic surveys, the operation of machinery and transport (ground and air), and the gas flaring. As with other extractive industries, oil and gas development require infrastructure, with concomitant knock-on impacts. The table on the previous page summarizes the key impacts on biodiversity of the primary oil and gas extraction stages.
98. Some of the key sector's activities, relevant to consider in this study, include: (i) Oil and gas - unconventional, conventional, onshore, offshore and deep-sea exploration; (ii) Mining - surface, sub-surface, onshore, offshore and deep-sea exploration, artisanal and small-scale mining (ASM); and (iii) Associated activities - ancillary developments (e.g. worker camps, waste facilities, access roads), services (e.g. waste, energy), infrastructure (roads, railways, offshore platforms, pipelines, gas storage stations, power stations, pylons, energy transmission) and transport (e.g. shipping).
99. Infrastructure development has been identified as the main threat to biodiversity in Mozambique by the threat assessment report and multistakeholder dialogue. Such endeavour occurs mainly during the development phase or after the development plan has been approved by the government (meaning that the project might be under development phase or production) of both mining and oil and Gas projects.
100. Usually those activities encompass: resettlement; roads and other logistic infrastructure erection; drilling (for oil & Gas production wells); plant construction; plant operation etc. As such the report is going to be limited to understanding the impact of infrastructure development on biodiversity in pre-selected projects (2 – one for each sector) chosen based on the following criteria:
  - (i) Project location – understand whether the project is located on a "No-Go Zone" as per the IUCN's standards.

- (ii) Impact on biodiversity – projects that have the highest probability to impact biodiversity.
- (iii) Economic relevance – projects that have greater relevance to the country based on the contribution to GDP therefore with potential impact on the decision-making process.
- (iv) Project status – phase of development should also play a role as the infrastructure development has been indicated, due to its capital intensiveness and ability to compromise biodiversity, as the main challenging phase.

### **3.11. Best practices of the mining and Oil & Gas sector and inspiring models**

#### *Mining*

- 101. The International council on mining & metals (ICMM) defines a set of best practices – Good Practice Guidance (GPD) for Mining and Biodiversity which highlights the importance of biodiversity and relevance to the mining sector and emphasizes the need for stakeholders' engagement in the identification, assessment, mitigation, and management of biodiversity.
- 102. The GPD offers practical modules that should enable companies to:
  - a. Understand the interfaces between their activities and biodiversity.
  - b. Assess the likelihood of their activities having negative impacts on biodiversity.
  - c. Mitigate potential impacts on biodiversity.
  - d. Explore the potential to contribute to biodiversity conservation.
- 103. The GPD considers the need to assess projects impact to biodiversity in each phase of mining project cycle. As such, there should be as much environmental impact assessment as many development phases are required to implement a project. Mining activities have three (3) phases namely: (i) New development which includes the exploration, pre-feasibility studies and construction; (ii) operations; and (III) Closure. Therefore, to meet the GPD, the companies should make sure they understand the impact of their activities under each phase.
- 104. Mozambican legislation (Mining law and regulation) also tackles this specific requirement by demanding a Socio-Environmental Study prior to conceding the right to appraise the asset (exploration phase) and subsequent phases.



**Figure 17 Integrating biodiversity into mining project cycle. Source: ICMM, Good Practice Guidance for Mining and Biodiversity.**

#### Kenmare experience

The Moma Project was developed in two phases: Phase I with 800 ktpa ilmenite, 50 ktpa zircon, 14 ktpa rutile and phase II with 1,2mtpa ilmenite, 75htpa zircon and 21 ktpa rutile. All phases were preceded by an environmental impact assessment and an environmental management plan is in place to manage and/or mitigate against certain environmental and social project impacts monitored through quarterly reports.

In 2020 the company transferred the wet concentrator plant (WCP) to PILIVI ore field (23km from Namalope). The original ore field route had to be shifted due to the discovery of a protected species. That was voluntarily done by Kenmare.

Apart from that, the company sets annual land rehabilitation targets. In 2021 the company rehabilitated circa 198ha, including planting indigenous trees, which supports biodiversity restoration.

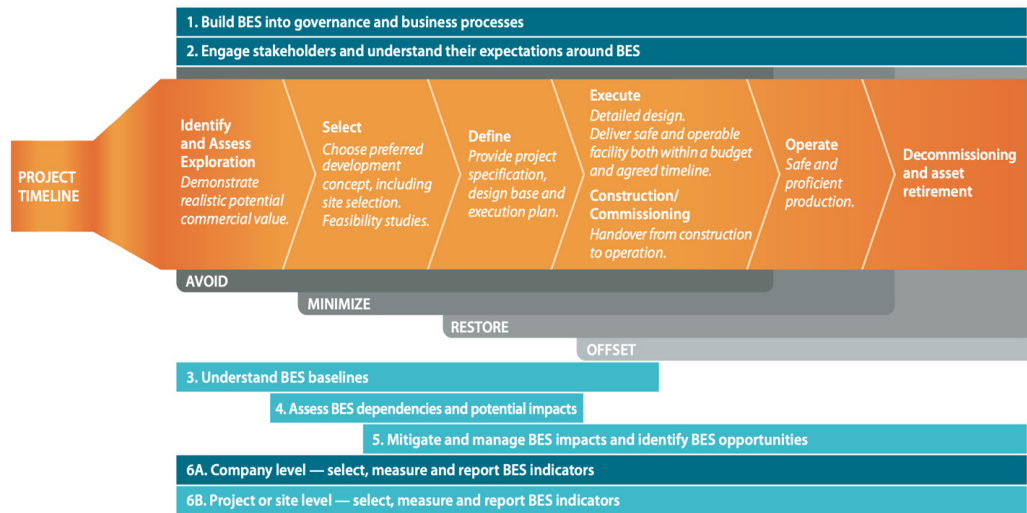
Kenmare is also partnering with the National Conservation Agency (ANAC) and the National Agrarian Research Institute to establish the Icuria Forest (adjacent company's operation field – Muli-muni) as a Conservation Area for Sustainable Use.

Further to this, they are incentivising local communities to use new farming techniques rather than traditional ones. The project has benefitted 700 farmers in 2021 and is managed by the National Association for Rural Extension (AENA) – CA Project. A more enhanced technical assistance is done through KMAD project which aims to train the farmers on seed production, product marketing and connect with seed suppliers.

105. The ICCM set the ground rules for mining activities. Those rules or guidelines have shown to be effective and in line with international standards. Mozambican law is also aligned with such principles despite having some areas to improve when it comes to monitoring and controlling the compliance with the law.
106. Kenmare have set a very good standard in mining sector and are perhaps the role models for the interactions between project – community -biodiversity.
107. Despite some grievances related to public consultation as described by the civil society organization Sekelekani, they managed to voluntarily review project location during the relocation of the WCP in 2020/2021 to **avoid endangering** a newly discovered specie.

#### Oil & Gas

108. The global oil & gas industry association for environmental and social issues (IPIECA) in collaboration with the International Association of Oil & Gas Producers (IOGP) provide guidance for the management of biodiversity and ecosystem services (BES) impacts, dependencies, risks and opportunities in the oil & gas industry through six (6) interrelated BES management practices, namely:
  - a. Build BES into governance and business processes.
  - b. Engage stakeholders and understand their expectation around BES.
  - c. Understand BES baseline.
  - d. Assess BES dependencies and potential impacts.
  - e. Mitigate and manage BES impacts and identify BES opportunities.
  - f. Select, measure and report BES performance indicators.

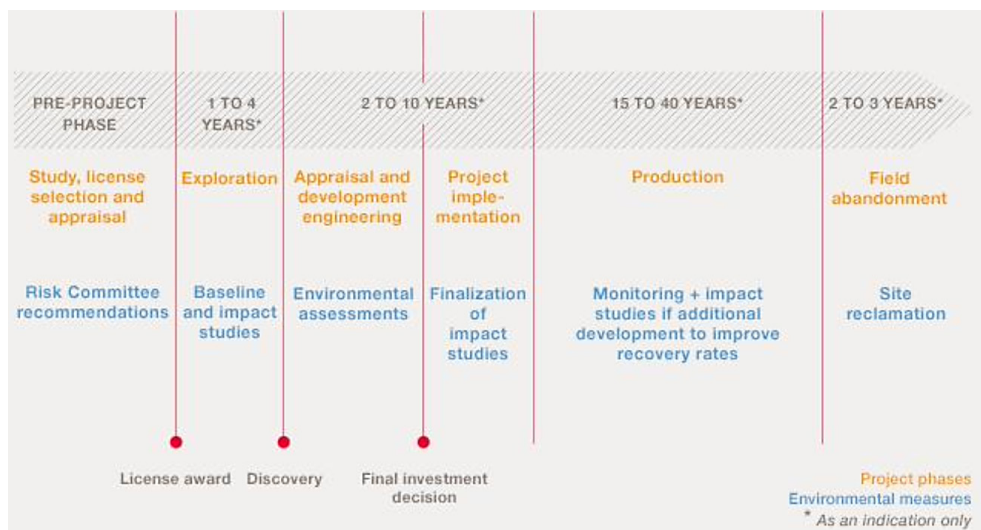


**Figure 18 Oil & Gas biodiversity management good practices. Source: IPIECA & IOGP Guidance document for the oil and gas industry ([www.ipieca.org](http://www.ipieca.org))**

### Build BES into governance and business processes

109. A handful of oil and gas companies have already an Environmental Management System (EMS) incorporated in their business process. Total is one of the companies implementing a globally recognized well established system which consists in performing an environmental impact assessment at the very beginning of the “outset” of each project to obtain:

- ✓ A detailed picture of the baseline situation
- ✓ A precise assessment of the potential effects of operations.
- ✓ A set of measures to minimize the impacts.



**Figure 19 Total approach to environment. Source: ([www.totalenergies.com/group/commitment/environmental-issues-challenges](http://www.totalenergies.com/group/commitment/environmental-issues-challenges))**

### Engage stakeholders and understand their expectation around BES

110. With the above depicted figure 19 one can understand the importance blending environment issues into company's business process. Therefore, biodiversity standard can assist the company in the following:

- ✓ Early project screening of biodiversity, ES and habitat sensitivities.
- ✓ Assessment of potential critical habitats.
- ✓ Impact assessment baselines.
- ✓ Impact mitigation.
- ✓ Sustainability reporting .

#### Sasol Project

Sasol was awarded in 2005 the Block 16/19, offshore block, located in the vicinities of Bazaruto National Park (a "no go zone"). Following an evaluation of the exploration potential of the blocks and an assessment of the report of the pre-feasibility phase of the Environmental Impact Assessment (EIA), Sasol has decided to relinquish its exploration license in Blocks 16 & 19 offshore Mozambique.

The company issued a press release saying: "...Sustainability is integral to how Sasol conducts business, which is underpinned by our commitment to compliance with all environmental legislation and undertaking any exploration activity in an environmentally responsible manner." (<https://www.sasol.com/media-centre/media-releases/sasol-relinquishes-blocks-16-19-license>).

111. The sasol project (block 16/19) is one example of good practice when it comes to deciding whether to implement a project. Besides environmental issues, it is also detrimental to understand the impact of your project within stakeholders. ENGAGEMENT is, therefore, a paramount and instrumental aspect to take into consideration.

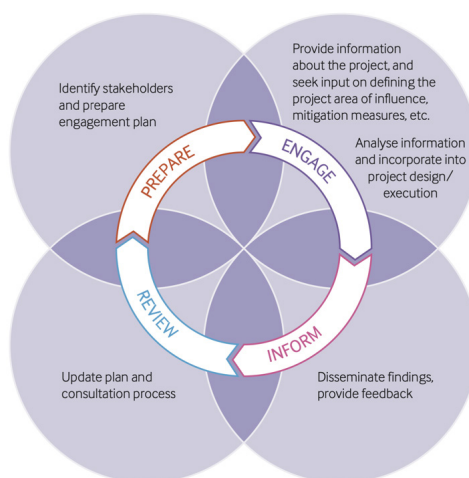


Figure 20 Stakeholder engagement cycle. Source: IOGP, 2014, apud IPIECA-IOGP (2016:11)



112. Development of any project should start by identifying relevant stakeholders and engage them towards understanding their expectations whilst “socializing the project” and undertake a dialogue on key issues. The output should be a project design and execution strategy which should be disseminated to get feedback through consultation (avoid community grievances) before implementing the project. This should be a continuous improvement process to make sure the stakeholder’s engagement are acted on as far as reasonably possible, and that information is fed back to inform actions to manage BES.

### Sasol Project

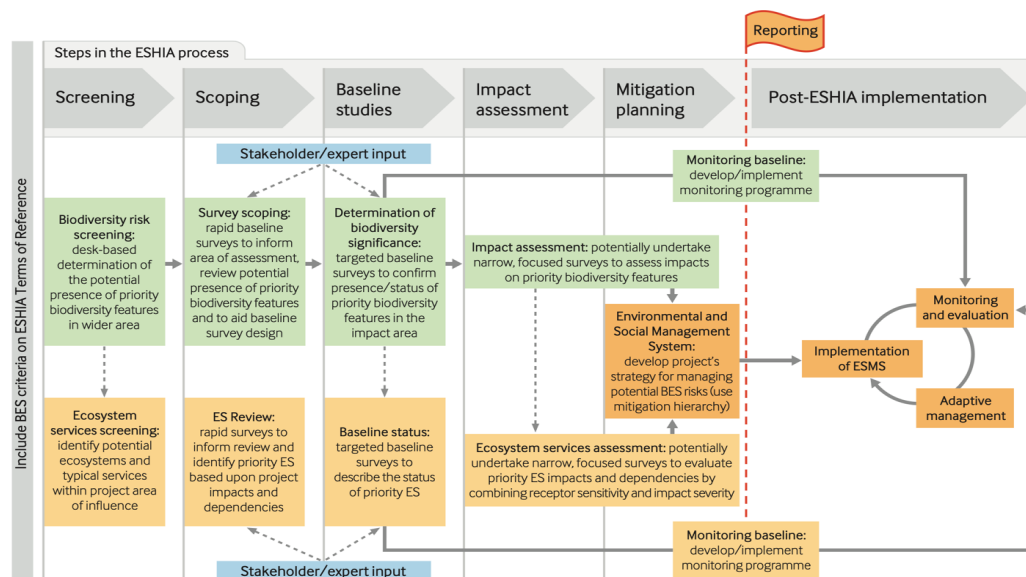
Prior to relinquishment, Sasol submitted a seismic and acquisition and offshore drilling project for offshore block 16/19 along the provinces of Sofala and Inhambane. Company managers detailed the project during a public hearing which took place in the city of Inhambane on the 5<sup>th</sup> July 2019. According to participants, the company was heavily criticized for breaching preexisting gas exploitation agreements.

“Fishermen may not be allowed to enter the sea. How is it with the situation of fishermen in this area? Sasol said it is looking for hydrocarbons. What exactly is it looking for? Gas or oil? (Gertrudes Namburete from Terra Viva Centre, an environmental NGO in Inhambane cited by Club of Mozambique, 9<sup>th</sup> July 2019).

113. Above example illustrates how important is communication between stakeholders and its impact on project development.

### Understand BES baseline

114. Understanding BES baseline beforehand underpins cost-effective mitigation and helps companies avoid BES-related project delays as well as problems in later stages of the asset life cycle. BES baseline studies provide information about the biodiversity that may be affected by a project before it begins, and the service that people and business derive from the environment. It helps shaping impact mitigation measures such as modifying, prohibiting, or restoring.



**Figure 21 Steps for a biodiversity baseline study as part of the ESHIA (Environmental-Social, and Health impact assessment). Source: IOGP, 2014, apud IPIECA-IOGP (2016:19)**

### Sasol Projects

Block 16/19 location was at the forefront of Sasol's relinquishment. It is located near a "no go zone" – Bazaruto National Park, host of several species (migrate for multiplication) and home for Dugongo (protected specie). There were already warning signs! As a result, prior to further advancements, Sasol was requested to do a Strategic Environmental Impact assessment covering the entire region and the results where those more costly techniques should be used to minimize the impact of drilling and seismic acquisition to preserve the the marine ecosystem. A baseline study should have provided those insights before Sasol had drilled wells in 2007/8.

### Identification of dependencies and potential and actual impacts and related risks

115. IPIECA-IOGP ecosystem services guidance provide a check list to identify impacts and opportunities arising from project activities.

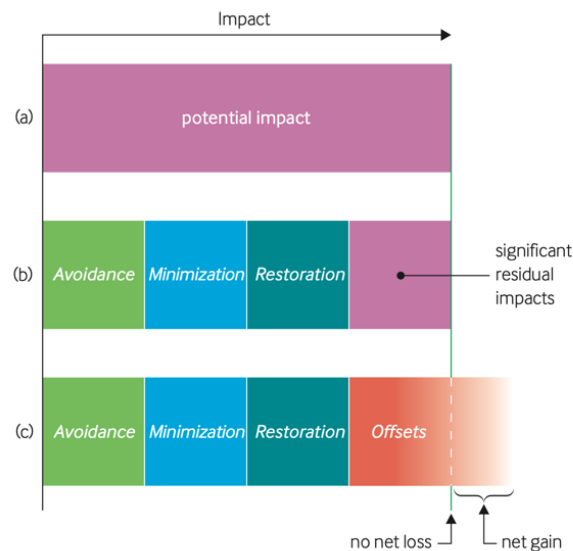
**Table 19 Potential and actual impacts and opportunities arising from project activities**

IMPACT TYPE	EXPLANATION	EXAMPLE	OIL AND GAS COMPANY RESPONSIBILITY
Direct (primary)	Direct impacts of project activity.	Road construction (clearing) removes or fragments habitat.	Full
Indirect (higher order)	'Knock-on' effects of direct impacts.	Clearing vegetation leads to increased river sedimentation, degrading water quality.	
Indirect (induced)	Presence of project triggers third-party development and access with its impacts/risks and opportunities.	Road provides access into an area, thus increasing local timber harvesting and habitat loss. Road also provides better access for subsistence hunters, poachers, recreational users and researchers.	Partial Adopt a collaborative approach to mitigate impacts and capitalize on opportunities.
Cumulative	Impacts and opportunities resulting from the combined effects of a project plus other activities, conditions and/or developments external to the project.	Habitat fragmentation and potential reduction in species diversity, but also increased access enabling research activities (e.g. wildlife monitoring) and the responsible use of ES.	

Source: IOGP, 2014, apud IPIECA-IOGP (2016:25)

### Mitigate and manage BES impacts and identify BES opportunities

116. Based on previous information gathered by stakeholders' engagement, understanding the BES baseline and assessing BES, dependencies, impacts, and related risks companies can develop strategies and plans to mitigate and manage potential and actual impacts and related risks associated with BES dependencies, as well as identifying opportunities for BES enhancement.



**Figure 22 The mitigation hierarch components**

#### 117. *Elements of good practice*

##### **a. Avoidance**

Avoidance anticipates and prevents potential and anticipated impacts on BES and their related risks during the entire life cycle of a project. Avoidance with regard to BES may involve:

- ✓ I where a project site is located (avoidance through site selection);
- ✓ I how a project is engineered (avoidance through project design); and
- ✓ I how project activities are timetabled (avoidance through scheduling).

##### **b. Minimization**

Minimization comprises measures taken to reduce—to the extent practically feasible—the duration, intensity and/or extent of impacts that cannot be completely avoided. It is usually most cost-effective to consider these options during the design phase of a project, while alternative design options can still be considered. Minimization may involve:

- ✓ I Adapting the physical design of project infrastructure (physical controls).
- ✓ I Managing and regulating the activities (aspects) associated with a project (operational controls).
- ✓ I Taking steps to reduce the levels of air emissions discharges and wastes (abatement controls).

##### **c. Restoration**

Restoration is the process of assisting the recovery of damaged or destroyed biodiversity. It typically involves on-site rehabilitation that aims to reinstate specific aspects of ecosystem structure, function and/or species composition. The feasibility of restoration and its contribution to the successful application of the mitigation hierarchy will vary greatly among projects. Generally, restoration is likely to be more feasible (and faster and less costly) for:

- ✓ Areas that are relatively lightly degraded, or

- ✓ When the aim is to restore relatively simple habitat structure or specific ecosystem functions.

#### **d. Offsets**

Offsets compensate for significant residual impacts (typically biodiversity-related) predicted to remain after all feasible measures for avoidance, minimization and restoration have been applied.

‘Offsets can carry many uncertainties and risks. Good practice is therefore to reduce residual BES-related impacts to ‘a level as low as reasonably possible’ (ALARP) before offsets are considered. Carefully implemented, offsets can provide a real opportunity to improve both biodiversity and ES outcomes. Offsets can, for example, be undertaken in the context of a biodiversity no net loss or net gain goal, and though this is not technically essential, it represents an emerging expectation from some host-country governments, multilateral and private financing institutions, conservation NGOs and other stakeholders. Offsets can also be undertaken in conjunction with protected areas management.

#### **118. Select, measure and report BES performance indicators**

Measurement and reporting help companies to track performance and share with stakeholders.

#### ***Elements of good practice***

1. Ensuring complete coverage of the area of impact, at a landscape level where/when appropriate.
2. Focusing on BES priorities (monitoring is expensive, so being focused is an opportunity for cost savings).
3. Ensuring adequacy of BES indicators and a clear link to mitigation measures.
4. Allowing for an adaptive management response based on monitoring results by refining/altering indicators and/or actions as needed.
5. Developing an integrated system of third-party verified, company-level and site-level indicators and monitoring system.

### **3.12. Strengthen the transformative role of the national framework towards a sustainable mining and Oil & Gas sectors**

#### ***Legal framework***

#### ***Mining***

119. Mining Law and the Environmental Regulation for Mining Activities classify mining activities into three categories, depending on the scope of the operation and the relative complexity of equipment used. Each activity has certain environmental obligations as a part of its classification: Level A activities include all mining activities carried out under a mining concession. These activities require a full Environmental Impact Assessment (EIA). Level B activities include quarrying activities, pilot projects of exploration activities and activities carried out under a mining certificate. These activities require a simplified environmental impact assessment (simplified EIA). The content of the simplified environmental impact assessment is yet to be regulated. Level C activities are mining activities carried out under a mining pass or an exploration license, which do not involve mechanized methods. Level C activities require an environmental management plan.
120. Companies undertaking Level A and B activities must provide a bond to cover the costs of environmental restoration during the closure of the mine. The bond can be an insurance policy, a bank guarantee, or a deposit in cash in a bank account provided by MIREME.

121. The amount of the bond is based on an estimate of the costs of the restoration (calculated during or after the active life of the project). The amount is set by MIREME and is reviewed every two years. For Level A activities, the amount is based on the terms of the relevant EIA. For Level B activities, the amount is based on the terms of the relevant environmental management programme. Companies engaged in activities involving a high risk of environmental degradation must obtain insurance to cover such liability.

### **Oil & Gas**

122. The Environment Act (Law No. 20/97 of 1 October) stipulates those activities that are likely to cause significant environmental impacts must be licensed by the environmental authority (currently the MTA), based on the results of an Environmental Impact Assessment (EIA) process. According to Decree No. 54/2015 approving the Environmental Impact Assessment Regulation, projects in the energy, oil & gas sector can obtain one of the following classifications:
- ☐ Category A+: Activities in this category require an Environmental Pre-Feasibility study and Scope Definition ("EPDA") and Terms of Reference ("TdR") for the Environmental Impact Study ("EIA") and subsequently an EIA. These studies are subject to review and supervision by independent experts with proven relevant experience.
  - ☐ Category A: Activities in this category require an EPDA and TdR for the EIA and subsequently an EIA.
  - ☐ Category B: Activities in this category require TdR for a Simplified Environmental Study ("EAS") and subsequently an EAS.
  - ☐ Category C: Activities in this category require Good Environmental Management Practice procedures.
123. During the Environmental Impact Assessment, an EIA or EAS (for category A+ and Category B projects, respectively) is produced and, in this document, the Environmental Management Plan (PGA) and a set of additional Plans (Waste Management Plan, Emergency Response Plan, among others) that incorporate the provisions of relevant environmental legislation in Mozambique (waste, air and water quality standards, among others) and which are the main tool for monitoring the environmental aspects of the project and, in this case, monitoring the respective concession contract. The Environmental Management Plan (PGA) lists the obligations and responsibilities of each of the parties involved in the project, the methods, and procedures to be implemented, as well as the environmental management actions that must be implemented.
124. The Environmental License is the document that gives the project environmental viability. The Environmental License is valid for a period of 5 years, renewable for the same period, upon request of its updating that must be submitted by the proposer to the MTA, 180 days before the end of its validity, and subject to payment of the respective fee. In accordance with Article 22(7) of Decree No. 54/2015, the renewal of the Environmental License (LA) for category A+ projects may be conditional on the presentation of an updated Environmental Management Plan (PGA) and/or an equally updated Biodiversity Counterbalance Management Plan. For category A and B activities, the renewal of LA depends on the submission of an updated PGA if audits and environmental practices justify it. In the case of category C activities, the renewal process requires a performance report of good environmental practice, based on the conditions laid down in the authorisation document. The renewal of the Environmental License must be preceded by a technical visit by the Environmental Impact Assessment Authority to the project site.

**3.12.1. Challenges and Opportunities from a legal framework perspective**

125. Sensible conservation strategies must first identify biodiversity priorities. Several frameworks currently (the environment act- law 20/97 of 1<sup>st</sup> October coupled with Decree No. 54/2015 approving the Environmental Impact Assessment Regulation), and the International Union for Conservation of Nature (IUCN) Key Biodiversity Areas standard is a globally consistent method for identifying conservation areas essential for stemming the loss of biodiversity. With these priorities identified and mapped, and a comprehensive assessment of likely impacts of mining on biodiversity undertaken, long-term strategic management plans can be put in place. These plans should follow the mitigation hierarchy: first by avoiding serious impacts (particularly to conservation priorities), then minimizing harm, before offsetting residual impacts.
126. Mozambique already has a specific Environmental impact assessment framework set by the Decree no 54/2015, although not capturing the full extent of Oil & Gas and mining related impacts on biodiversity. Regulatory approval of new projects (or expansion of existing projects) frequently only considers the most direct impacts on biodiversity, ignoring larger-scale and longer-term consequences, which often interact with other stressors and cumulate over space and time.
127. In some cases, even the most rigorous attempts will not eliminate impacts of Oil & Gas and mining on biodiversity. Offsets have been proposed as means to address residual impacts and fully compensate biodiversity losses. Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for residual adverse impacts generally (although, not always explicitly) under a 'no net loss' (NNL) paradigm. However, their implementation remains a challenge. Few studies provide empirical evidence of success, and some suggest widespread trade-offs between biodiversity and ecosystem services occur. Many other technical challenges exist to effectively measure losses and gains owing to mining and offsets, but despite this, offsetting unavoidable losses increasingly occurs as a tool and potential source of revenue for biodiversity conservation.
128. New mechanisms are emerging to both encourage and enforce effective conservation action, for example, via specific investment and performance standards for lenders and investors (e.g. World Bank, International Finance Corporation (IFC), and regional development banks). While some positive signs via increasingly rigorous standards are being generated by many in the lending sector (e.g. IFC performance standards), it is too early to demonstrate lasting impacts. Further, opportunities exist to use ecosystem services in framing conservation actions in mining regions. For example, the World Bank has worked with conservation organizations to develop the 'Wealth Accounting and Valuation of Ecosystem Services' (WAVES) platform to evaluate comparative return on investment of using natural capital for development options, including mining.
129. It is increasingly accepted that to ensure the long-term persistence of biodiversity, there is a fundamental need to minimize encroachment of activities that promote habitat loss, degradation and fragmentation. Proactive activities including limiting road expansion, and preventing large-scale developments such as forestry, and agriculture following a mining action, are essential in retaining the integrity of ecosystems. Fundamentally, evaluating the full impact on biodiversity at all scales is a critical prerequisite to taking advantage of conservation opportunities. Anticipating and acting on foreseeable development-conservation decisions that will harm biodiversity will ensure effective conservation solutions because the cost of conserving species and communities increases rapidly as they become less widespread and options for their conservation narrow.
130. The recently approved Ministerial Diploma 55/2022 which sets principles, methodologies, requirements and procedures for the right implementation of Biodiversity Offsets in the country, allowing the Government of Mozambique to ensure that category A+ and A development projects of
-



any type of activity subject to the environmental license, with significant residual negative impacts on biodiversity, implement biodiversity offset management plans to achieve at least No Net Loss (NNL) or Net Gain (NG) of biodiversity at sites outside the area of direct influence, preferably in conservation areas or important areas for biodiversity, after the implementation of measures to Avoid, Minimize and Restore represents an opportunity to align countries procedures and mechanisms towards protecting biodiversity.

#### **Accountability mechanisms and specific metrics**

131. Today it is required that the companies acting in mining and oil and gas sectors report on a quarterly basis to the regulators and MTA. Such reports should also include:
  1. Monitoring implementation of environmental management plan and annual performance sectorial report
  2. Environmental metrics
  3. Development of environmental impact assessment database which is currently not available.

#### **3.12.2. External and internal factors and practices of the actors (public and private institutions and companies) that are unfavourable to the engagement of the actors in favour of biodiversity**

##### *Kenmare heavy sands project*

132. It was reported that on the 23rd March 2021, On the 23rd of March, five communities from the Moma district in Nampula province thwarted a public consultation on the environmental impact of a heavy sand exploration area expansion project planned by Kenmare for the the Pilivilil Seat communities, such as Mpuitine, Muholone, Epwiri and Namaize met at the seat of Pilivilil locality to discuss the feasibility of this project in that region, in an extension of 17 kilometres on the coastline, from Tophuito to the Moma district seat. (Sekelekane report, 2021)
133. According to Kenmare representatives, the Environmental Impact Study initially focused on surveying the diverse types of vegetation and animal life as well as other natural resources, including marine resources.
134. Moma communities have demonstrated a relatively high level of awareness of their rights and how to uphold them when threatened. A first sign of this was the protest the long chain of translations (English - Portuguese - Emakwa and vice versa) established for them to participate in the consultation: most of basic information was lost in translation, either from one or other direction. The second, and certainly the most significant sign was the decision to hold a single joint consultation of all five communities covered by the heavy sand exploration area: the communities realized from the previous “consultations” that the company divided them, telling each community separately that other communities had already agreed on a particular matter, leaving this community in a sensitive position, running the risk of being accused for being the only one to “block the investment.” Therefore, the five communities from the Seat of Pilivilil, including Mpuitine, Muholone, Epwiri and Namaize, through their respective leaders, agreed on positions and, in one voice, said: there are no conditions for this consultation to proceed because:
  - o there were no clear and effective communication mechanism between the parties when it comes to using a chain of three languages.
  - o there was a lack of clear information on the objectives thereof.



- it was not clear why there should be another consultation, when there are already studies with recommendations or decisions on the area environmental protection.

#### *Oil & Gas sector*

#### **Sasol Project**

135. The company submitted an updated environmental monitoring plan to the MTA after engagements on the impact on operations of COVID-19 global restrictions. In December 2020, the government audited the CPF operations. The audit found no incidents of non-conformance, however it made certain observations that were noted and are being addressing. (Sasol sustainability report, 2021)
136. A non-compliance notification was issued by the Department of Territorial Development and Environment, relating to the compensation process undertaken during debushing for the PT5-C2D Seismic Campaign. Sasol has engaged the authorities on the notification and an outcome is still pending. (Sasol sustainability report, 2021)

#### **3.12.3. Opportunities and challenges for voluntary commitments**

137. Commitments towards reconciling economic production and biodiversity could be composed of:
  - (i) *Individual Self-Commitments To Environmental Protection*
    - a. Compliance with Eco-Standards: Global Voluntary Standard on Reduction of Gas Venting and Flaring; Principles of the ICC Business Charter for Sustainable Development; OECD Guidelines for Multinationa Enterprises;
    - b. Climate Protection: Carbon Management; Exploration of New Energies
    - c. Eco-Friendly Products and Processes: Shell Pinedale; Eni's Drill Ship Saipem 10000; Petroplus Low Energy Asphalt Manufacture (LEA)
    - d. Sustainable Land Use: Establishment of „No-Go-Zones“, e.g. Natural Heritage Sites
  - (ii) *Collective self-commitments*
    - a. Climate Action Initiatives: The Climate Group; “Caring for Climate”; Copenhagen-Kommuniqué; Initiative 2;
    - b. Initiatives to that Promote Energy Efficiency & Environmental Performance of Fuels: Partnership for Clean Fuels and Vehicles ; Freedom CAR and Fuel Partnership; California Fuel Cell Partnership;
    - c. Initiatives for Dealing with Oil Spillage: Joint Industry Programm on Oil in Ice (JiP); Oil Spill Preparedness Regional Initiative (OSPRI); ROSE Foundation.
  - (iii) *Commitment service for stakeholders*
    - a. Monitoring of Suppliers: Environmental Supply-Chain Management
    - b. Support for Regions and Countries: Eni's Sustainability Agreement with the Italian Region
    - c. Basilicata; IPIECA's “Urban Air Quality Program”
  - (iv) *Introducing potential compensation for biodiversity protection.*
138. Nevertheless, from a territorial, perspective there should also be a common practice agenda whereby multiple stakeholders operating in the same territory agree on a specific set of principles to protecting biodiversity in Mozambique. This set of principles should be agreed between the government, the CTA, multinational companies, NGOs working on biodiversity and other relevant

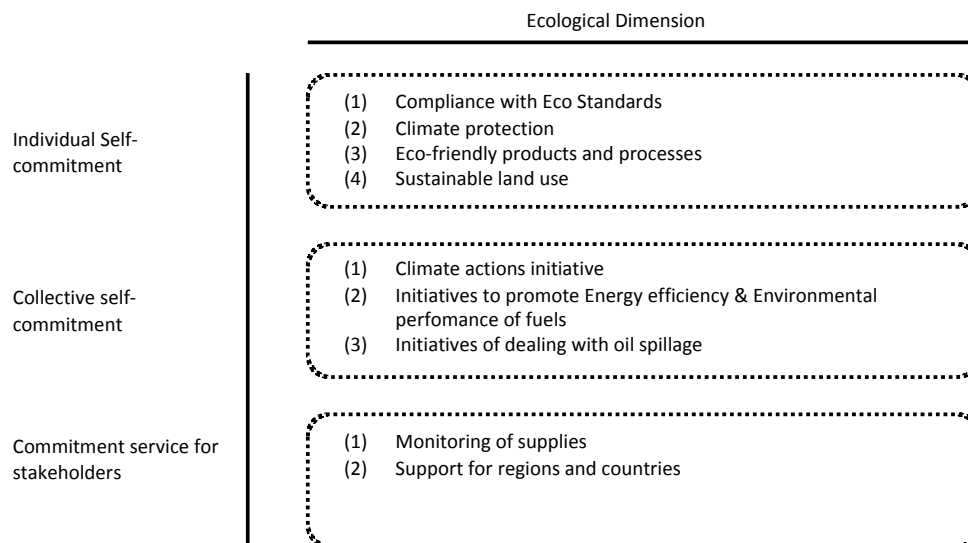
bodies to ensure that wherever they operate in the territory they adopt the new set of practices – “New Governance”.

139. Such endeavour should have specific funding options. The government would have challenges incentivising the IOC’s and “IMC” to introduce voluntary commitments beside what is required from a legal perspective. Therefore, it is fundamental having a special funding option to make feasible any voluntary commitment strategy for the extractive industry due to:

1. Actors with strong governance standards.
2. Actors already listed in stock exchanges therefore with strong compliance requirements; (sustainability report is a MUST)
3. Capital intensive sector requiring intervention of financial sector.

140. This is an opportunity to the country to include some of the specific metrics required by international bodies into our legislations such as:

- ✓ Carbon emissions targets.
- ✓ Water reutilization targets.
- ✓ Reforestation targets.



**Figure 23 Voluntary commitments themes.**  
Source: adapted from Pies, Ingo et al, 2010

1. A few examples of how a biodiversity business case can provide opportunities for financial sector businesses:
  - ✓ Improved stakeholder perception.
  - ✓ Enhanced ability to attract talent.
  - ✓ Increased income from pro-biodiversity investments.
  - ✓ Growing markets for certified sustainably produced commodities.
  - ✓ Advisory services for clients concerned with biodiversity-sensitive projects.

- ✓ Biodiversity-related insurance cover.
- ✓ Development of new markets such as habitat banking.
- ✓ Government-induced opportunities.

141. This is not an exhaustive list of opportunities; in the current market and social conditions, the attention for the environment and sustainability keeps increasing and new opportunities for biodiversity-related financial sector business keep developing almost daily. Financial sector businesses need to be at the forefront of this development, both as a driver and to benefit from the new investment opportunities.

142. A swot analysis was developed to better understand the areas of improvements (opportunities) with a more holistic view of the industry. From a legal perspective the country has fair framework related to mining and oil & gas activities to tackling biodiversity protection and best practices adoption. The two projects chosen for the report have proven to be already adopting international standards on what biodiversity is concerned mostly because the sponsors are multinational companies filiated to international sectorial organizations and listed in stock exchanges which have biodiversity as part of their core values, therefore mandatory for associated entities, as well as report requirements (sustainability report) for quoted entities such as Sasol and Kenmare.

**Table 20 Swot analyses of the extractive industry**

Swot analyses of the extractive industry

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>○ Capital intensive sector and financial structure (funding from financial sector) favours alignment with best practices followed by funding entities.</li> <li>○ Blue chip companies with biodiversity compliance guidelines already in place.</li> <li>○ Legal framework aligned with international benchmark.</li> </ul>	<ul style="list-style-type: none"> <li>○ Government institutions with limited biodiversity awareness.</li> <li>○ Lack of monitoring technical and financial capacity.</li> <li>○ Limited capacity of law enforcement when it comes to biodiversity or environmental crimes</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>○ Several international initiatives such as COP 21, IUCN, etc aiming to address biodiversity issues.</li> <li>○ New bidding round for Oil &amp; Gas blocks brings an opportunity to set new standards.</li> <li>○ IOC's willing to fund certification – increased awareness from SME's.</li> </ul>	<ul style="list-style-type: none"> <li>○ Continuous communication gap between the companies and civil society organizations and local communities.</li> <li>○ Gap of knowledge between the IOC's and IMIC's and governmental institutions.</li> <li>○ Lack of biodiversity studies on impact of mining an oil &amp; gas activities on biodiversity.</li> </ul>

Source: authors

143. Moreover, due to project size and capital-intensive nature, they rely on multilateral agencies and the World Bank (WB) institutions to make projects bankable therefore having to adopt biodiversity best practices accordingly.

144. However, from the interviews with several actors, was possible to understand that whilst the above statement is true, there remain space for additional commitments mainly related to ensuring compliance with Biodiversity and Ecosystem Services (BES) as defined by the global oil & gas industry association (IPIECA) together with the international association of oil & gas producers (IOGP) through 6 interrelated BES management practices, namely:

- a. Build BES into governance and business processes.
- b. Engage stakeholders and understand their expectation around BES.
- c. Understand BES baseline.
- d. Assess BES dependencies and potential impacts.
- e. Mitigate and manage BES impacts and identify BES opportunities.

145. From the above guidelines become clear the relevance of project stakeholders' management when addressing biodiversity issues. Hence, during the infrastructure developments is detrimental to have all actor (sponsors, government, local communities, civil society organizations, local enterprises, universities, financial system, etc) involved into the process to understand their motivation, align their interest and, therefore, mitigate and manage BES.

146. Both projects Kenmare and Sasol have had specific issues highlighted by the stakeholders during the interviews: (i) the *communities* are not satisfied with project outcomes or expectations come short and questioning the level of information provided and benefits from the resource exploration; (ii) *civil society organizations* (CSO) believe there is a lot more that can be done by the international companies (sponsors) to increase the level of awareness and improve communication with communities located in project vicinities; (iii) *local companies* want to be more interventive supplying goods and services though halted by international companies requirements; (iv) *financial sector* is also interested in having more impact into mining and oil & gas projects; (v) *universities* need more funding for research to help understanding the impact mining and oil & gas exploration have on biodiversity therefore deriving scientific identified solutions.

147. Those concerns can barely be addressed by a stringent law if not well accompanied by appropriate monitoring and control mechanisms (in fact Mozambique legal framework favours biodiversity and the recently approved offset "Ministerial Diploma" – net zero loss - n° 55/2022 of 19 May, mandatory for any project subject to Environmental Impact Assessment Category A+ or A, further corroborate the efforts being made to reinforce and provide clear framework for biodiversity protection) which seems to be a challenge for the government bodies. They require a more collaborative effort between the actors – stakeholders. They require Voluntary Commitments (VC) aligned with stakeholders' interest and motivations – a step forward from mandatory legal commitments or group commitments (from international organizations) or individual commitment from company's core values, to ensure all stakeholders bond towards biodiversity safeguard.

### **3.12.4. Recommendations: scenarios of commitments for Extractive industry – Mining and Oil and Gas sector**

148. To address all those issues, it is recommended to have a phased approach where the companies are:

- (i) Recommended to follow international best practices on mining and oil & gas regarding biodiversity;

- (ii) recommended to improve the level of communication with stakeholders and understand their expectations;
- (iii) Recommended to not only assess dependencies and impacts but also feedback communities and help them understanding the relevance of such actions;
- (iv) Recommended to finance the monitoring and controlling bodies to enhance their knowledge and controlling capacity;
- (v) Recommended to work with financial to help the local SME's adhering to good practices in favour of biodiversity.

149. These recommendations cannot be done all at once, therefore, a two-step staged approach is proposed divided into:

- a. **Low level ambition:** capacity building and biodiversity awareness period – during this phase it is expected that international companies with more understanding and capacity help local stakeholders to enhance their level of knowledge and understand the impact of protecting biodiversity. This phase need funding from the International Oil Companies (IOCs) and International Mining Companies (IMC's) and better communication and reporting to the regulators, local service providers and surrounding communities.

During this phase is paramount to collect baseline data for fauna, flora and marine life through a strategic study to better understand the level of awareness and collect baseline data of Mozambican fauna and flora as well as marine life (as we enter into the final stages of the 6<sup>th</sup> bidding round were the majority of oil & gas blocks are offshore, this become more important this days).

Hence, the low-level approach entails the following commitments:

#### **VC 01: support and strengthen the participation of local communities**

There is increasing recognition that the extraction of natural resources needs to generate improved and sustainable well-being for mineral and oil & gas producing regions and cities. If local communities do not benefit from those activities through better economic opportunities and quality of life, it will undermine their support for extractive activities, and increase adjustment costs when resources are depleted. The same can be derived for biodiversity protection.

Development involving minerals and other natural resources has been the cause of displacement and victimization, made easier by poor protection of indigenous peoples' rights to their land. The injustices of the past and present have engendered a deep mistrust of outsiders – in this case, governments, and mining companies.

Much of the environmental damage caused by mining and oil & gas affects local communities, most significantly in terms of their livelihoods and health. Environmental health problems may become evident not just close to the mine, but some distance away.

Buildings, roads, airstrips, and so on – as well as immigration of population and increased human activity – all create considerable change in local environments. This may lead to loss of biological diversity, including plants and animals important to peoples' livelihoods, such as cultivated land or pasture for livestock. The changes may affect land used by indigenous people for hunting and gathering, shift cultivation, or adversely affect forests that yield timber and a wide range of non-timber forest products such as game, resins, dyes, vegetables, and medicinal plants. The destruction of habitats fostering traditional herbal and medicinal plants can also weaken indigenous people's

autonomy and identity, not to mention their health. Noise from mining operations can be a problem for nearby settlements.

Damaging biodiversity, water depletion may also destroy or reduce fish stock, depriving local people of a vital source of food and, possibly, livelihood. If mining operations are to help communities work towards sustainable development, the communities need to be able to participate effectively in the decision-making processes for establishing and running the operations, to avoid or minimize potential problems. Moreover, the relationships between the community and other actors, including the company and government, need to be ones of collaboration, trust, and respect. The actions of companies and governments need to reflect cultural sensitivity and relevance.

**VC 02: encourage and promote effective public-private and civil society partnership, building experience and resourcing strategies of partnership**

During the interviews was possible to understand that there is a lack of trust among stakeholders: for example, between companies and civil society organizations (CSOs), between companies and government, between government and CSOs. Finding ways to bring all these interests together in various ways is an important dimension of the overall governance challenge associated with the natural resources industries. This voluntary commitment entails to building trust through multi-stakeholder dialogue to show that prioritizing common objectives and agreeing actions by each of the stakeholder groups can enhance biodiversity protection. This is further confirmed by the World Economic Forum WWF (2013:6) apud Addison and Roe (2018:9) that all stakeholders involved in mineral development ought to find common ground to understand each other's need, perception, and priorities.

A new relationship is beginning to emerge, based on recognition of the rights of communities and the need for community participation in decision-making. Moreover, new initiatives seek to avoid the company assuming the role and responsibilities of government, but rather focus on improving the capacity of local government and other local institutions to deliver extractive industry derived benefits over the long term. It is increasingly recognized that CSO's groups can also act as independent mediators, facilitating the flow of information to and from communities and implementing actions in partnership with companies and government. This approach centres on establishing a formal relationship with local people and their representatives and being guided by their needs and priorities – in effect, trying to work well with formal and informal local governance structures.

**VC 03: enhance the level of knowledge of Mozambican fauna, flora and marine ecosystem**

- b. High level ambition:** biodiversity standards as core values of country extractive industry development – the phase where all stakeholders understand, and support sustainable development therefore commit themselves toward being stewardship of compliance.

This approach comes with a set of commitments which represents the way forward and baseline for 2030 biodiversity voluntary commitments

**VC 01: set up voluntary exclusion zones as part of company values** – do not conduct mining or oil & gas activities in zones which are UNESCO World Natural Heritage sites and/or part of Key Biodiversity areas. Whilst “no go zone” policy might rather be seen as a mandatory commitment for IOC's and IMC's (the anchor players) affiliated to international sectorial body's hence following IUCN biodiversity guidelines or due to Mozambican law which prevent that to happen, the main idea behind this commitment is to make sure it goes all the way to the stakeholders.

Local communities, CSO's, companies providing services or goods to the anchor players, banks, etc should also abide to the No go zone policy if they want to have relationship with the first. This goes

with funding and increase the awareness level for all the stakeholders which is expected to happen following the VC's 01 and 02 from low level ambition.

**VC 02: Promoting biodiversity** – to promote biodiversity is required to the companies a more open approach to the stakeholders by, for example, allowing universities access to environmental studies and management plans and reports. This would allow the academic sector to further enhance their knowledge and suspect new investigation lines enriching country biodiversity knowledge for a better and informed decision-making process.

The companies should also entertain funding of educational initiatives (today young people are the decision makers of tomorrow) towards supporting climate and coastal areas & Oceans as well as research related activities onto those areas.

To better monitor above approaches, a set of indicators has been developed, based on the matrix below.



Table 21 Voluntary Commitments and low-level ambition

Low level Ambition Capacity building and biodiversity awareness							
VC	Pressure: Problem addressed	State	Impact	VC Response	Actors	Expected change	Broad indicator
Support and strengthen the participation of local communities	Local communities lack of "sense" of project appropriation and biodiversity awareness	Deforestation, habitat loss, land cover changes Threat to animals, plants, sea mammals, herpetofauna, accelerate soil run off, etc	Society as a whole loses ecosystem services and their associated welfare and well-being. Private companies in the sector are exposed to higher reputational risks	<ul style="list-style-type: none"> <li>Provided more responsibility and visibility to local community liaison person within the organization and share critical project data and impact on local communities</li> <li>Increase local community access to opportunities arising from project development</li> <li>Set up biodiversity champions within the communities</li> <li>Management plan for displaced</li> </ul>	IOC's, IMC's, Regulators, Civil society, local communities, MTA	<ul style="list-style-type: none"> <li>Increased level of project awareness</li> <li>Local communities become biodiversity champions</li> </ul>	<ul style="list-style-type: none"> <li>Number of meetings between local communities and project operator/owners</li> <li>% of project acceptance within the local communities (through an acceptance survey to be done on a yearly basis)</li> <li>% of local community persons employed</li> <li>% of local community companies providing services</li> </ul>

encourage and promote effective public-private and civil society partnership, building experience and resourcing strategies of partnership	<ul style="list-style-type: none"> <li>Project stakeholders lack of biodiversity management standards</li> <li>Poor control and monitoring from regulators and government institutional agencies.</li> <li>Poor follow up on environment al</li> <li>SME's without biodiversity awareness embedded into core</li> </ul>	Oil spill during logistic, use of plastic non friendly products, endangering of species due to road opening Threat to animals, plants, sea mammals, herpetofauna, accelerate soil run off, etc	<ul style="list-style-type: none"> <li>Society as a whole loses ecosystem services and their associated welfare and well-being.</li> <li>Private companies in the sector are exposed to higher reputational risks</li> <li>Government is more exposed to breach of law due to lack of control and monitoring capabilities</li> </ul>	<ul style="list-style-type: none"> <li>Fund certification for service providers</li> <li>Advocate for sustainability report from service providers</li> <li>Liaise with banks requesting more stringent environmental guidelines for access to credit by the service providers</li> <li>Fund capacity building initiatives for governmental bodies responsible for</li> </ul>	people with clear control and monitoring mechanism.	IOC's, IMC's, Regulators, Civil society, local communities, MTA, Association of private companies	<ul style="list-style-type: none"> <li>SME's and other service provider certified and with increased level of biodiversity awareness</li> <li>Private companies, CSO, financial institutions with clear understanding of IOC's and IMC's biodiversity core values</li> </ul>	<ul style="list-style-type: none"> <li>% of certified service providers per year</li> <li>% of local content</li> <li>Number of meetings with stakeholders</li> <li>\$ of total budget to fund certification and local enterprises capacity building</li> <li>\$ of total budget to fund CSO awareness programs in local communities</li> <li>\$/year to fund control and monitoring capacity for local government entities</li> </ul>
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enhance the level of knowledge of Mozambican fauna, flora and marine ecosystem	values endangers. Ex: Fuel transportation to project camps are done through trucks and most of the times drivers do not take into account measures to protect biodiversity	<ul style="list-style-type: none"> <li>Financial system more exposed to international breach of compliance on biodiversity issues</li> <li>CSO less collaborative with IOC's and IMC's with</li> </ul>	environmental issues <ul style="list-style-type: none"> <li>Set up a platform to discuss with the CSO and sponsor initiatives towards elevating their role in the local communities</li> </ul>	IOC's, IMC's, Regulators, Civil society, local communities, MTA, Association of private companies	<ul style="list-style-type: none"> <li>Strategic biodiversity study conducted</li> <li>Studies on alternative energy source</li> </ul>	<ul style="list-style-type: none"> <li>\$ of total budget allocated to research</li> </ul>
	<ul style="list-style-type: none"> <li>Investment in potential biodiversity rich area</li> </ul>	<ul style="list-style-type: none"> <li>Deforestation, habitat loss</li> <li>Threat to animals, plants, sea mammals, herpetofauna</li> </ul>	<ul style="list-style-type: none"> <li>protect habitats: conduct an enhanced EIA before approving development plans</li> <li>invest in research to better understand biodiversity richness</li> </ul>	<ul style="list-style-type: none"> <li>Fund research initiatives related to biodiversity protection</li> </ul>		

Table 1 Voluntary Commitments and High-level approach

High level ambition							
Dimension	Pressure: Problem addressed	State Change	Impact	VC Response	Actors	Expected change	Broad indicator
Set up voluntary exclusion zones as part of company values	Investment in potential biodiversity rich area	Deforestation, habitat loss Threat to animals, sea plants, sea mammals, herpetofauna	Society as a whole loses ecosystem services and their associated welfare and well-being.	“No Go Zone” police expanded to suppliers, local communities, and relevant stakeholders ““No Go Zone” police expanded to areas within the concession	IOC's, IMC's, Regulators, Civil society, local communities, MTA, universities	Increased level of understanding of the fauna, flora and marine life and associated values for the society as a whole	Zero projects being implemented in “No go zones” Zero tolerance to companies and/or to products or services coming/sourced from “No Go Zone”
Promoting biodiversity	Lack of awareness and scientific studies of mining activities and its impact on biodiversity in Mozambique	Deforestation, habitat loss Threat to animals, sea plants, sea mammals, herpetofauna	Society as a whole loses ecosystem services and their associated welfare and well-being.	Fund research initiatives allowing universities access to environmental studies and management plans and reports	IOC's, IMC's, Regulators, Civil society, local communities, MTA, universities	Increased level of understanding of the fauna, flora and marine life and associated values for the society as a whole	\$ of total budget for research (annual) \$ of total budget for research and educational purposes (annual)

### 3.12. Fisheries sector in Mozambique – a situational analysis

#### Major Characteristics and challenges

1. Mozambique has one of the largest coastal areas in East Africa, estimated at around 2,800 km, including different types of ecosystems and high biological diversity. More than 60% of the population lives within no more than 100 km of distance from the coastline, where fishing is one of the main sources of livelihood and income generation (Hoguane, 2007; Pereira, 2014; IDEPA, 2019).
2. In general, the sector activities are divided into fishing activities and the fishing complementary activities as follows: Fishing activity divided into two parts: a) Extractive – those with the purpose of capturing, collecting or harvesting fishery resources in maritime and continental waters; and b) Aquaculture – refers to the farming of aquatic species outside their natural environment, under humanly controllable conditions.
3. Complementary activities are divided in four parts: a) Processors or Transformers – those related to the forms of processing that include, refrigeration, freezing, canning, drying, smoking, salting, among others; b) Marketing – those referring to the first sale of fishery products and their transport; c) Port services - those comprising the mooring of vessels, unloading and loading of fishery products or of goods and inputs for fishing and aquaculture; and d) Construction and manufacture – those relating to shipbuilding and repair and the manufacture of fishing nets, artefacts, gear and other accessories.
4. Extractive fishing activities include industrial, semi-industrial and artisanal fishing. Industrial fishing - consists of Shallow water shrimp fishing in the Sofala bank and Maputo bay; Fishing for deep-water crustaceans including shrimp, crayfish; Lobsters and crabs; Fishing for demersal fish and large pelagic fish in the open sea and in the exclusive economic zone (EEZ) which includes grouper, snapper, emperor, Dorado, and Tuna. Semi-industrial fishing - consists of fishing of small pelagic fish; Shallow water Shrimp fishing; Kapenta - Is one of the most important semi-industrial fishery in inland waters (Zambezi river), in Tete Province; Use of By-catch.
5. Artisanal fishing - consists of shallow water shrimp fishing; Fishing for deep-sea crustaceans including shrimp, crayfish; Fishing of small pelagic fish; Lobsters and crabs; Fishing for marine and freshwater fish; shellfish fishing; Use of by-catch. The aquaculture activity - consists of industrial aquaculture of marine shrimp, Industrial seaweed aquaculture, Industrial aquaculture of marine fish, Industrial freshwater fish aquaculture; and Small-scale freshwater fish aquaculture (developing).
6. The potential of fisheries resources in Mozambique is estimated at around 332,000 tons, where the main resources are shallow water shrimp, deep-sea crustaceans, horse mackerel, mackerel, and demersal fish (PDP, 2010-2019). From this potential, about 214 thousand tons are explored, where the artisanal fishing subsector contributes with about 91% of the global catches, 2% of the semi-industrial fishing and 7% of the industrial fishing subsector (Soto, 2014).
7. Nonetheless, the contribution of economic activity in the fishing sector has varied between 2 and 4% to the national GDP. Moreover, despite the low contribution to the national GDP, fishing continues to play an important role for food security and employment. The largest aquaculture production so far was observed in 2005 from black tiger shrimp and algae productions (1067 and 20 tons, respectively) (MMAIP).
8. Shrimp farming has contributed significantly to the local economy before it was hit by outbreak of white spot virus disease back in 2010-2011 and significant losses were observed (). Although the shrimp industry has been trying to recover since the virus outbreak, inland fish farming (e.g. tilapia) has been showing some promising growth through some small and medium/large scale farmers (). However, overall the current production does not represent at least 5% of the aquaculture production capacity potential which Mozambique has in inland and coastal areas.
9. The fishing activity provides around 334,000 direct jobs, where about 290.000 is occupied by fishermen and the rest are collectors, divers, fish traders, processors, carpenters and naval mechanics. There are approximately 900,000 families that directly depend of fishing for income generation, subsistence and food security (PDEP 2012-2019).
10. Small pelagic fish (anchovies) of the genus *Thryssa* are normally the most abundant in artisanal catches along the Sofala bank, however with low economic being accessible to low- income coastal communities (Santos, 2014). On the other hand, the most profitable catches are from demersal resources such as the Ariidae family represented by *Arius dussumieri*; Leiognathidae family represented by *Gaza minuta*, *Secutor insidiator* and

*Leiognathus equulus*; and the Haemulidae family, represented by *Pomadasys kaakan*, which are registered as the most important (Santos, 2014).

11. Fishing communities are among the most vulnerable, isolated and marginalized people. Some of them are landless and situated at the forefront of climate change, subject to flooding, erosion, changes in the distribution of fish resources, extreme climatic events and rising sea levels.
12. The big fishing companies' activities are in the Sofala bank and Maputo bay (Figure 24). The map below shows the distribution and location of the main marine topographic banks that are extremely important from an ecological point of view for the different fisheries.



**Figure 24 Main fishing areas in Mozambique**  
Source: Google Earth

#### Structure of Fisheries Sector

13. The organic structure of the fisheries sector comprises 11 administrative institutions, Six (06) supervised institutions and one (01) subordinate institution. Each of the institution has its own role within the fisheries administration, based on a sequenced system in political, economic, scientific, social and technical terms, with legislation and other specific regulatory instruments (Santos, 2007; Pereira, 2014). The supervised institutions are: (i) The ADNAP; (ii) The National Institute for Fisheries and Aquaculture Development– IDEPA; (iii) The National Institute of Fish Inspection – INIP; (iv) ProAzul; (v) Fisheries Museum; (v) School of Fisheries. The subordinate institution is the National Institute of Fisheries Research - IIP. (Rebranding to InOM - Oceanographic Institute of Mozambique).
14. Some of these institutions are represented at provincial and district level where the main fishing centres are located (Pereira, 2014). In addition, there are others that include those responsible for stimulating productive activities such as the SDAE (*Serviços Distritais de Actividades Economicas*) and financial support institutions such as ProAzul which, in terms of actions, replace the FFP (Fishing Promotion Fund) or FIL (Local Investment Fund), which support investment projects. The role of each of these institutions in the fisheries value chain is described in the table 23.

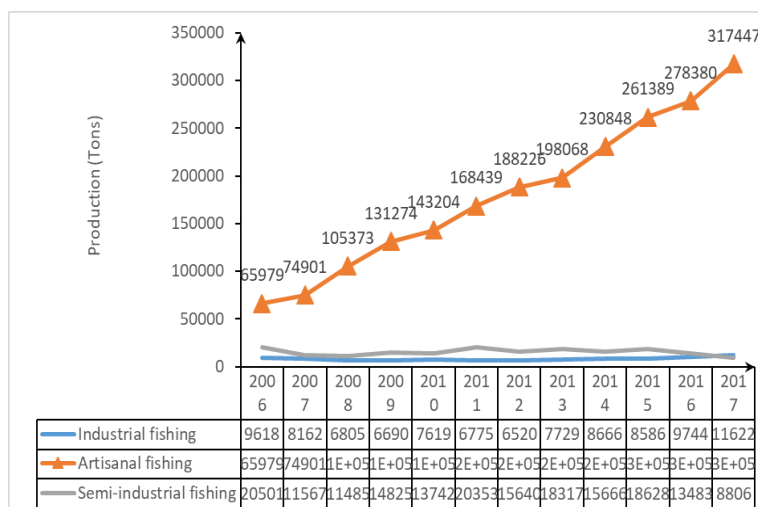
**Table 23 Structure of fisheries sector**

Institutions	The Role/Responsibilities
ADNAP (National Administration of Fisheries)	Has the responsible for controlling access to resources by issuing licenses and quotas, and ensures that these are met with inspectors. Ensure the conservation of aquatic biological resources susceptible to fishing through efficient and sustainable management, based on scientific and legal precepts.
IDEPA (National Institute for Fisheries and Aquaculture development)	Conducts research and promotes the development of small-scale fisheries and small scale aquaculture. It promotes actions aimed at the improvement of living and working conditions for fishermen and fish farmers.
INIP (National Institute of Fish Inspection)	It is responsible for ensuring the quality of seafood exports and imports.
IIP (Instituto Nacional de investigação Pesqueira) Note: It is being rebranded to InOM (Oceanographic Institute of Mozambique)	Conducts biological research to determine biomass and resource stock. Promotes the Sustainable Development of Fisheries and aquaculture.
ProAzul	Investment Projects
SDAE (District services of economic activities)	Technical assistance and Investment Projects districts
FIL (local investment fund)	□ Investment Projects

Source: Adapted by the author

#### Production statistics for industrial, semi-industrial and artisanal fishing sub-sectors

15. The contribution of each sub-sector over 12 years is shown on Figure 25. The artisanal fishing has the most contribution with about more than 80 % of total production, which means it plays an important role for the country economy. This great contribution represents, on the one hand, the socio-economic importance of the sector for coastal communities, mainly with regard to poverty alleviation, since fishing has been the main source of subsistence, of generation income and employment of several families. However, on the other hand, it may be the result of excessive fishing effort resulting from the greater number of fishermen (290.000) involved. It may also be associated to increasing in the number of fishing gears in recent years, especially beach trawling, the most favourite for fishermen because it provides greater catch yields compared to other fishing gear.

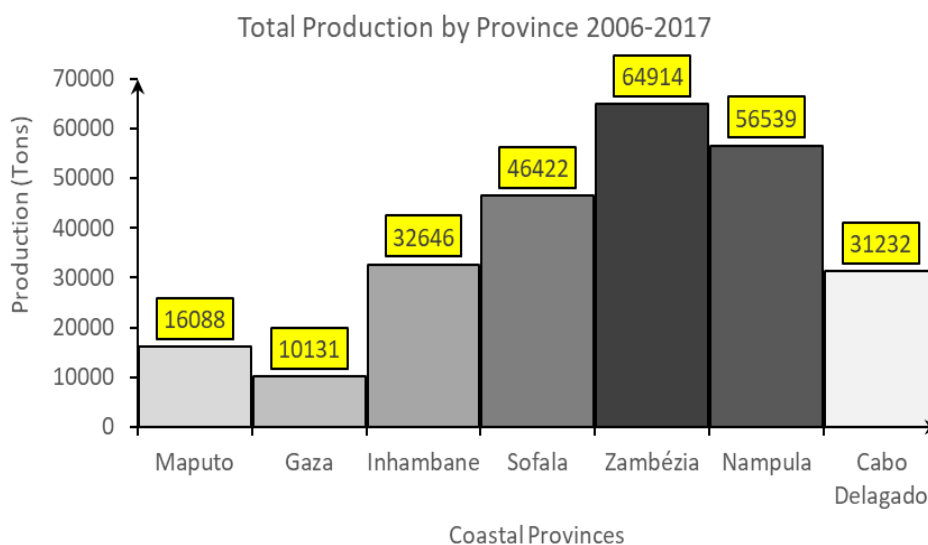


Source: MIMAIP, 2017

Artisanal fisheries production by coastal Provinces



16. Figure 26 shows the contribution of coastal provinces to the total artisanal fisheries production. Based on that figure, the seven (07) coastal provinces contribute more than 80% (257,972 tons) of the total catch, and the three (03) provinces of the Sofala Bank region (Sofala, Zambézia and Nampula Provinces) contribute with 53.4% of the total fish production.
17. A separated analysis by Province shows that the Zambézia Province is the most productive in the country with around 64.919 tons, followed by the Nampula Province (56.539 tons) and in third place by Sofala Province (46.442 tons).



**Figure 26 Artisanal Fisheries Production by Province**  
Source: MIMAIP, 2017

### Main fishing resources

18. Most fisheries resources that make up the value chain include *Lobsters, Crabs, marine fish, freshwater fish, tuna and related species, shrimp, Acetes, Cephalopods and Molluscs, shark* and others (Table 24). The data refer to the 2017 Statistical Bulletin, where for each group the contribution of total production in tons and the corresponding income values are presented.

**Table 24 Fisheries resources**

Group	Artisanal Production (tons)	Income (10 <sup>3</sup> MTS)	Coverage Sectors	Fishing gear
Lobster	1.058	197.745	Industrial, Semi- industrial and artisanal fishing	Beach seine; Bottom drag;
Crab	3.587	277.754	Industrial, Semi- industrial and artisanal fishing	Beach seine; Bottom drag;
Marine fish	191.469	12.780.536	Semi-industrial and artisanal fishing	Beach seine; Bottom drag; Surface and Background gillnet
Freshwater fish	90.052	6.010.962	Semi-industrial and artisanal fishing	Cast net; Line; surface gillnet, Cages
Tuna and related species	6.299	331.889	Industrial, Semi-industrial and artisanal fishing	Beach seine; Line; longline; Surface and Background gillnet
Shrimp	6.295	1.008.497	Industrial, Semi-industrial and artisanal fishing	Beach seine;
Acetes	3.533	47.164	Artisanal fishing	Beach seine;
Cephalods and Molluscs	4.125	275.343	Industrial, Semi – industrial and artisanal fishing	Pots; Beach seine;
Shark	1.969	131.430	Industrial, Semi-industrial and artisanal fishing	Beach seine; surface and Background gillnet
Others	4.381	58.482	Industrial, Semi-industrial and artisanal fishing	Beach seine; Line; longline; Surface and Background gillnet
Use of by-catch	1.703	22.734	Artisanal fishing	Beachseine; Surface and Bottom gillnet

19. According to these data, the most important groups in terms of production volume and income generation are marine fish with an estimated production of 191,469 tons and corresponding revenue of 12,780,536 MT, and shrimp with an estimated production in 6,295 tons and a corresponding revenue of 1,008,497 MT.
20. On the other hand, shrimp and marine fishes are the ones that present a social and economic importance for the fishing communities. However, in the last 3 years, live mangrove crab export associated to artisanal fishery has also become an important resource for the communities. Crab fishery is also linked to increasing of small and medium retailers and processor companies.
21. Most of the export is associated with industrial shrimp fishery, whilst artisanal fishery is directly or indirectly related to local income distribution, employment generation and business opportunities.
22. The main fishing gear used is Beach seine, a multi-specific fishing gear that provides higher yields in terms of capture, but often with low selectivity, which is a major problem for the sustainability of aquatic resources.

**Opportunities and challenges/constraints for marine biodiversity conservation**

23. Major opportunities and challenges for marine biodiversity conservation in Mozambique according to our fieldwork data are presented in Table 25. Most of fishermen, traders, crab companies and public sector actors understand that to create positive impacts on conservation involve mainly on direct engagement with coastal communities through environmental education and participatory management in order to raise main issues associated to their current practices on fishing methods, the key roles of surrounding environment (e.g. Mangroves ecosystem, corals habitat), fishing prohibition period and understanding the existing fishing laws.
24. In addition, doing ecosystem or habitat recovery program such as mangrove reforestation is key for the conservation. Adoption of other economic actions like aquaculture and improving the value chain to create more employment has also been identified as important activities which promote positive impacts.
25. Public sectors, private sector, NGOs and fishermen agree that more resources are required to support the existing regulating institutions and institutions involved in other economic activities other than fisheries. In addition there is a need for development of other income activities for coastal communities and improvement of fishery resources exploitation status assessment, and take advantage of existing international biodiversity conservation programs.
26. Biodiversity conservation awareness programs can be included in basic school and marine conservation areas can be established. There are international collaborative conservation projects and funding.
27. The main challenges found for marine biodiversity conservation start with continuous use of inappropriate fishing methods (e.g. dangerous gears and small nets) and cutting of mangroves for other services (e.g. wood, firewood). Furthermore, other economic activities such as mining and heavy sand exploration represent challenges when they are not managed sustainably and efficiently. Lack of or very limited financial resources and/or coordination to support current biodiversity conservation measures and government institutions are another bottleneck. Also lack of alternatives activities to fishery is major issue which indirectly force the coastal communities to do things which are not in favour of biodiversity conservation or scientific recommendations. At last and not least, climate change has been identified as being one of the main challenges.

Table 1 Major positive and negative activities affecting marine biodiversity conservation, and opportunities and challenges/constraints for marine biodiversity conservation in fishery sector

Activities associated to marine biodiversity and opportunities for marine biodiversity conservation in fishery sector				Challenges
Activities which create positive aspects for biodiversity	Activities which create negative aspects for biodiversity	Internal	External	Constraints for biodiversity conservation
Educate coastal communities to respect mangroves	Using dangerous fishing gears	There is willingness to do more campaigns on biodiversity conservation and use of dangerous fishing gears such as chicocota	Factories and industries can be set up along the coast to provide other alternatives	Lack of funding and/or coordination to support current biodiversity conservation measures and government institutions, and NGOs
Use selective fishing gears and stop cutting mangroves	Trawl in coral areas	Relevant institutions seeking for more resources	Local development strategies for development require more external resources.	No commitment from local communities with biodiversity conservation measures (e.g. Continue cutting mangroves for different purposes such as wood, heavy sand extraction)
Raise awareness among coastal communities on the role of mangroves in biodiversity conservation	Using small fishing gears/mesh	Fishery sector requires more funding for their activities.	Fishermen are open to get subsidized credit system.	No alternative to fishing (lack of other alternatives)
Establish fishing prohibition period	Anchoring in seagrass	Mangroves reforestation programs needs more support	Fishery sector requires more funding for their activities.	Current regulatory approach is not working properly
Create minimal fishing size	Heavy sand exploration	There is need to do biodiversity conservation awareness in the community.	There is need to do environmental education	Law implementation is not satisfactory
Do mangroves replanting	Cutting mangroves and seagrass, and coral destruction	Actors open to diversification of other income activities	There is need for more knowledge and funding	Inefficient inspections of the fishery activity

Create more local Community based organizations	Mineral activity	There is a willingness to envelop sustainable mangrove management approach.	Alternative activities requires more funding.	Scientific data are ignored
More mangroves restoration program	Climate changes	More fishery resources exploitation status are required.	There is a need for more collaborative projects among the stakeholders.	
Have accurate number of fishermen	Water pollution	There is room to create specific fishery Resources recovery areas such as sanctuary.	There are international organization working on marine biodiversity conservation	
Ecosystem and habitat restoration program		More employment can be created through other activities.	Mozambique is signatory of many international agreement on biodiversity conservation	
Implement aquaculture		There is some mangrove reforestation program in Mozambique which can be used as examples.	There is interest from international investor to support marine biodiversity conservation	
Improve social responsibility from companies based in coastal areas		There is international willingness to improve biodiversity conservation.		
Promote infrastructures constructions across the value chain to promote employment in the community		Public sector willing to include biodiversity issues at primary school.		
Adopt participatory management		Lack of biodiversity loss awareness.		
		There are institution/NGOs already working on biodiversity issue		

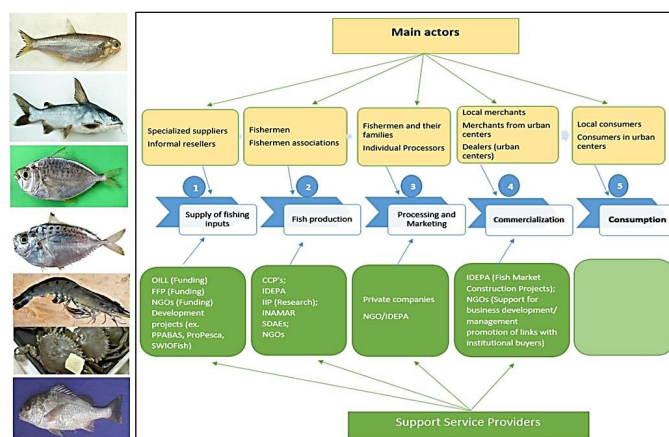
		There are area to establish marine conservation zone			
		Lack of better inspection logistic (equipment's and technologies) which can be used 24 by 24.			
		There are organized communities and good regulation			

Source: authors

### 3.13. Mapping of actors and stakeholders of Fishery Sector

#### *General mapping of actors and stakeholders of artisanal fisheries (including shrimp and crabs)*

1. The entire structure of the artisanal fisheries value chain involves the following actors: government, fishermen, processors, traders, private sector, NGOs and other institutions that express an interest. Their tasks are divided between supervision, coordination, supply of inputs, technical assistance and financial support.
2. As strategies to improve processing and conservation techniques across all fish value chain, the government through fisheries sector has been promoting the following activities: Building of first sale markets (FSMs) in the main fishing centers distributed all over the coastal area of the country; Allocating the necessary equipment to meet the needs of FSMs, such as ice factories, refrigerated containers and small water supply system; and It has also been working on finding solutions to improve access routes to the main fishing centers, as a way of facilitating the flow of fishery products.
3. Nonetheless, these activities have not been well adopted by artisanal fishermen. The inadequate location of most markets, and the lack of clarification of the terms of use, were the main reasons raised by fishermen, which resulted in their abandonment. The logical structure of the value chain of fish products, main actors and stakeholders involved in the process is outlined in the following Figure 27. According to the figure, the value chain of artisanal fishing products comprises two parallel segments, which are: (i) Main actors - these are elements that are involved in all stages of the chain, including the supply of fishing inputs, fish capture, processing and conservation, transport and marketing, as well how to consume fish; and; (ii) Value chain support services - these are external elements or entities that provide technical assistance, finance activities, construction of market infrastructures whose purpose is to improve the performance of the value chain as a whole.
4. In that context the main actors and providers of assistance and support of the value chain of fishery products resulting from artisanal fishing are described in the below diagram (Fig. 5). According to the diagram, fishing inputs are provided both by specialized suppliers, informal resellers, as well as by projects or programs through entities that provide support services and technical assistance.
5. Fishermen, either individually or by associates, are the main actors in production. However, to carry out their fishing activity, fishermen have several support bases, from inspection, support to development, safety aspects and contraventions and incentives.



**Figure 27 Value chain of fishery products from artisanal fisheries.**

Source: Adapted by the author



6. Processing is usually done by the fisherman himself or by their families, often using traditional and inappropriate techniques. Since the processing techniques are not adequate, some Private organizations, non-governmental organizations and public institutions, through some programs, promote training and support fishermen and resellers in terms of fish processing and conservation.
7. Local and urban traders are the pivots that guarantee the marketing of fish products. However, as it is a fish value chain, some traders also benefit from some type of support from NGOs or public institutions, from the construction of markets, training in business matters.
8. Regarding consumption, most artisanal fishing production is consumed locally, which includes local and urban communities. However, some artisanal fishery products manage to be exported to neighbouring African countries and others to European and Asian countries.

#### Case study mapping of actors and stakeholders of shrimp and crabs artisanal fisheries in Pebane and Nicoadala/Quelimane

9. This section describes a case study of main actors of the shrimp and crab artisanal fisheries value chain, the components of the chain and analysis the related main issues. This study was done to complement the general mapping described in section 2.2.1. In general the actors involved in artisanal shrimp and crab fishery are all the same; therefore they have common value chain.

#### Involved actors and Stakeholders

10. The stakeholders involved in the small scale fishery sector of shrimp and crab are divided into four groups (Figure 28): Fishermen and associated action structure, public sector, private sector and organizations/or partners which work for environment. There has been recently, intensification of the relationship among those actors. Apparently, this evolution is linked to intervention of the public sector through their representative at local level and their financial and supporting partners who engage on actions which promote sustainability and conservation of biodiversity.

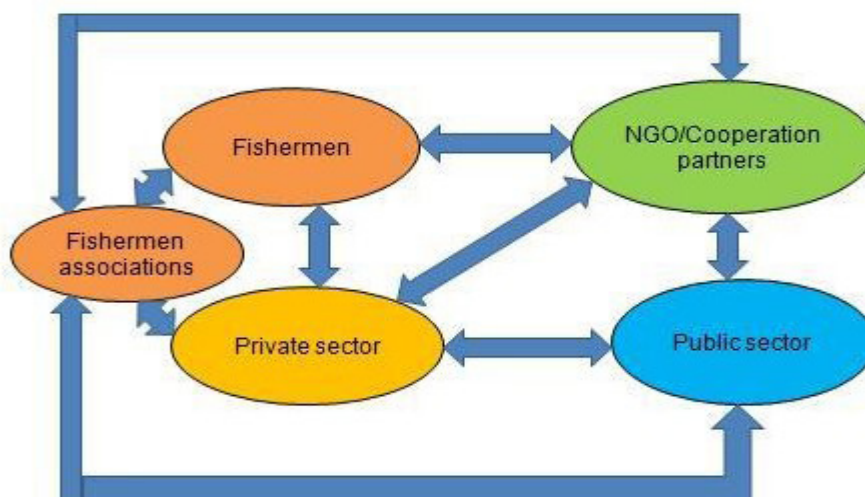


Figure 28 Category of stakeholders in small scale fishery

**Fishermen and their respective collective action structures**

11. From socio-economic structure point of view, fishermen can be divided between the owners of conventional arts and boat/vessel, and fishermen without any property who most of them work with the other group based on informal contracts. Those contracts imply that the fishery products sharing are divided by half (one half for the owner and another half for the fishermen who are employee).
12. Although the owners are considered fishermen, it is common for them not to fish but get involved in vessel/boat preparation and on fishery products selling to informal buyers. It is also usually to see fishermen running other activities than fishery in the community or near them but at very low level. The fishermen families, the wife in particular, are frequently involved in small scale agriculture which is for subsistence. This indicates that if any improvement or support has to be done to improve small scale fisheries and reduce pressure on biodiversity, there is need to include gender role as the female can have a key responsibility on alternative activities.

**Fishing Associations**

13. Some fishermen are organized in associations. According to the local source, there are fishermen association (e.g. Association of Natural and Friends of Madal – ANAMA, Association of Natural and Friends of ICIDUA – ANAICIDUA, Fishery association of Zambézia – ASSOPEZA) and many Community Council of Fishery (CCP); however in general those organizations are less active and have very low institutional development status. Apparently, those organizations are created to facilitate attainment of external support and access to OII.

**Community Council of Fishery (CCP)**

14. The CCP was created based on board of the National Politic for Fishery. Those entities do monitor themselves and regulate fishery through best fishery practices and environmental education, conflict resolutions, and to help the authorities on fishery licensing and inspection.
15. Therefore they play a key role in the value chain considering that they are diversified group composed of fishermen (Vessel owners and their employee), processors, traders, and other association members, and work with public sector and NGOs.

**Public Sector**

16. Besides District Services of Economic Activities (SDAE) which inspect, provide and determine license fees for fisheries, there are other public sectors which act on behalf of MMAIP such as Provinces Fishery Direction (at Province level) and National Institute for Development of Fishery and Aquaculture (IDEPA). IDEPA promotes practices which stimulate small scale fishery and aquaculture development and contribute on improvement of working conditions of fisheries communities. Another institution is called National Institute of Fishery Inspection (INIP) which inspect seafood health and safety.

**Private Sector**

17. Intervention of formal “private sector” in small scale fishery is strong in the study region. There are companies which are crabs buyers (e.g. Ten Da Hai, Taicom Mozambique, Mozambique Xinhong, Crown Fand). Their headquarters are based in Quelimane but they have representatives in Pebane and some in Maputo (where the process crabs to export). Some crabs are consumed locally or in urban areas.
  18. Private sector in shrimp value chain is based on informal individual traders, hotels and
-

restaurants, and local and urban consumers.

### Partners and NGOs

19. Partners and NGOs are everywhere in the value chain of shrimp and crab through funding inputs, institutional support to fishermen associations, CCF and processors, and support on business development and management to promote connection between them and buyers.

### Value chain component

20. According to our data and information from Sofala Bank, the value chain is divided in five main components (Figure 29).

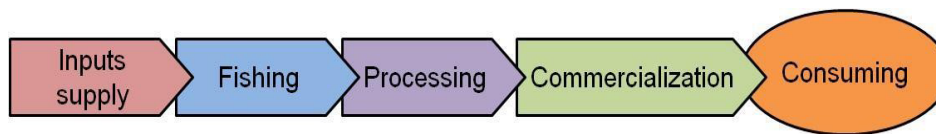


Figure 29 Shrimp and crab value chain components

### Input supply

21. All inputs required for fishery, processing and commercialization are acquired from specialized establishment and informal resellers with or without accreditation from specialized companies. Informal resellers do sometime get their products from overseas.
22. Inputs are composed of boat and fishnet maintenance material, small processing material, wood and salt.

### Fishing

23. This is production part of the value chain through shrimp and/or crab fishery. This activity involves fishermen and other type of professions which are directly or indirectly connected to fisheries. Small scale fisheries do also interact with semi-industrial and industrial fishery.

### Processing and commercialization

24. The fishery product processing rely on the location of the where fishermen land, local processing conditions and/or the final product destination (e.g. depending also on type of the consumer).
25. Crab is commercialized alive by size at the landing site (e.g. Fishing centres, port or natural harbors), nationally or overseas. Fresh shrimp is also sold locally or to overseas.
26. The products can be sold directly to the consumers or resellers who are the intermediate but they are known to pay less for fishery product.
27. When the fishermen cannot sell their product, most of them will have to process them
28. Transportation and distribution agents also play is key role in the value chain.
29. Regional buyers are divided in two groups. First one gets the products directly from fishermen and/or national retailers. This business model is applied for both shrimp and crab. Second group include agents/resellers who transport and sell fishery products in other districts and provinces within Mozambique.
30. A summary of commercialization value chain is shown below:

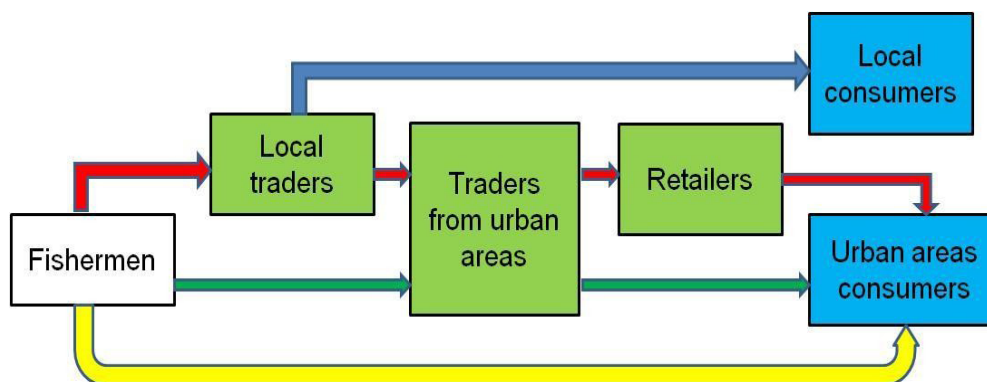


Figure 30 Commercialization value chain scheme of shrimp and crab

### Mozambican consumers

31. This is the last part of the value chain. Consumers get fisheries products from fair, retailers, resellers, and supermarket or in restaurants and/or hotels. This depends on the consumer origin and their income level. Consumers of artisanal fishery products can be divided between individual or institutional (see Table 26 for more details).

Table 26 Consumers' segmentation

Segment		Characteristics
Institutional buyers (Urban area)	Hotels and restaurants	Source fresh and frozen products, mainly first class fish and large shrimp. Do not always pay when the product is ready.
	Major companies	High financial capacity. Source mainly frozen carapau. Payment methods is diversified but they usually pay weekly
	Public establishments	Limited financial capacity. Source frozen imported carapau in huge quantities and smoked/salted fish. Payment is usually done between 15 to 30 days.
Rural individual consumers		Low purchasing power. They source irregularly and mainly dried/smoked/salted fish. When available they source imported frozen carapau. Purchase also dried/smoked/salty fish to pay seasonal work forces (This practices is decreasing)
Urban Individual consumers		High purchasing power. They source regularly and sometimes using credit card. They source diverse amount of products. Urban consumers of low incomes source regularly frozen imported carapau.

### 3.14. Pressures triggered by fisheries on biodiversity and impact

#### Current state of biodiversity and desired state in activity zones of the sector

32. According to Pereira et al. (2014), Mozambique has 7 high areas of biological values which are considered as locations of biodiversity hotspots (Table 27). Overall, the conservation status of

the biodiversity is incomplete in some hotspots (e.g. Quirimbas National Park, Zambezi Delta & Marromeu Complex, Pomene Estuary) and do not exist in other (e.g. Inhambane Zavora).

33. Zambezi Delta is part of the Sofala Bank area where the fisheries of shrimp and crab is done. It means the biodiversity of the overall fishery area is partially protected and it does not even represent 50% of the Sofala Bank area which suggest an urgent need to improve the current status.

**Table 27 Biodiversity hotspots in Mozambique**

<b>Region</b>	<b>North of Mozambique</b>
<b>Location</b>	<b>Quirimbas Archipelago &amp; Nacala-Mossuril (EcoRegion importance)</b>
<b>Conservation Status</b>	Quirimbas National Park (partial protection of the Archipelago since 2002 – 1,430km <sup>2</sup> ; Decree 14/2002).
<b>Biological Value</b>	Coral reefs, mangroves and savannahs. Highest diversity of corals and fish, aggregation of sharks, Bumphead parrotfish ( <i>Bolbometopon muricatum</i> ) and Napoleon wrasse ( <i>Cheilinus undulatus</i> ). Nesting area for Green and Hawksbill turtles and foraging ground for Olive Ridleys, Loggerheads and Leatherbacks (Garnier et al., 2008).
<b>Remarks</b>	Some important biological areas such as Neptuno reef, which is a remarkable nursery area for sharks, are located outside the park's borders (Silva, pers. comm.). Other areas might be protected by local initiatives such as Vamizi Island which has its own community sanctuary (Garnier et al., 2008).
<b>Region</b>	North of Mozambique
<b>Location</b>	Primeiras and Segundas Archipelago (10,411 km <sup>2</sup> )
<b>Conservation Status</b>	Environmental Protected Area since 2012 (Decree 42/2012) EcoRegion importance
<b>Biological Value</b>	Coral reefs. Important nesting grounds for green and hawksbill marine turtles, highly diverse coral reefs, home to migratory whales, dolphins and bird species.
<b>Remarks</b>	The protected area was created as a joint effort of CARE, WWF, and the government to protect the environment and improve fisheries and people livelihoods.
<b>Region</b>	Mozambique central regional
<b>Location</b>	Zambezi Delta & Marromeu Complex
<b>Conservation Status</b>	Partially protected by the Marromeu Special Reserve (1,500 km <sup>2</sup> ) Decree 1994 of July 23, 1960. Marromeu Complex of the Zambezi Delta was declared Wetland of International Importance in the Ramsar Convention in 2003. Global importance
<b>Biological Value</b>	Mangroves and swamp.  Part of the largest mangrove complex in the Western Indian Ocean (2,800 km <sup>2</sup> ) and a nursery area for fish and prawns. Concentrations of Risso's Dolphin, Humpback Dolphins and whales including breeding Humpback Whales (EAME, 2004). Highest density of waterbirds in Mozambique including Great White and Pinkbacked Pelicans, Glossy Ibis, Spuwing Geese and Whitebreasted Cormorants and the endangered Wattled Cranes (Bento & Beilfuss, 2000) and African Skimmer (EAME, 2004). The area is also habitat for other wildlife including elephants, wild dogs, Leopards and lions (Bento & Beilfuss, 2000).

<b>Remarks</b>	There is an urgent need to restore seasonal flood flows of the Zambezi River to sustain ecological processes (Beilfuss & Santos, 2001). The Zambezi Delta regulates the recruitment of prawns, one of the biggest industries in Mozambique. Protection of the area is important for both the economy of the country and the ecology of the area (da Silva, 1986).
<b>Region</b>	Southern
<b>Location</b>	Bazaruto Archipelago and Cabo São Sebastião
<b>Conservation Status</b>	Protected by the Bazaruto National Park since 1971 limits expanded in 2001 (1,430 km <sup>2</sup> ; Decree 39/2001 of 27 November) Globally important Cabo São Sebastião - Total Protect Zone since 2003
<b>Biological Value</b>	Coral reefs, rocky reefs, seagrass banks, mangrove, sand dunes  Biggest Dugong ( <i>Dugong dugon</i> ) population in the Western Indian Ocean, 4 marine turtles, shark aggregation, 5 dolphin and 3 whale species (United Nations & World Heritage Convention, 2014), 6 endemic gastropod mollusc species. Populations of six bird species regularly exceeds 1% of the global population (EAME, 2004).
<b>Remarks</b>	Approximately 3500 people are living within the park. Barrier to cyclones and barrier lakes.
<b>Region</b>	Southern
<b>Location</b>	Pomene Estuary
<b>Conservation Status</b>	Partially protected by Pomene Reserve (Decree 2496 of 4 July 1964)
<b>Biological Value</b>	Mangroves, seagrass banks, coastal forest and rocky reefs. Large estuary important as nurse area for a great variety of fish, seagrass banks and sea horses.
<b>Remarks</b>	Seahorse population massively declined in the last 5 years (Y. Tibiriçá, pers. obs.)
<b>Region</b>	Southern
<b>Location</b>	Inhambane-Zavora (including Inharrime Complex)
<b>Conservation Status</b>	Not protected
<b>Biological Value</b>	Rocky reefs, tidal reefs, mangroves, lake systems and sand dunes Aggregation of manta rays ( <i>Manta birostris</i> and <i>Manta alfredi</i> ), and whale sharks ( <i>Rhincodon typus</i> ), especially from Tofo to Zavora. Mating and reproduction area for a large population of Humpback whales during winter months. Leatherback turtles and Loggerhead turtles nesting area.
<b>Remarks</b>	United Nations & World Heritage Convention (2014) suggest Tofo-Bazaruto as a potential World Heritage marine site differentiated into two units: Bazaruto and Tofo. We agree that this area is a hotspot for conservation.  However, we suggest that the Tofo-Bazaruto hotspot be extended to Zavora-Bazaruto to guarantee the integrity for protection of manta rays and whale sharks, since several scientific studies (Marshall, 2008; Marshall & Bennett, 2010; Pierce & Marshall, 2008; Pierce et al., 2010; Rohner et al., 2013) show that these large animals aggregate from Zavora to Vilanculos. There are only a few reefs in each zone where these animals aggregate often. Failure to protect part of this area could affect the successful protection of these species. Therefore small but effective protection for those reefs as part of a network would be the most effective way to protected these endangered species
<b>Region</b>	South - Maputo Bay-Machangulo Complex
<b>Location</b>	Ponta do Ouro to Inhaca



<b>Conservation Status</b>	Inhaca (DL 2620 of 25 July 1965) Ponta do Ouro Partial Marine Reserve established in 2009 (Decree 43/2009 of 21 August). Belongs to Maputaland-Pondoland-Albany Hotspot (CEPF, 2010) Global importance
<b>Biological Value</b>	Subtropical rocky reefs, marshes, seagrass banks, savannahs and grasslands. High diversity of fish, invertebrates, sharks, rays and skates (the elasmobranch fishes). Aggregation of sharks especially bull sharks ( <i>Carcharhinus leucas</i> ). Particularly important as a nesting area for loggerhead turtles ( <i>Caretta caretta</i> ) and leatherback marine turtles ( <i>Dermochelys coriacea</i> ) (Hughes, 1971). Important feeding area for turtles, dugong and migratory birds such as whimbrels and flamingos. Northern limit of migration for Southern Right Whale, migratory route for humpback whales and resident dolphins
<b>Remarks</b>	The area is part of a transboundary conservation project jointly funded by the Mozambican and South African Government.

### Direct and indirect pressures

34. The environmental impacts of shrimp fishery is closely linked with the reduction of stocks as a result of overfishing, which is however a major problem, as it creates pressure on other species. On the other hand, fishing without awareness of the risks to the environment, accelerates the increasing release of the rest of fishing materials such as synthetic nets, among others, which, in addition to being a non-biodegradable material, pollute the environment, and poses a danger to marine life as it can kill other animals.
35. Currently, the environmental impact of crab fishery is associated to bad fishing management as fishermen do catch small crabs at some stage. This will have serious effect on the crab population and other species related to them in their food chain.
36. Use of destructive shrimp fishing practices such as deep trawls creates negative consequences for marine biodiversity and habitats.
37. The strong pressure exerted by shrimp and crab fishing activity has serious implications for spawning, maturation and reproduction of those species and those caught on bycatch. Due to the intensity of this action, it is inevitable that there is direct and indirect ecosystem imbalance, which will result in environmental (Food chain change, low efficiency of the flow of biomass in the ecosystem, impoverishment of the ecosystem); social (Lack of food, malnutrition, poverty, among others); and economic damage (low family income).

### Risks and impacts for the sector and the country

38. Shrimp and crabs rely on mangroves ecosystem in most part of their life cycle. Mangroves have nutrient rich-environment and are also an important habitat for other species (e.g. plankton, fish, birds) where they spend some or all part of their lifecycle. Some of those species have high economic value for the coastal communities and are key populations in other habitats such as coral reefs, seagrass beds and the offshores when adults. In addition mangroves protect the coastline (e.g. preventing erosion) and inland areas (e.g. from extreme weathers), and act as fitorremediators (e.g. detoxification and depuration of waste water). Coastal communities also get construction material, firewood and tannis from the mangroves (Bandeira et al., 2009; Paula



et al., 2014).

39. The main risk of mangrove ecosystem to fishery sector in Mozambique is related to their reduction due to unsustainable clearance of mangroves for other activities other than fisheries (e.g. agriculture, salt, heavy sands and hydrocarbons extractions). Therefore, decrease of mangroves abundance in coastal areas will have direct impact on shrimp and crabs populations stocks and other associated species, and indirectly will have negative effect on population of other habitats (e.g. coral reefs, seagrass, offshores). Furthermore, due to increase occurrence of extreme weather in past 5 years in Mozambique, especially in areas dominated by mangroves populations (e.g. Sofala Bank), mangroves reduction has been showing to increase coastal areas vulnerability to storms and strong winds.
40. Enhancing the status of biodiversity will have positive effects on fishery sector as it is assumed that the process will contribute to recovery of economic species population and also provide diverse fishery species choices for the fishermen. In addition, it **may indirectly reduce pressure on mangroves destruction as some people will move to fishery.**

### 3.15. Best practices of the Fisheries and inspiring models

#### Existing sectoral best practices in Mozambique

41. As shrimp and crabs spend some/most of their life cycle in mangroves, there are restoration programs coordinated by the government and non-governmental institutions.
42. There is community engagement to support them with best fishing practices although it is limited by other factors, mainly financial and infrastructure resources.
43. Coastal communities have been incentivized by the government to adopt aquaculture as an alternative to fishing. However, this sector is still at very early stage.
44. Prohibition fishing period has been established and widely spread across the public communication channels (e.g. radio, TV) although there are still found some fishermen who break the laws and still go fishing due to lack of other alternatives. There is fishery law and fishery management plan.
45. The Ministry of the Sea, inland waters, has for many years developed several partnerships with international organizations through which it develops programs and projects aimed at the development of the fishing sector in the country. According to (Lopes, 2006, cited by Santos, 2007 ), the main organizations that have given their great support to the sector since 1994, are NORAD (Norwegian Agency for Development); (ii) DANIDA (Danish International Development Agency), ICEIDA (Icelandic Development Agency), OPEC, DFID, European Community, cooperation from several countries such as France, Japan, Belgium, Italy, South Africa, Ireland and Spain and agencies such as IFAD (International Fund for Agricultural Development) and AfDB .
46. The Government of Mozambique through Ministry of the Sea, Inland Waters and Fisheries is a signatory of the Convention on Biological Diversity (CBD). Therefore, there is no doubt that there will be great interest to catalyze and enable voluntary commitments from economic actors in this sector that aim to put down the loss of biodiversity
47. Proazul project has been subsidizing fishermen/companies adopting some best fisheries

practices.

**Other relevant best practices to address pressures from other countries**

48. South Africa has exclusive institution working on marine biodiversity issues (South African National Biodiversity Institute which - SANBI) which have scientist working across science-policies in order to provide science based policies to relevant public and private sector. It also has an aquatic biodiversity global renowned institution (South African Institute for Aquatic Biodiversity) which contribute to South African and international biodiversity knowledge. Mozambique does not have any specific institution.
49. Brazil has National Commission for Biodiversity (CONABIO) which is responsible for the country best practices of biodiversity conservation. Mozambique should have one.
50. The UK has the UK Marine Biodiversity Monitoring Strategy. It helps designing a scheme for monitoring the different biodiversity components (benthic habitats, plankton fish & cephalopods, seals, seabed, cetaceans and ecosystems processes and functions) in a cost-effective and integrative way.
51. Private shrimp aquaculture companies across Asia and Latin America have annual mangroves reforestation program which contribute to preservation of marine organisms associated to mangrove ecosystems. This type of program is used as part of sustainability strategy for those companies to get national and international certifications.

### Combined responses

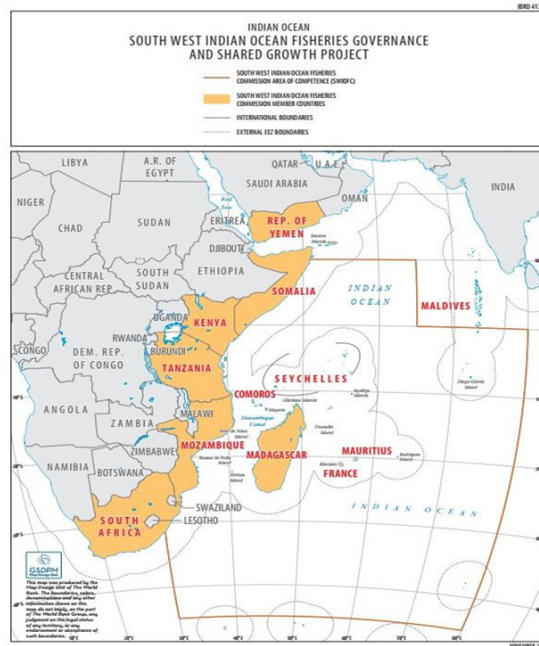


Figure 31 Map showing the SWIOFC member countries.

52. Mozambique has been part of the South West Indian Ocean Fisheries Commission (SWIOFC), a regional collaboration project between twelve member's states (Figure 31), which worked to reduce resource degradation and strengthen fisheries management to boost the regional economy and enhance local livelihoods.
53. The country is a signatory of the Convention on biological diversity, and has several documents that aim at the conservation of ecosystems, habitats and biological resources. The existence of institutions and organizations that work around the conservation and preservation of biodiversity is a great advantage.

### 3.16.Strengthen the transformative role of the national framework towards a sustainable fisheries sector

#### 3.16.1. Aspects of the framework in favour of environment and sustainable development

*Constitution of Republic of Mozambique (November 16, 2004)*

- a. The current constitution of Republic of Mozambique on article 90 establish the fundamental right to create "balanced" environment and obligation to defend it
- b. The State and local councils in collaboration with associations linked to environment defense, can adopt politics of environment defense and oversee the rational use of all natural resources
- c. In addition, the constitution declare that natural resources in the ground, underground, inland waters, territorial waters, continental platforms and exclusive economic zone are State proprieties.

### **Fishery Law**

Establish the judicial regime of fisheries and their complementary activities. The end goal is to maintain protection, conservation and sustainable utilization of aquatic biological resources.

### **Sea Law**

Protect the Mozambican national interest in the sea through their maritime space and support exploration of marine biological and non-biological resources.

#### **1. General regulation of marine fishery**

Regulate marine fishery based on the fishery law framework. It establishes management model and ordering of marine fishery, and monitoring fisheries activity as well as inspecting economic exclusive zone.

#### **2. General regulation of inland water fishery**

Regulate inland fishery based on the fishery law framework. It also establishes management model and ordering of inland fishery, and monitoring fisheries activity.

#### **3. General regulation of aquaculture**

Regulate aquaculture based on the fishery law framework.

#### **4. Strategic and action plan for biodiversity conservation in Mozambique**

Long term goal is to reduce pressure on biodiversity. The plan also wants to secure biodiversity conservation through integration, capacity building, funding and enforcement of solid partnership among different sectors of the society.

#### **5. National plan for territorial development**

Identified some diverse and important coastal areas for conservation and protection of biodiversity and there is conflict with extractive activities through license exploration.

#### **6. Environment National Politic (Resolution 5/1995 August 3rd)**

It establish the base for sustainable development of Mozambique through acceptable and realistic commitment between socio-economic development and environment protection

The main goal of sustainable development in Mozambique is to eradicate poverty, improve livelihood quality and reduce environmental damage.

#### **7. Environment law (Decree 20/97 October 1st)**

Environment law defines several fundamental concepts and principles of environmental management, and establishing basic institutional framework for environmental protection.

Establish general norm which forbid completion of all activities that cause environmental damage and exceed the limits legally defined (especially for pollution).

Establish special norms for environmental protections (in particular to biodiversity protection)

#### **8. Regulation on environmental impact assessment process (Decree 45-2004 September 29 and Decree 42/2008 November 4)**

Environmental Impact Assessment (EIA) is a legal requirement in terms of environment law (Law 20/97 October 1) to any activity which may have direct or indirect impact on environment.

The environment law demand any activity to have environmental licensing and registrations which due to their nature, location or proportions can probably cause significant impact on environment, and they are subjected to specific legislation.

Environmental license is issues based on Environmental Impact Assessment which must precede

concession of any other type of licenses required by law for each of the cases (Article 15 and 16 of environment law)

9. Regulation for Pollution Prevention and Protection of Marine and Coastal Environment (Decree 45/2006, November 30).

The main goal is to prevent and limit pollution from illegal discharges done by ships, platforms or other sources based inland areas, across the Mozambican coast. It also establish legal base for protection and conservation of areas which are maritime public domain, lake and river beaches and weak ecosystems.

10. Forest and wildlife law (Law 10/99 July 7)

It defines protection zones such as national parks and reserves, and zones of use and zones of historic and cultural value.

11. Fishery law (Law 3/90 September 26)

It defines the legal framework for fishery planning and management, implementation of licensing system, adoption of resources conservation measures, auditing of fishery products quality destined to export, and supervision of fisheries activity auditing.

It is the main instrument which includes fishery activity management which establish the judicial regime of fisheries activities and activities complementary to fishery. The end goal is to have sustainable protection, conservation and utilization of aquatic biological national resources.

12. General Regulation for Maritime Fishery (REPMAR)

Defines as fisheries sector competence the declaration of preservation areas within maritime limits, and establish the procedures related to licensing and management measures.

13. Regulation of Forest and wildlife Law (Decree 12/2002, June 6)

It defines list of protected animals. For example, dugongs, certain coastal and marine bird species, and marine turtles.

### **3.16.2. Aspects of the framework preventing the transition towards sustainable and responsible practices and possible measures to alleviate them**

54. Although there are all this legislations which must be used and published, implemented and applied, it appears that they are not very clear on implementation strategies (how they should be implemented) due to lack of clear definitions on institutions responsibilities regarding their interventions in coastal zones. Hence, this weaken the legislations publications (it is not sufficient) to the communities and also compromise monitoring of the legislation implementation.
55. The fishery law does not highlight aspects linked to biodiversity conservation which means an update is required.
56. The issues mentioned above end up causing lack of coordination and sector inequality, hence making legislations weak. Thus a clearer framework is required.
57. Therefore this awareness work to bring value chain actors from small scale, semi- industrial and industrial fisheries, to assume volunteer commitments (based on lack awareness of weak biodiversity preservation and conservation in this sector) would be a great opportunity.

### **3.16.2. Opportunities and challenges/constraints of shrimp and crab fisheries in favour of marine biodiversity conservation**

#### *Shrimp*

58. Although shrimp in Mozambique has been historically abundant, their biomass is now under threat and this represents a risk for people's livelihood and biodiversity. The main constraints of shrimp fishery include bad management, overfishing, illegal fishing, bycatch, climate change and threaten

to ecosystems.

59. Overfishing: Industrial fishing is done unsustainably and the artisanal fishermen catch small juveniles before the shrimp complete their reproductive cycle. In deep waters, trawls create negative impacts to the shrimp habitat.
60. Illegal fishing: This includes non-declared and non-regulated fishing. It is a global challenge and lack of knowledge of its true impact on biodiversity, has made shrimp management more difficult.
61. Bycatch: the unwanted fish and other marine creatures caught during commercial shrimp fishing is estimated to be 85% and this number is a huge risk for the health of the biodiversity and ecosystem. Fishermen are resistant to changes as they think that less bycatch by trawls means less fished shrimp.
62. Climate change: Mozambique is the third most vulnerable country to climate change in Africa. Coastal erosion threatens resilience of coastal infrastructures which makes the fishery market less accessible. Droughts make people to transit from agriculture to fishery, hence increasing pressure on the fisheries resources such as shrimp and biodiversity.
63. Threaten to ecosystem: Although Mozambique is developing, the environmental impact through pollution and habitats destruction including mangroves which are very important nursery area for shrimp, crabs and other species has been one of the main challenges to favour biodiversity conservation.

#### Crabs

64. *Scilla serrata* (mangrove crab) is distributed globally in tropical and subtropical regions of Indo and West Pacific, from East to South Africa, Southeast and east of Asia and Northeast of Australia (Hubatsch et al., 2016). The species is generally associated to estuarine ecosystems and living in clay and sand substrates in coastal environment, especially in mangroves (Lebata et al., 2007).
65. Mangroves are the ecosystem where mangrove crab spend majority of their lifecycle. In Mozambique, mangroves are abundant in North and Centre regions where there are most of the river discharges (e.g. Zambeze, Punge, Buzi and Save rivers) to the Indian Ocean.
66. The potential of crab fishery was estimated for the first time in 2012 and it was about 5700 tons (MIPES, 213). Then in 2018 when the area of crab distribution was included, it was updated to 12676 tons (Filipe and Samucidine, 2018).
67. Due to low value of mangrove crab and accessibility for sampling, it is assumed that the current catch report data are underestimated which indirectly affect the management of this resource. However, in the past 5 years there has been high interest in crab fishery due to increase in number of licenses obtained by processors (10) for export purpose. Most of those processors are based in Zambézia. Hence, this has resulted in rapid expansion of crab market in coastal communities and increase pressure on the resource fishery. In addition, closure periods have been introduced to halt the pressure (3 months in 2018 and 5 months in 2019).
68. Mangrove crab fishery has become one of the main fishery activities which require more data to support sustainable actions. Therefore, it is urgent to update the current mangrove crab fishery potential (a study has been done and waiting for publication). At the moment mangrove crabs fishery main constraint is associated to their habitat. Similarly to shrimp, their abundance may be under pressure due to unsustainable use of mangroves services (e.g. unsustainable mangroves cutting for other purposes).

#### Challenges of the value chain

69. The main problem of the value chain is associated to its low efficiency level due to deficiency across the components of input supply, fishing activity, processing and commercialization. Overall, the value chain has low performance although there is higher product demand. Hence, there is weak income

generated among the value chain stakeholders and this creates a very limited investment capacity in the sector as well as in other activities (Figure 32 and Table 28).

70. Most of the small scale fishery value chain stakeholders do not have good socio-economic level (e.g. most of them are in poverty). Therefore there is still a lot to be done for their improvement.

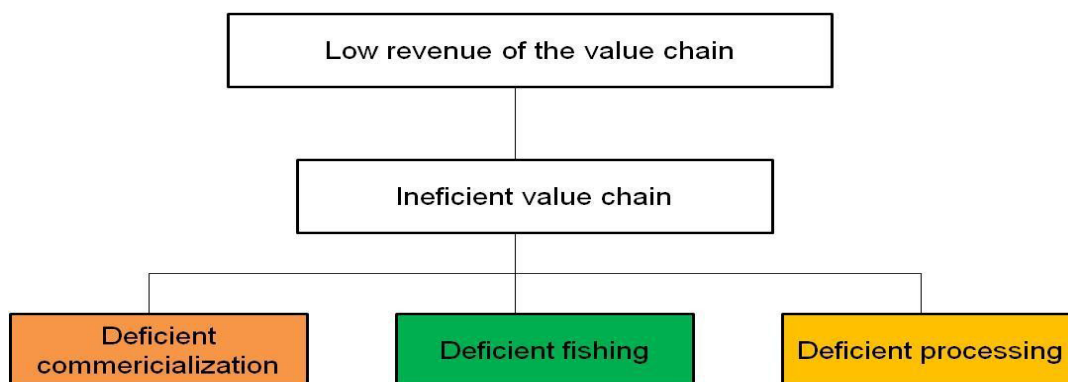


Figure 32 Value chain problem of shrimp and crab



Swot analyses of the extractive industry	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>There are CCP and associations</li> <li>Proven saving capacity by fishermen</li> <li>Working force available across all value chain</li> <li>Available local infrastructures (First selling market)</li> <li>Association staff are sensible to environmental problems</li> <li>High demand</li> </ul>	<ul style="list-style-type: none"> <li>Weak institutional development of fisheries associations</li> <li>Some associations are illegal and with or without activities plans and/or funding sources</li> <li>Weak capacity for vessels maintenance</li> <li>Multiplication and abundance of intermediaries in commercialization channels</li> <li>Offer volatility in terms of quality and quantity</li> <li>Commercialization volatility in terms of buyer regularity</li> <li>Deficient information linked to market</li> <li>Weak capacity of management from local agents</li> <li>Lack of freezing/cooling materials (ice, store, transport, conditioning)</li> <li>Weak hygiene during fishing, processing and distribution</li> <li>Poverty status of the fishermen is a barrier for sustainable use of fishery resources</li> <li>Weak environmental awareness of fishermen</li> <li>Conflict relations between fishermen and inspectors</li> <li>Competition to access the resources with semi and industrial fishery</li> <li>Fishery resources are rapidly decreasing</li> <li>Inefficient articulation of fishery and processing components</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>There is potential market for fresh and frozen product</li> <li>There is source of public and private funding</li> <li>Interests of the private sector to invest in the value chain</li> <li>Electric network is developing although at slow rate</li> <li>Road system infrastructure is under planning and improvement</li> <li>Development of bank system coverage</li> <li>Development of mobile network</li> <li>Relative increase in consumer power</li> </ul>	<ul style="list-style-type: none"> <li>Constant conflict between small scale and semi and industrial fishing</li> <li>Current product is blocked due to lack of hygiene and deficient quality</li> <li>Degradation and deficient maintenance of access roads</li> <li>Bad quality of electric network</li> <li>Bad quality of mobile phone network</li> <li>Lack of alternative for incomes</li> </ul>

### 3.17. Recommendations: scenarios of commitments for Fisheries

#### *Crab*

1. The potential voluntary commitments aligned with three scenarios will require that the Ministry of the Sea, Inland Waters and Fisheries creates specialized program with an action plan for crab fisheries which will involve fishermen, fishermen associations and community council, private sector (e.g. companies buying crabs), public sector (e.g. National Institute for Fisheries and Aquaculture Development - IDEPA, District Services of Economic Activities - SDAE, , National Institute of Fish Inspection - INIP, and National Administration of Fisheries - ADNAP) and environment NGOs/associations (e.g. WWF).
  2. The plan will have as baseline a subsidized system for fishermen, traders or resellers, and sustainable sourcing evaluation system (similar to certification scheme) for the companies. Sustainable sourcing refer to sourcing of crabs and shrimp caught using sustainable practices which include minimum size of catch (more than 250g and nearly 10 g for crab and shrimp respectively), 3 to 4 months prohibition period for both resources, no cutting mangroves, use of selective fishing gears, use of bycatch (which often is discarded) for other purposes (e.g. sell to small scale fishermen or actors interested to use them to produce feed ingredient), training and educating for raising awareness (eg. of mangroves role in shrimp and crab life cycle and benefit of reducing pressure on biodiversity) of fishermen, middlemen, retailers and consumers.
  3. Fishermen, traders or resellers, will get bonus (e.g. additional money, processing materials, household materials, education materials, scholarships for their children) for selling crabs of normal commercial size to companies which in turn will get positive sourcing rating system that confirm that they source sustainable products. In addition, during prohibition period for crabs fishing, fishermen wives (usually do alternative subsistence activity such as agriculture) will get support for their activities. This is a short and medium term plan (at least 5 years). During the program, public institutions such as IDEPA, SDAE and relevant NGOs/Associations will intensify environmental education together with other public institutions responsible for protection of Mangroves habitat (e.g. Environment, Land and Rural Development Ministry), and CCP. In addition, there are already crabs farming technologies around the world, so the plan will have to include piloting farming projects at small scales and this would be implemented during the prohibition period of the crabs fishing. Private companies will be required to invest in farming activity and not allowed to fish after at least 10 years of the program.
  4. The public actions mentioned above are required to support also private actors. For instance, private companies sourcing crabs expressed their interest to have better public actions to support crabs conservations. In addition, they are willing to comply with new public actions. Similarly, private fishing shrimp companies are willing to follow and support any new public strategies.
  5. As a whole, there is willingness from the private sector to engage with volunteer commitment, as long as better public actions (such as those mentioned above) are implemented. Among private actors, some crabs sourcing companies do not comply for example with stopping sourcing small crabs (less than 250 g) and compromises the overall commitment to that restriction. Therefore, most of the private companies think that those public actions can force all actors to comply.
  6. An important issue when considering private sector is related to the value chain per se. Although there are companies sourcing crabs, other part of the value chain is not properly or formally organized (e.g. No retailers companies, no specific selling organizations) in small scale fishery. The fishermen or informal reseller are not organized as “companies”, they sell the products as single fishermen. Therefore, when referring to private sector in crab fishing we can only talk about the sourcing companies. The public actions have also to improve the value chain through creation of formal business actors for crab and shrimp fishing in small scale fishery. The semi-industrial and industrial shrimp fishing companies do everything (fishing, processing and sell or export) and they can easily adopt volunteer commitment. Overall, the existing private sector is happy to participate in mangroves restoration program, environmental education, and improve transparency.
  7. Local consumer’s behaviour change should also follow any action plan such the one above. Uneducated
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consumers will continue to source small animals from irresponsible fishermen, traders or retailers. However, this behavioural education has to demonstrate that there are other sustainable food choices during that period when there is no crab fishing. In addition, some consumers such as the ones with low purchase power may find it difficult to get other food type items. Therefore, when thinking of consumers such factors should also be considered. Low income consumers create indirect pressure on biodiversity when they cannot afford to diversify their food choices. The government through ministries associated to food production should create those education programs and try to improve purchasing power of Mozambican consumers.

### ***Shrimp fishery***

8. Shrimp fisheries are done using midwater and bottom trawls. Trawling can be unsustainable fishing technique and have negative impact on biodiversity when the trawls are not selective (i.e. catch most of the organism regardless of their type and size). This results in high levels of bycatch which are usually discarded. In addition, bottom trawls can destroy habitats or ecosystems (e.g. corals, seagrass) important to maintain lifecycle of most aquatic organisms. Therefore, unsustainable trawling can quickly lead to biodiversity losses.
9. Mozambique has enormous potential for coastal and marine aquaculture development. IDEPA should implement similar inland small scale aquaculture projects to coastal communities but focused on shrimp or other marine organisms farming. Private sector (e.g. semi-industrial and industrial) should also consider adopting shrimp farming projects from long term perspective as almost 55% of current global shrimp production is from aquaculture and this has become one of the main activities to reduce pressure on biodiversity by shrimp fisheries.
10. Hence, the Fishery, Inland and Sea water Ministry should get funding for coastal communities small scale aquaculture projects and also get national and international private investors to set up aquaculture companies. Aquaculture has proven to be an alternative activity to coastal communities across Asia and South America where tropical aquaculture is more developed and have very positive impact in local communities' livelihoods and prevent pressures on fisheries and biodiversity. Small scale, semi-industrial and industrial fishermen involved in shrimp fisheries will stop or reduce more than 50% of their fishing activity once they get involved in aquaculture projects. The Ministry of Sea, Inland Water and Fisheries will prioritize shrimp aquaculture and reduce the number of license for shrimp fisheries.
11. Another important aspect that the Ministry of the Sea, Inland Waters and Fisheries should consider is to improve and/or invest in infrastructure for processing and technology to reduce post-catch losses, to add value within Mozambique and raise the product quality to boost commercialization. Losses post-harvest/catch and low value-added generated within the country does not only reduce the income of the fishermen, retailers or resellers; it also increases pressure of the fishery activity and biodiversity. The volunteer commitment of small scales shrimp fishermen (they also catch crabs) would follow similar approach to the one described for crabs where public subsidy is the cornerstone to all fishermen adopting sustainable fishing methods. Semi-industrial and industrial shrimp fishermen are export oriented industries, therefore an export scheme similar to the one described in crabs section for crabs sourcing companies should be applied.

Overall, the most important aspect identified in this work is that all interviewed actors (e.g. Fishermen, fishermen associations, CCP, private companies, public sector) are happy to make volunteer commitments which may reduce the pressure on biodiversity but also improve their livelihoods. The current fishery legislation and action plans may require improvement in order to address above actions in most effective ways. Therefore, the Ministry of the Sea, Inland Waters and Fisheries will play a key role here during the adoption of those actions. The ministry will engage with all actors and provide relevant information, and will also secure new actors (e.g. External funders/investors, NGOs). Furthermore, the private sector and coastal communities should also push the government to provide other associated infrastructures (e.g. better roads, provide electricity) and education in order to provide skills required for alternatives activities

Table 1 Voluntary commitments and low and medium level ambition (2020-2025)

Dimension	Scenario 1: Low to medium level of ambition					
	Pressure: Problem addressed	State	Impact	VC Response	Actors	Expected change
Crab	<ul style="list-style-type: none"> <li>• Sourcing of small size crabs and mangroves deforestation.</li> <li>• Consumer education and weak value chain.</li> <li>• Lack of alternatives income activities during fishing prohibition period.</li> </ul>	<ul style="list-style-type: none"> <li>• Some crabs sourcing companies still source small animals.</li> <li>• Coastal communities still rely on cutting mangroves for other purposes.</li> <li>• Local consumers awareness on sourcing small animals is low</li> <li>• The value chain requires significant improvement from organization perspective and development of structured private sector.</li> </ul>	<ul style="list-style-type: none"> <li>• Fishermen will catch fewer crabs if they continue fishing small ones.</li> <li>• Crabs sourcing companies will disappear and increase unemployment.</li> <li>• The coastal communities as a whole will face the problems associated to cutting of mangroves (e.g. less fisheries products coming out, erosion, and more intense storms).</li> <li>• Lack of alternatives will force the fishermen to break the laws for their livelihood.</li> <li>• The fishermen and other stakeholders will not improve their income with the current value chain status.</li> </ul>	<ul style="list-style-type: none"> <li>• Actors open to get involved in public action plans.</li> <li>• Adoption of subsidies system</li> <li>• Adoption of certification and assurance system for the sourcing companies</li> </ul>	<ul style="list-style-type: none"> <li>• IDEPA, SDAE, INIP, and ADNAP</li> <li>• Crab sourcing companies</li> <li>• Fishermen associations and CCPs</li> <li>• WWF</li> <li>• Ministry of environment, Land and Rural Development</li> </ul>	<ul style="list-style-type: none"> <li>• All crabs sourcing companies complying with minimum commercial size</li> <li>• Fishermen selling only commercial size animals</li> <li>• Reduction in mangrove cutting</li> <li>• Local consumer sourcing commercial size animals</li> </ul>
						<ul style="list-style-type: none"> <li>• Public actions plans available and the stakeholders/actors are aware of it.</li> <li>• Increase in crab production with less fishing effort</li> <li>• Mangroves coverage area recovering</li> <li>• Number of fishermen adopting other activities during fishing prohibition period increases.</li> <li>• The abundance of other marine species associated to crab fishing and mangrove increases</li> </ul>

<b>Shrimp</b>	<ul style="list-style-type: none"> <li>• Use of low selective and habitat destructive trawls.</li> <li>• Mangroves destructions.</li> <li>• Lack of alternatives income activities during fishing prohibition period (For small scale fishermen).</li> <li>• Lack of conservation system/infrastructure (small scale fishermen) for high quality products</li> <li>• Bad road access to other market</li> </ul>	<ul style="list-style-type: none"> <li>• Fishermen still using non-selective trawls and destructive bottom trawls.</li> <li>• Coastal communities still rely on cutting mangroves for other purposes.</li> <li>• Fishermen still fishing during prohibition period (small scale fishery).</li> <li>• Post-harvest losses is still very significant</li> </ul>	<ul style="list-style-type: none"> <li>• Fishermen will catch fewer shrimp if they continue using non-selective trawls. They will also catch less of other economic fish caught in those types of trawls.</li> <li>• Shrimp fishing companies will disappear and increase unemployment.</li> <li>• The coastal communities as a whole will face the problems associated to cutting of mangroves (e.g. less fisheries products coming out, erosion, and more intense storms).</li> <li>• Lack of alternatives will force the small scale fishermen to break the laws for their livelihood.</li> </ul>	<ul style="list-style-type: none"> <li>• Actors open to get involved in public action plans.</li> <li>• Adoption of subsidizes system</li> <li>• Adoption of certification and assurance system for the shrimp fishing companies.</li> </ul>	<ul style="list-style-type: none"> <li>• SDAE, INIP, and ADNAP</li> <li>• Crab sourcing companies</li> <li>• Fishermen associations and CCPs</li> <li>• WWF</li> <li>• Ministry of environment, Land and Rural Development</li> </ul>	<ul style="list-style-type: none"> <li>• All shrimp fishing companies and small scales fishermen complying with use of sustainable trawl (selective)</li> <li>• Reduction in mangrove cutting</li> </ul>	<ul style="list-style-type: none"> <li>• Public actions plans available and the stakeholders/actors are aware of it.</li> <li>• Increase in shrimp production with less fishing effort</li> <li>• Mangroves coverage area recovering</li> <li>• Number of fishermen adopting other activities during fishing prohibition period increases.</li> <li>• The abundance of other marine species associated to shrimp fishing and mangrove increases</li> </ul>
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Table 2 Voluntary commitments and high level ambition (2025-2030)

Scenario 2: High level of ambition						
Dimension	Pressure: Problem addressed	State	Impact	VC Response	Actors	Expected change
Crab	<ul style="list-style-type: none"> <li>Sourcing of small size crabs and mangroves deforestation.</li> <li>Consumer education and weak value chain.</li> <li>Lack of alternatives income activities during fishing prohibition period.</li> </ul>	<ul style="list-style-type: none"> <li>Some crabs sourcing companies still source small animals.</li> <li>Coastal communities still rely on cutting mangroves for other purposes.</li> <li>Local consumers awareness on sourcing small animals is low</li> <li>The value chain requires significant improvement from organization perspective and development of structured private sector.</li> </ul>	<ul style="list-style-type: none"> <li>Fishermen will catch fewer crabs if they continue fishing small ones.</li> <li>Crabs sourcing companies will disappear and increase unemployment</li> <li>The coastal communities as a whole will face the problems associated to cutting of mangroves (e.g. less fisheries products coming out, erosion, and more intense storms).</li> <li>Lack of alternatives will force the fishermen to break the laws for their livelihood.</li> </ul>	<ul style="list-style-type: none"> <li>Actors implementing and adopting revised public action plans.</li> <li>Adoption of new subsidizes system</li> <li>Adoption of improved certification and assurance system for the sourcing companies</li> <li>Fishermen and companies involved in aquaculture pilot and permanent projects</li> </ul>	<ul style="list-style-type: none"> <li>IDEPA, SDAE, INIP, and ADNAP</li> <li>Crab sourcing companies, crab farming companies, processors.</li> <li>Fishermen associations and CCPs</li> <li>WWF</li> <li>Ministry of environment, Land and Rural Development</li> </ul>	<ul style="list-style-type: none"> <li>All crabs sourcing companies complying with minimum size Fishermen selling only commercial size animals from fishery</li> <li>Fishermen and companies adopting other activities during fishing prohibition period increases more than 50% than the past 5 years.</li> <li>Biodiversity status has significantly improved and species abundance as well.</li> <li>Local consumer sourcing commercial size animals from aquaculture and fishery</li> </ul>

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## Annexes

### Annex 1 - Draft note on “voluntary commitments”



#### **BIODEV2030: Guidelines and criteria for robust “voluntary commitments”**

*Intended for BIODEV2030 project partners*

#### **Context:**

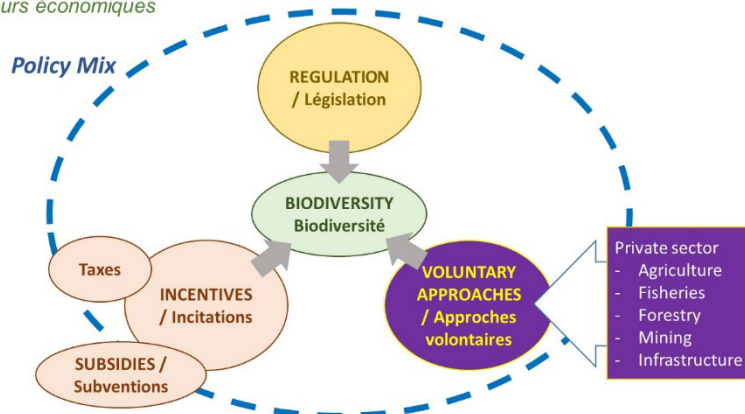
A policy mix is traditionally composed of (i) legislative/regulatory measures, (ii) incentive measures but also (iii) voluntary measures at the initiative of economic actors (figure below).

In preparation for the negotiation of a post-2020 Global Biodiversity Framework with ambitious objectives, BIODEV2030 aims to strengthen national policy mixes for biodiversity conservation by encouraging the emergence of “voluntary commitments” from economic actors.

**BIODEV2030 : Objective #1**

Strengthening existing national policies by voluntary measures from economic actors

*Renforcer les politiques nationales existantes par des mesures volontaires des acteurs économiques*



The logical framework foresees that for each country targeted by the project, “*voluntary commitments will be formulated at national or local level by key actors in the targeted sectors of activity*”. These “voluntary commitments” will have to “*integrate trajectories with targets and MRV<sup>1</sup> mechanisms if relevant*”.

**Purpose of this document:**

The term “voluntary commitment” (VC), at the heart of the BIODEV2030 project, is polysemous. The current discussions and work in the BIODEV2030 project will intensify the use of this concept as the fine-tuning stage of the sectors selected in Study 1 is being finalised or is in the process of being finalised in most of the 16 pilot countries. The subsequent multi-stakeholder dialogue stage will aim to concretise such commitments.

The aim of this document is therefore to propose a number of benchmarks in order to

- harmonise our common understanding of these “voluntary commitments”;
- align ourselves on the possible content of such commitments, as a project deliverable. These benchmarks will help to guide future work among all BIODEV2030 project stakeholders: IUCN and WWF-France (HQ/ Regions/Countries), CBD Focal Points, hired consultants, private sector actors and representatives, etc.

**Proposed definition and criteria of a voluntary commitment for BIODEV2030:**
**General definition:**

A voluntary commitment could be defined as “a set of forward-looking, strategic, shared and science-based actions that lead to positive and measurable change in biodiversity.”

A VC can be taken by an individual stakeholder or by a group of stakeholders.

<sup>1</sup> Monitoring, Reporting, Verification

**BIODEV2030 criteria:**

In the framework of BIODEV2030, the voluntary commitments sought will ideally be made at the level of an economic sector (or a territory or other group of actors if relevant). In this case, they must be obtained by consensus following an inclusive process of discussion and negotiation involving the actors and their stakeholders.

A VC must also

- be formalised in writing
- be made public
- include SMART indicators: specific, measurable, accurate, relevant, time-bound.
- be accompanied by a robust, nationally driven monitoring and evaluation system.

Although the objective of BIODEV2030 is to encourage VCs from the economic sectors as a priority, the other actors have a role to play which may be reflected in the VC. Thus, VCs may also, if relevant:

- propose a distribution of efforts between types of actors or between regions;
- ensure a role for civil society actors (NGOs, representatives of local communities, indigenous peoples, etc.) in reflection and decision-making bodies;
- list a series of accompanying measures under the responsibility of the state or financial institutions which, if put in place, would facilitate its wider adoption and/or faster or more sustainable implementation: new regulations or new state resources to implement existing regulations, zoning, new incentives (taxes, subsidies), coordination between actors, arbitration function in negotiations played by the state, investment in infrastructure, technical tools (GIS), awareness-raising or capacity-building sessions for stakeholders (training, seminars, etc.), valuing the actors who take part in the process. ), enhancement of the value of the actors involved and promotion of the associated EVs to the general public and consumers, etc.

**Some prerequisites before designing and discussing concrete voluntary commitments (non-exhaustive list)**

Here are 4 steps before voluntary commitments can be made:

1. Scientific diagnosis of threats (study 1) to identify
  - a. the main threats/pressures in the area of interest and the sectors of economic activity with which they are associated (urbanisation, agriculture, extraction, etc.);
  - b. whether biodiversity loss should be halted or biodiversity already lost should be restored
  - c. the relevant area of action and, within that area, the actions to be taken.
2. Mapping of stakeholders, their interests and roles (Study 2)
3. Identification of possible good practices (Study 2):
  - a. Which actors can/should change their practices?
  - b. What new practices should they adopt and what knowledge/skills are already available on these<sup>2</sup>?

<sup>2</sup> During the multi-stakeholder consultation phase, there is a risk that the stakeholders will restrict themselves and prioritise international good practice. In order to avoid this bias, it would be useful to specify here that these good practices may well be part of an endogenous approach based on local traditional knowledge. Thus, the VCs undertaken within the framework of BIODEV2030 could contribute to scaling up and enhancing the most relevant of them already existing at the community, local or national level, even when they are embryonic or modest. This would open up interesting prospects in terms of inclusive governance, territorialisation of commitments and social acceptability of these voluntary measures.

#### 4. Understanding the context in which the actors in the sectors operate, which can either act as a brake or a lever (Study 2)

- a. Institutional, cultural, geographical, territorial context, etc.
- b. For example, if a sectoral approach has been favoured in the BIODDEV2030 project, it may be useful to simultaneously adopt a “landscape” approach that makes it possible to integrate all the relevant actors in a given territory as well as to consider all the changes in the practices of actors from different sectors, and to envisage their intersectoral cooperation.

It is on the basis of a prior understanding of these four points that the voluntary commitments are built.

#### **Recommendations for the formulation of a voluntary quality commitment :**

Each commitment must follow its own logic.

	Recommendation	To be specified
Problem addressed	The VC is explicitly stated with reference to the <b>DPSIR</b> (Driver, Pressure, State, Impact, and Response) framework.	The actors involved The territory of action
Extent of expected change		Define a broad indicator representing the expected impact on biodiversity
“Solutions/practices to be implemented by economic sector actors to achieve this change	Good practices and actions needed to reduce pressures on biodiversity by sectors ( <i>identified beforehand through a detailed understanding of the characteristics of the sector in the country or in a given region</i> )	Role of each of the actors in this implementation. Concrete action plan for each of them. Indicate actions whose successful implementation depends on networking or a collaborative approach between several actors, (e.g. due to interdependence). Intermediate objectives measuring the quality of this collaboration could be selected.
“Counterparts / Enabling conditions”: Means to be implemented by other actors (State, NGOs, financial actors...) to enable or accelerate this change	Other means/actions to be implemented by other stakeholders to promote ambitious change and the adoption of good practice: - Technical means (change/adaptation of regulation or law, incentives...) - Financial means (investments, grants...) - Human resources (training, etc.) ( <i>identified beforehand through a detailed understanding of the context of the sector in the country or in a given region</i> )	Role of each actor in this implementation Concrete action plan for each of them. Idem: Indicate actions whose successful implementation depends on a networking or collaborative approach between several actors, (e.g. because of an interdependent situation). Intermediate objectives measuring the quality of this collaboration could be selected.
Quantified objectives on a 10-year trajectory	Use time milestones with a reference date (against which to compare changes in practices), a final date, and possible intermediate dates  The objectives and trajectories (final and intermediate targets) of the VCs are based on science and in particular on the scientific diagnosis of stage 1 of the BIODDEV2030 project.	Define indicators that can be measured and aggregated from individual actors to the “group” level  Objectives must be « SMART »



<b>Intermediate results expected over the period</b>	The VC statement explicitly formulates a final and intermediate objective(s), based on science (in particular on the scientific diagnosis of stage 1 of the BIODEV2030 project), the means to achieve them and a strategy that explains how the means to be implemented will enable the objectives to be achieved	Include in the VC a robust monitoring and evaluation system piloted at the national level. An initial inventory (baseline situation) makes it possible to characterise the situation of a territory before the implementation of the VC. This is essential for generating reliable, exhaustive data in contexts where statistics are often not available or even non-existent. Monitoring the implementation of the VC (information on specific and contextualised indicators) also constitutes a tool for in-depth understanding of the impacts of the VC
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It will subsequently be important to:

- collect and publish data regularly;
- revise the goal(s) and objectives according to the results;
- ensure that financial means and resources are available for the effective implementation of monitoring and evaluation systems. Often there is no way to measure the implementation of commitments, the achievement of indicators, the impacts generated over time.
- monitor the implementation of the voluntary commitment with specific indicators describing the resources to be mobilised.

**(Fictitious) examples of the formulation of a voluntary BIODEV2030 commitment:**

*“In region x of country y, agricultural production of crop z has been increasing since (year) mainly through an increase in cultivated areas (Driver). This increase in cultivated areas is achieved in particular at the expense of highly biodiverse forest land, which is burnt before being cultivated (Pressure). The forest habitats of many species are destroyed. The species that depend on them disappear, their conservation status deteriorates (State) and the many ecosystem services from which human populations benefit are greatly reduced or even disappear (Impact). In order to stop this phenomenon of conversion of forest land into farmland, agricultural stakeholders have decided to massively change their agricultural practices. The objective (Response) of actors X, Y and Z is to halve the number of hectares of forest converted to farmland by 2025 compared to 2015, to reach “zero hectares of forest converted to farmland” by 2030 and to maintain this objective beyond that. In addition, the region’s agricultural stakeholders commit to restoring to forest land, by 2030, 30% of the former forest land converted to agricultural land between 2000 and 2015. A transition point of 15% in 2025 is set.*

*To achieve these objectives, the following means (Response) will be mobilised:*

- Means 1
- Means 2
- Etc.

Here, the VC lists the activities and means that will be implemented to achieve the objectives, in order to be concrete and not to remain at the mere statement of the objective. The means in question may be technical, financial, human, etc. They can be broken down by type of actor (economic sectors and other actors) and must take into account their respective capacities to contribute, as expressed during the dialogue phase (bilateral and multi-stakeholder). An action plan must accompany the VC and detail these means.

**Examples of possible and complementary actions to improve practices and reduce pressures on biodiversity**

Sectors	Actions
Agriculture	Plans for agroecological intensification of cultivated areas, sustainable agricultural practices and certification
	Commitments to reduce the quantities of chemical inputs per hectare (pesticides, herbicides, fertilisers, fungicides, etc.)
	Development of farmer networks for sharing experiences, knowledge and services (at local, regional and even national levels)
	Zoning of land uses - Buffer zone between PA and agriculture
	Contractualisation of payments for environmental/ecosystem services (PES) on the basis of indicators defined according to the local context (e.g. % of biodiversity indicator species in the biome)
	Certifications: Label Bio UE, Natureland, Demeter, USDA Organic, JAS, RSPO, UTZ
	Zero deforestation/traceability of supply
	Control of investments and land acquisitions (fight against land grabbing) and/or commitment to implement sustainable practices on these lands
Forestry	REDD+ initiatives
	Timber legality/traceability and warranty system
	Payments for environmental/ecosystem services (PES)
	Zero deforestation/traceability of supply
	Sustainability standards and certification (FSC)
Fishery	Certifications: MSC (Marine Stewardship Council), Natureland, Best Aquaculture Practices (BAP), Aquaculture Stewardship Council (ASC), Global GAP, ect.
	Voluntary closed areas
	TTED (Trash and Turtle Excluder Device) selectivity system by shrimp trawlers.
Mines	Implementation of compensatory measures / programmes (further development of the "Compensate" sequence of the ERC)
	Implementation of management and rehabilitation plans for the site after the operating phase
	Consideration of biodiversity <i>ex ante</i> and <i>in itinere</i> in the assessment of the environmental impacts of a project (fauna-flora inventory and design choices based on it, etc.)
	Mercury-free gold production practices
	Global standard EITI (Extractive Industries Transparency Initiative)
	Certification: IRMA, TSM, Fair Stone, etc.
Fuel wood and charcoal	Logging permit system
	Forest management plan for fuelwood exploitation
	Promotion of alternatives (biomass briquettes, improved stoves, etc.)

**Relative criteria for a quality VC process:**

Good governance, and in particular the inclusiveness (and recognition of the plurality of interests and values) of the process of building a VC is as important as its content. The effective involvement and participation of all relevant stakeholders will enhance the chances of good ownership of the VC, which will increase its chances of implementation, monitoring and evaluation.

The VCs should have been discussed as much as necessary by all legitimate stakeholders in the sector or region, relying on actors with a capacity to influence other actors (“opinion leaders”) The stakes, objectives, means and consequences of the VCs are understood and appropriate by each stakeholder. These discussions were eventually informed by complementary, objective and shared analyses.

Be engaging:

- Generate pride and demonstrate added value.
- The key is to get support from all sectors of society so that companies do not feel alone but feel that they are contributing to the greater good.
- Also involve global trade actors if they are part of the value chain as buyers of raw materials or finished products - make sure they also appreciate the efforts.
- Consider mechanisms to monitor progress and communicate: a national register; an award; an annual conference; a website - all to celebrate progress.

The VC is written, made public (e.g. it is posted for a long time on official (sector, company, government) websites). Its content and the way in which it has been developed are transparent. On these websites, the efforts and commitments of the actors should then be promoted through positive communication.

If a consensus has not been reached, the arguments of the most opposed stakeholders have been heard, noted and means of supporting the actors most exposed to possible short-term losses are considered and proposed.

**Typical formats for voluntary commitments:**

- Territorial charter: this “code of good conduct” commits all the actors of one or more economic sectors present in a defined territory, as well as any future new entrant who must comply with it in order to operate in the territory. The territory charter can contain SMART objectives for this territory and they can be broken down into SMART objectives for each of the sectors that are active in this territory;
- Multi-stakeholder agreement at national level: this agreement commits the signatory actors to adopt new practices wherever they operate in the national territory;
- Multi-stakeholder agreement at regional level: this agreement commits the signatory actors to adopt new practices wherever they operate in the region;
- State-sector y commitment contract in region x ; - etc.

**Reminder of the logical framework :****RA 1.3: STRATEGY FOR MOBILISING THE 2 SECTORS**

Guidelines are established to define a method for mobilising actors and standard formats for voluntary commitments.

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These guidelines are harmonised, coherent and standardised as much as possible. Identification of scientifically established targets and possible trajectories.

Act. 1.3.1: Draw up guidelines on voluntary commitments that mention

- the different standard formats of commitments (Charter, Multi-stakeholder agreement, Sectoral commitment, etc.) depending on the type of stakeholders to be mobilised;
- the content of these commitments: draw up a list of “possible” actions to improve practices and reduce pressures on biodiversity for each target sector, based on available knowledge.

Act. 1.3.2: Draw up, in the 16 countries, a detailed analysis of the 2 key sectors aimed at:

- 1/ Understand the characteristics of the sector in the country and its role in relation to pressures;
- 2/ identify the best practices and possible actions for each sector necessary to reduce pressure on biodiversity;
- 3/ propose a strategy for mobilising stakeholders.

### Annex 2 – List of relevant documents

No	List of relevant documents	Provided
	<b>Agriculture</b>	
1	Statutes of MADER	Yes
2	Statutes of MTA	No
3	Statutes of IIAM	No
4	Statutes of COPAZA/SBS	No
5	Statutes of CLUSA	No
6	FAEF's internal regulation	No
7	Statutes of Xinavane Sugar Cane Company	No
8	Strategic Plan for Agricultural development (PEDSA)	Yes
9	SUSTENTA national program	Yes
10	MADER's Environmental and Social Management Plan	No
11	Xinavane' Environmental and Social Management Plan	No
12	COPAZA's Environmental and Social Management Plan	No
13	CLUSA's Environmental and Social Management Plan	No
14	Inquerito Agrário Integrado (IAI) 2020	Yes
15	PACE's enviromental plan	No
16	Cartas Tecnológicas for technology packages under SUSTENTA	No
17	Annual Agricultural Reports for the last 5 years	No
18	2015-2035 National Biodiversity Strategic Action Plan (NBSAP)	Yes
	<b>Extractive industry – Mining and Oil and Gas sector</b>	
	<b>Fisheries</b>	
19	Action Plan for Biodiversity Conservation	Yes
20	Environmental managment legal frameworks	Yes
21	Fisheries master plan	Yes
22	Fisheries policies and implementation strategies	Yes
23	Fisheries annual reports	No
24	Fisheries strategic plans	Yes
25	Co-management manual	Yes
26	Fisheries and Aquaculture Statistical Bulletin (2006-2017)	Yes

**Annex 3 – Interview Guides****Interview Guide for Agricultural Public Institutions (MADER/MTA) and Producing Companies****Introduction**

- Recent scientific knowledge points to the acceleration of the loss and decline of biodiversity and ecosystem services. This situation weakens livelihoods, food security, health and quality of life worldwide and poses economic and financial risks; moreover, it poses plausible risk of mass extinction of species in the next few decades, if urgent measures are not taken globally and within states.
  - IUCN funded by the French Development Agency (AFD), in close collaboration with the Ministry of the Environment is implementing the BIODEV2030 project to reduce pressures on biodiversity and promote more sustainable and resilient economy.
  - The goal of the two-year BIODEV2030 project is to create the conditions for a national dialogue involving stakeholders around strategic economic sectors, relevant to the country economy and biodiversity. This dialogue will aim to catalyse concrete national and sectoral voluntary commitments to reduce pressures on biodiversity over the next decade.
  - The project conducted a scientific study/diagnostic in which agriculture, mining industry and fisheries were identified as main economic sectors responsible for the decline of national biodiversity. It is believed that dialogue among stakeholders, can lead to their commitment to reduce pressure on biodiversity.
  - Therefore, this consultancy is a “Situational Analysis” aimed at contributing to the creation of conditions for a “multi-stakeholder Dialogue” to obtain the commitment of (two) key economic sectors to reduce their pressures on biodiversity over the next ten years with measurable objectives. Such voluntary contributions will be a big step towards building ambitious common goals to halt the decline in biodiversity by 2030 and restore biodiversity by 2050.
  - For that purpose, your institution was selected and we have prepared some questions, to guide our conversation around major value chains in your sector, direct and indirect pressures on biodiversity associated with the 3 target sectors (type, geographical area), opportunities and constraints to the reduction of pressures and stakeholders’ commitment in favour of biodiversity.
  - The data collected will be used only for the purposes of creating scenarios of stakeholders’ engagement in favour of biodiversity.
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## Public institutions

### P1. Institutional arrangements

1. Organizational Chart. Activities carried out by the organization. How has management considered biodiversity conservation aspects?
2. What is your organization's policy towards biodiversity conservation? ***(Please provide copies of major documentation, such as Environmental and Social Management Plans and PACE's environmental plans)***
3. How is the policy towards biodiversity conservation impacting commercial agriculture pressure on biodiversity?
4. What are the main biodiversity friendly farming techniques mostly utilized by farmers in Mozambique? What is the success rate of implementation? What is the failure rate and why?
5. What are the designated conservation regimes areas (regulations and policies) that are being enforced varying from fully protected zone to a partially protected multiple-use where controlled activities are allowed? ***(Please provide details/documentation of these zones and regimes concerned)***.
6. Please list the Commercial agricultural fields that are within conservation areas and those in the KBAs and the respective permissible agricultural practices.
7. How do you assess the implementation of these policies and regulations by major commercial agriculture projects commercial agriculture companies and actors, please specify the major weaknesses? ***(Sugar Cane, Maize/Boer, Eucalyptus, and PACE in SUSTENTA)***.
8. What are the major gaps for the implementation of these regulations and policies including in the designated conservation areas that result in increasing commercial agriculture biodiversity pressure?
9. What are the new policies and regulations that are being proposed to close these gaps?

### P2. Potential voluntary commitments to reduce pressures on biodiversity

*Under the two-year BIODEV2030 project, stakeholders around strategic economic sectors are expected to make voluntary commitments to reduce pressures on biodiversity over the next decade (2030), along three possible scenarios (low, medium and high) of ambition for biodiversity. In a gradual perspective, the low scenario represents the scientific research needed to support preventative measures for avoiding negative impact on biodiversity. The medium scenario accumulates de low scenario and adds measures to reduce the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity. The high scenario accumulates de low and medium scenario and adds measures for counterbalancing in order to compensate adverse significant impacts on biodiversity and philanthropic initiatives related to corporate responsibility e.g. towards biodiversity conservation (KBA).*

1. What are your thoughts about these possible scenarios to reduce pressures on biodiversity, considering their alignment with MADERs policy and strategies, and their responsiveness to most pressing diversity conservation problems such as deforestation, loss of habitat, land cover



changes, and pollution?

2. If they are not properly aligned with MADERs policies and strategies, and to properly addressing the pressing problems, what are the changes that you suggest for better alignment and responsiveness?
3. To what extent do you think the commercial agricultural companies and producers (***Maize/Boer, Sugar Cane, Eucalyptus***), would make voluntary commitments to implement each of these scenarios?
4. What types of voluntary commitment by the commercial agriculture you consider most important for implementation of each of these scenarios?
5. What support (incentives) would you provide to the voluntary commitment by commercial agricultural, to implement each of these three scenarios?

### Private companies

#### C1. Institutional arrangements

1. Please provide your company's name (***Headquarters, Branches, Major business***), organizational chart including activities carried out by the organization? (***Please provide company's' descriptive documentations***)

- 1.1. What is the total cultivated area in hectares of your crop? (Sugarcane/boer)?
- 1.2. What is geographical distribution (province, district) of cultivated area in hectares of each commercial crops? (Please provide a map).
- 1.3. What is the crop average productivity (ton/hectare)? What is the total tonnage harvested in last year?
- 1.4. What is the current total sales a/exports (last sell)?
1. What is your organization's policy towards biodiversity conservation? (***Please provide copies of major documentation, such as Environmental and Social Management Plans and PACE's environmental plans?***)

2. How do you assess your implementation of these policies and regulations? What systems are in place for monitoring and evaluation of the Environmental and Social Management Plans?
3. What are the major gaps for the implementation of these regulations? What do you think are the results on biodiversity conservation, of such gaps? What do you propose to close these gaps?

#### C2. Agronomic systems (current the practices of production)

**C2.1.** What is the sequence in which the crop is grown? When is it grown? When is it harvested? Do you grow other crops in the same field?

**C2.2.** How do you prepare the field for growing the crop (equipment used)?

**C2.3.** How do you supply nutrients to the soil?

**C2.4.** How do you control weeds?

**C2.5.** Do you use irrigation?

## **C2.6. What other practices do you use to grow the crop?**

### **C3. Practices**

**C3.1.** What are the types of biodiversity conservation approaches, and good practices that favour biodiversity conservation adopted by your company?

**C3.2.** What are the practices used for: a) preventing, or avoiding negative impacts on elements of biodiversity? b) Reducing the duration, intensity and extension of direct and indirect or cumulative impact on biodiversity? and C) compensating impacts on biodiversity?

**C3.3.** How are your ESMPs adapted to deal with species conservation status for Vulnerable, Endemic species, almost endemic species? ***(Provide concrete projects that ensure that regulations for these species are being implemented/enforced).***

**C3.4.** What conservation-friendly agriculture practices inside and outside conservation areas are incorporated in your ESMP?

**C3.5.** What varieties adapted for climate change are being utilized?

**C3.6.** What biodiversity friendly farming techniques (e.g. crop rotation) which can decrease the use of pesticides and chemical fertilizers required, are used in the field?

**C3.7.** What natural pesticides or pesticides that can have lower adverse impacts on the environment, are used or being considered for use?

**C3.8.** What nature friendly practices such as forest regeneration are being used (e.g. tree planting)?

**C3.9.** How prepared (ready) is your organization to implement nature-friendly practices? Opportunities and challenges?

### **C4. Actors in value chain**

**C4.1.** What are the major inputs (**and quantities /ha**) used for production your crop? (Agrochemicals, mechanization/fuel, irrigation)

**C4.2.** Who are the suppliers of each input, chemical inputs but also, seeds, machinery, etc. (manufacturer, distributor, dealer, a retailer)?

**C4.3.** Who are the consumers of your products? What are their requirements/preferences in terms of more biodiversity friendly commodities?

**C4.4.** Who is involved in Assembly (Processing, Grading, Storage, Transporter, Traders, Distributors, Rural Inter-mediaries)

**C4.5.** Who is involved in Wholesale (Importers/ Wholesalers, Urban Wholesalers)?

**C4.6.** Who is involved in Processing (Chicken feed processors, Mealie Meal and Flour Processors, sugar factories etc)?

**C4.7.** Who is involved in Retail (Supermarkets, Catering Companies, Informal Sector Retailers, Local Retail Shops, General shops)

### **C5. Potential voluntary commitments to reduce pressures on biodiversity**

*Under the two-year BIODEV2030 project, stakeholders around strategic economic sectors are expected to make voluntary commitments to reduce pressures on biodiversity over the next decade (2030), along three possible scenarios (low, medium and high) of ambition for biodiversity. In a gradual perspective, the low scenario represents the scientific research needed to support preventative measures for avoiding negative impact on biodiversity. The medium scenario accumulates de low scenario and adds measures to reduce the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity. The high scenario accumulates de low and medium scenario and adds measures for counterbalancing in order to compensate adverse significant impacts on*

*biodiversity and philanthropic initiatives related to corporate responsibility e.g. towards biodiversity conservation (KBA).*

**C5.1.** What are your thoughts about these possible scenarios to reduce pressures on biodiversity, considering their responsiveness to the most pressing biodiversity conservation problems such as deforestation, loss of habitat, land cover changes, and pollution?

**C5.2.** If they are not properly addressing the pressing problems, what are the changes that you suggest for better alignment and responsiveness?

**C5.3.** To what extent do you think your company would make voluntary commitments to implement each of these scenarios?

**C5.4.** What types of voluntary commitment (actions) would your company be willing to make for implementation of each of these scenarios? And what indicators would your company use to monitor the implementation of these commitments?

**C6. Opportunities:** The following questions aim to identify the factors and practices external and internal to your commercial agriculture organization/company which are favourable to the reduction of pressures and their commitment in favour of biodiversity.

**C6.1.** What incentives, in form of tax, new market opportunities, competitive advantage your company expect when implementing or making future commitments for measures/practices to reduce pressure on biodiversity?

**C6.2.** What are the enabling conditions such as regulations, investment opportunities your company expect when implementing or making future commitments for measures/practices to reduce pressure on biodiversity?

**C7.Constraints:** The following questions aim to identify the external and internal factors that are unfavourable to the engagement of your organization/company in voluntary commitments that reduce pressures on biodiversity.

**C7.1.** What are the factors such as weak capacity, lack of financial resources, weak institutional support, lack of government incentives and support, your company expect to face when implementing or making future commitments for measures/practices to reduce pressure on biodiversity? (Please specify any other constraint that might discourage you to make voluntary commitments)

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## Interview Guide for Agricultural Academic and Research Institutions

### RAC\_A1. Institutional arrangements

1. Organizational Chart. Activities carried out by the organization regarding the selected crops (value chains).
2. What is your organization's policy towards biodiversity conservation? **(Please provide copies of major documentation describing these policies)**
3. How is the policy towards biodiversity conservation impacting commercial agriculture pressure on biodiversity?
4. What cooperating/collaborative mechanisms are in place in your organization to support commercial agriculture companies/farmers for reducing pressures on biodiversity and promote more sustainable and resilient economy?
5. What are the main biodiversity friendly farming techniques mostly utilized by commercial agriculture companies/farmers in Mozambique that your organization support with applied research? What is the success rate of implementation? What is the failure rate and why?
6. How the research work of your organization is impacting the conservation regimes areas (regulations and policies) for fully protected zone, and for partially protected multiple-use areas where controlled activities are allowed? **(Please provide details of your advisory work)**
7. How do you assess the implementation of these policies and regulations by major commercial agriculture projects commercial agriculture companies and actors, please specify the major weaknesses? **(Sugar Cane, Maize/Boer, Eucalyptus, and PACE in SUSTENTA).**
8. What are the major gaps for the implementation of these regulations and policies including in the designated conservation areas that result in increasing commercial agriculture biodiversity pressure?
9. What are the new policies and regulations that are being proposed to close these gaps?

### RAC\_A2. Potential voluntary commitments to reduce pressures on biodiversity

*Under the two-year BIODEV2030 project, stakeholders around strategic economic sectors are expected to make voluntary commitments to reduce pressures on biodiversity over the next decade (2030), along three possible scenarios (low, medium and high) of ambition for biodiversity. In a gradual perspective, the low scenario represents the scientific research needed to support preventative measures for avoiding negative impact on biodiversity. The medium scenario accumulates de low scenario and adds measures to reduce the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity. The high scenario accumulates de low and medium scenario and adds measures for counterbalancing in order to compensate adverse significant impacts on biodiversity and philanthropic initiatives related to corporate responsibility e.g. towards biodiversity conservation (KBA).*

1. What are your thoughts about these possible scenarios to reduce pressures on biodiversity, considering the requirement that voluntary commitments under these scenarios must be science based, and that they should be responsiveness to most pressing diversity conservation problems such as deforestation, loss of habitat, land cover changes, and pollution?

2. Considering the required scientific advisory and technical support for the implementation of these scenarios, what changes would suggest for these three scenarios in order to better address the most pressing biodiversity conservation problems referred to above?
3. How your organization would support scientifically and provide technical advice to the implementation of the voluntary commitments of commercial agriculture companies in the context of these three scenarios:
  - a. Implementation of preventative measures for avoiding negative impact on elements of biodiversity;
  - b. Implementation of measures to reduce the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity;
  - c. Counterbalancing measures to compensate adverse significant impacts on biodiversity and;
  - d. Implementation of actions related to corporate responsibility towards biodiversity conservation.
4. What are your organization's major capabilities that will facilitate the support that you will provide for the provision of scientific and technical advice for the implementation of these scenarios?
5. What are the major constraints that your organization will have to overcome? What type of assistance would your organization require?

## Interview Guide for Trade Associations

### TA1. Institutional arrangements

1. Please describe your trade association, goals, structure in order to coordinate marketing efforts with commercial agriculture producers of sugar cane/beans, distributors, and retailers.
2. What are the requirements of your clients/market regarding product related environmental standards? And to what extent are you able to meet those requirements?
3. What is your trade associations' policy towards biodiversity conservation? ***(Please provide copies of major documentation, such as Environmental and Social Management Plans and PACE's environmental plans)?***
4. What is your role as a trade association towards motivating commercial agriculture producers (sugar cane/beans), distributors and retailers to take coordinated actions for implementing trade associations' policy for reducing pressure on biodiversity?
5. What are the main biodiversity friendly coordinated courses of actions that your trade association motivate commercial agriculture producers of sugar cane/beans, distributors, and retailers to implement in the current and new markets or with their products? What is the success rate of implementation? What is the failure rate and why?
6. How those coordinated actions, taking into account the designated conservation regimes areas (regulations and policies) of either fully protected zone or partially protected multiple-use, are impacting targeted consumer markets and products?
7. In the sugar cane, and beans commercial agriculture, what are the major players for the effectiveness of these biodiversity friendly courses of action impacting the markets in your trade association? Please explain why are they major players?
8. How do you assess the risks involved for implementing biodiversity friendly courses of action by major commercial agriculture projects commercial agriculture companies and actors in the current and new markets ***(Sugar Cane, Maize/Boer) including in the context of PACE in SUSTENTA).***
9. What are the major gaps for building effective and durable biodiversity friendly commitments among your associates that reduce pressure on biodiversity?
10. What are your plans to close these gaps?

### TA2. Potential voluntary commitments to reduce pressures on biodiversity

*Under the two-year BIODEV2030 project, stakeholders around strategic economic sectors are expected to make voluntary commitments to reduce pressures on biodiversity over the next decade (2030), along three possible scenarios (low, medium and high) of ambition for biodiversity. In a gradual perspective, the low scenario represents the scientific research needed to support preventative measures for avoiding negative impact on biodiversity. The medium scenario accumulates de low scenario and adds measures to reduce the duration, intensity and extension of direct, indirect or cumulative impact on biodiversity. The high scenario accumulates de low and medium scenario and adds measures for counterbalancing in order to compensate adverse significant impacts on biodiversity and philanthropic initiatives related to*

*corporate responsibility e.g. towards biodiversity conservation (KBA).*

1. What are your thoughts about these possible scenarios to reduce pressures on biodiversity, considering their alignment with Trade Associations' policy and strategies, and their responsiveness to most pressing diversity conservation problems such as deforestation, loss of habitat, land cover changes, and pollution?
2. If they are not properly aligned with Trade Associations' policies and strategies, and to properly addressing the pressing problems, what are the changes that you suggest for better alignment with market trends?
3. To what extent do you think your associates' commercial agriculture producers (sugar cane/beans), distributors and retailers would make voluntary commitments to implement each of these scenarios?
4. What types of voluntary commitment by commercial agriculture producers (sugar cane/beans), distributors and retailers you consider most important for implementation of each of these scenarios?
5. What support (incentives) would you provide to the voluntary commitment by commercial agricultural, to implement each of these three scenarios?

**Interview Guide for Civil Society/ ONGs (additional questions to the public institution guide)**

**NGO1. Institutional arrangements**

1. What are the main biodiversity friendly farming techniques mostly utilized by farmers in Mozambique that your organization support? What are the major forms of support? What is the success rate of implementation? What is the failure rate and why?
  2. What are the Commercial agricultural companies/ outgrowers that are either within conservation areas or KBAs you collaborate with for implementation of permissible agricultural practices.
-



### Interview guide and protocol for Extractive industry – Mining and Oil and Gas sector

#### a) Biodiversity Conservation, Protected Areas and Mining and Oil and Gas Development:

- ☐ Your mandate and roles in the sector development process in Mozambique
- ☐ Your views on Mining and Oil and Gas development projects in protected areas in relation to national laws and international conventions to which Mozambique is a signatory
- ☐ Your opinion on mining and Mining and Oil and Gas development processes that have gone very well and those that may require improvement
- ☐ Challenges your organisation has experienced in implementing projects that are related to mining and Mining and Oil and Gas development

#### b) Mining and Mining and Oil and Gas development and impacts on biodiversity and protected areas:

- ☐ Identified significant impacts on biodiversity by Mining and Oil and Gas development and whether all the impacts were correctly predicted by the environmental impact studies
- ☐ Impacts of Mining and Oil and Gas exploration on resource use and surrounding areas around the protected areas
- ☐ Identified sensitive wildlife species and ecosystems in the protected areas and whether they have been spared by mining and Mining and Oil and Gas development
- ☐ Whether your organisation is involved in monitoring Mining and Oil and Gas development activities and systems put in place for systematic recording of impacts and recovery (e.g. waste disposal sites, decommissioned camps, roads, spills etc) for future monitoring
- ☐ Records of gaps in knowledge on impacts of Mining and Oil and Gas development and uncertainties and how they have been managed in your organisation
- ☐ Evidence of non-compliance by the mining and oil companies in the protected areas and how they have been resolved
- ☐ Knowledge on history of impact management by the companies currently involved in Mozambique
- ☐ Technologies used in Mozambique mining and Oil and Gas exploration in comparison with other technologies used elsewhere
- ☐ Scale of mining and Mining and Oil and Gas development activities (e.g. size of land of protected areas lost to infrastructure development in protected areas)
- ☐ The dos and don'ts for mining and Mining and Oil and Gas development activities in protected areas

#### c) Roles of key stakeholders in the mining and Mining and Oil and Gas development process:

- ☐ Collaborative initiatives with other key organisation in ensuring efficient and effective implementation of the process or lack of it
- ☐ Satisfaction with your current level of involvement and participation and how it could be improved if necessary
- ☐ Your views on how key stakeholders are identified for consultations

#### d) Decision making process in Mining and Oil and Gas development process

- ☐ Importance of environmental impact assessment (EIA) and strategic environmental assessment (SEA) in the mining and Mining and Oil and Gas development process
- ☐ Factors your organisation considers important for mining and oil and gas EIA processes
- ☐ Whether you think lack of baseline studies prior to commencement of mining and Mining and Oil and Gas development activities will have impacts on future evaluation of impacts

- ☐ Adequacy of information and presentation of EIA for decision making
  - ☐ Transparency of decision making process for increasing public confidence (e.g. whether summary evaluation reports are made public or not)
  - ☐ Knowledge of decision-making tools used in management of potentially conflicting activities
  - ☐ Evidence of rights of appeal against decisions taken in permitting projects in Mozambique
- e) Factors that could determine co-existence between mining and Mining and Oil and Gas development and biodiversity conservation

#### **Guidance questions for the focus groups**

- a) Mining and Mining and Oil and Gas exploration
- ☐ Please can you tell me about your views on the mining and Mining and Oil and Gas development process since your village happens to be one of those affected by the development?
  - ☐ Specifically I wanted to find out how the process was done, your experiences and the impacts
- b) Benefits
- ☐ Can you please tell me about the benefits the mining and Mining and Oil and Gas development has brought to your area?
  - ☐ If the government were to come with plans to help the communities what kinds of projects would you suggest to the government?
- c) Land
- ☐ Please tell me about issues associated with land in your village as a result of the Mining and Mining and Oil and Gas development process
- d) Employment
- ☐ Are there people from your village employed by the company and how did you choose the people to be employed?
- e) EIA Consultations
- ☐ Where you consulted by the EIA team and your views on the consultation process
- d) Co-existence
- ☐ What advice would you give to ensure that the mining and Mining and Oil and Gas development process can be improved so that the community can benefit and the wildlife are not affected?

#### **Interview guide for National Institute for the Fisheries and Aquaculture Development of – IDEPA**

##### **IDEPA consultation topics**

- ☐ Analysis of the value chain of artisanal fisheries products;
- ☐ Analysis of post-capture losses;
- ☐ Strategic economic areas of this sector (indication of 2 types of artisanal fish with great potential and that are references);
- ☐ Main forms of aquaculture development and its distribution in the country (cultivation systems

and respective cultivated species);

**1. Value chain analysis of artisanal fisheries products (small and large pelagic fish, deep and shallow water shrimp, crustaceans, mollusks and cephalopods;**

*1.1. What are the fisheries resources of great economic importance to the communities?*

- a) Shallow water Shrimp ☐
- b) Deep-water shrimp ☐
- c) Small pelagic fish ☐
- d) Large pelagic fish ☐
- e) Crustaceans ☐
- f) Mollusks ☐
- g) Cephalopods ☐
- h) Demersal fish ☐
- i) Others ☐

**Note:**

*1.2. How is the value chain of artisanal fisheries products structured and how are the different players organized?*

- a) Shallow water shrimp \_\_\_\_\_
- b) Deep-water shrimp \_\_\_\_\_
- c) Small pelagic fish \_\_\_\_\_
- d) Large pelagic fish \_\_\_\_\_
- e) Crustaceans \_\_\_\_\_
- f) Mollusks \_\_\_\_\_
- g) Cephalopods \_\_\_\_\_
- Demersal fish \_\_\_\_\_
- Others \_\_\_\_\_

Note.

*1.3. Quais os principais actores envolvidos na exploração e na cadeia de valor desses recursos de grande importância?*

Actor 1 \_\_\_\_\_

Actor 2 \_\_\_\_\_

Actor 3 \_\_\_\_\_

Actor 4 \_\_\_\_\_

Outros 5 \_\_\_\_\_

**Note:**

*1.4. What are the most used processing techniques to add value to artisanal fishery products and what is the impact in terms of suitability?*

1. Technic 1 \_\_\_\_\_

2. Technic 2 \_\_\_\_\_

3. Technic 3 \_\_\_\_\_

4. Others 4 \_\_\_\_\_

Note:

## 2. Analysis of post-catch losses

*2.1. What is the trend of post-capture losses in the last decade?*

a) Growing ☐ Reducing ☐ Indifferent ☐

Note:

*2.2. What are the main causes that lead to post-catch losses?*

1. Cause 1 \_\_\_\_\_

2. Cause 2 \_\_\_\_\_

3. Cause 3 \_\_\_\_\_

4. Others \_\_\_\_\_

*2.3. What are the easy and hard spoilage species?*

a. Easy spoilage species

b. hard spoilage species

Note:

**4. What are the main gaps in marine biodiversity conservation?**

4.2. What activities do you think create negative impacts on marine biodiversity?

4.3. What activity do you think create positive impacts on biodiversity?

4.4. What actions are being taken to reverse this scenario?

**5. Identification of internal and external opportunities that could be used to slow the loss of marine and coastal biodiversity.**

5.1. What internal opportunities are you taking advantage of to reverse the scenario?

5.2. What external opportunities could be used to reverse the scenario?

Note:

**Interview guide for National Institute of fishery Research Institute - IIP**

**IIP consultation topics**

- ☐ Understand the distribution pattern of fisheries resources of great socio-economic importance in Mozambique;
- ☐ Trends in annual catches vs condition of natural stocks;
- ☐ Identification of fish stocks heavily affected by overfishing and fish stocks at risk of overfishing;
- ☐ Analysis of the value chain of fish products from artisanal fishing;
- ☐ Identify the problems leading to accelerated loss of marine and coastal biodiversity

**1. Understand the distribution pattern of fisheries resources of great socio-economic importance in Mozambique;**

*1.1. What are the most important fishing resources in terms of economic income?*

- a) Shallow water shrimp
- b) Deep-water shrimp
- c) Small pelagic fish
- d) Large pelagic fish
- e) Crustaceans
- f) Mollusks
- g) Cephalopods
- h) Demersal fish
- i) Others

Notes:

**1.2. What are the main actors involved in the exploration and in the value chain of these very important resources?**

Actor 1 \_\_\_\_\_

Actor 2 \_\_\_\_\_

Actor 3 \_\_\_\_\_

Actor 4 \_\_\_\_\_

Others 5 \_\_\_\_\_

Note:

**1.3. How the actors are distributed in the country, with a view to exploring the various fisheries resources?**

1. South region \_\_\_\_\_

2. Central region \_\_\_\_\_

3. North region \_\_\_\_\_

Note:

**1.4. What is the distribution pattern of the main fish stocks in the country?**

1. South region \_\_\_\_\_

2. Central region \_\_\_\_\_

3. North region \_\_\_\_\_

Note:

**2. Trends in annual catches (Statistics) vs current condition of fish stocks;**
**2.1. What is the behavior of catches over the years (Last 10 years)?**

a) Shallow water shrimp:

b) Deep-water shrimp:

c) Small pelagic fish:

d) Large pelagic fish:

e) Crustaceans:

f) Mollusks:

g) Cephalopods:

h) Demersal fish:

i) Others \_\_\_\_\_:

Note:

**3. Identification of fish stocks heavily affected by overfishing and fish stocks at risk of overfishing**

**(Declining);**

- a) Shallow water shrimp:
- b) Deep-water shrimp:
- c) Small pelagic fish:
- d) Large pelagic fish:
- e) Crustaceans:
- f) Mollusks:
- g) Cephalopods:
- h) Demersal fish:
- i) Others \_\_\_\_\_:

**Notes:**
**4. Identification of the main gaps in the conservation of marine biodiversity?**

- 4.1. What are the main difficulties in the conservation of marine biodiversity?
- 4.2. What activities do you think create negative impacts on marine biodiversity?
- 4.3. What activity do you think create positive impacts on biodiversity?
- 4.4. What actions are being taken to reverse this scenario?

Note:

**5. Identify internal and external opportunities that could be used to slow the loss of marine and coastal biodiversity.**

- 5.1. What internal opportunities are you taking advantage of to reverse the scenario?
- 5.2. What external opportunities could be used to reverse the scenario?

Note:

**6. The value chain analysis of fisheries products from artisanal fisheries**

- a) Small pelagic fish?
- b) Large pelagic fish?
- c) Shallow water shrimp?
- d) Deep-water shrimp?
- e) Deep-water crustaceans?
- f) Mollusks? and;
- g) Cephalopods?

Note:



**Annex 4 - Sources of information/interviewees**

Sector	Sources of information/interviewees					Methods		
	Organization	Position	Name	Phone contact	Local	SSi	FGD	Date
Agriculture	MADER/National Directorate for Development of Family Agriculture (DNDAF)	Director	Nilza Paunde					
Agriculture	MADER/Social and Environmental Safeguards Office (GSA)	Environmental	Sara Guibunda		Maputo	X		21/10/2022
Agriculture	MADER/National Directorate for Promotion of Commercial Agriculture (DNPAC)	Technical Team	Aderito da Silva, Eduardo Massingue, Rogerio Jamisse		Maputo	X		03/10/2022
Agriculture	UEM/ Faculty of Agronomy and Forestry Engennering	Researcher	Almeida Siteo		Maputo	X		22/04/2022
Agriculture	MTA/ National Directorate for the Environment	Director and Technical Team	Guilhermina Amurane, Alexandre Bartolomeu, Anselmo Gaspar, Ana P. Francisco,				X	22/02/2022
Agriculture	District Services for Economic Activities - SDAE	Director	Jose Manuel Armando Afonso Catxava	842208474/ 863633100	Gurue	x		03/10/2022
Agriculture	Upper Zambezia Producers Cooperative (COPAZA)	President	861403601		Gurue	x		03/09/2022
Agriculture	NOSSARA Cooperative -	Coordinator	846427790/ 878305293		Ruace,	x	x	03/09/2022

	Soy Producers and Processors		Augusto						Gurue	
Agriculture	NOSSARA Cooperative - Soy Producers and Processors	Team leader	Cecilia Beliate						Ruace, Gurue	03/09/2022
Agriculture	NOSSARA Cooperative - Soy Producers and Processors	Treasurer	Telma Mario						Ruace, Gurue	03/09/2022
Agriculture	District Services for Economic Activities - SDAE	Head of Agriculture and Fisheries Department	Jose Manhacha Salvador			x			Gurue	03/10/2022
Agriculture	Agri-Mel/ Agricultural input provider	Owner	Hein Rito			x			Gurue	03/10/2022
Agriculture	Hoyo Hoyo agribusiness	Director	Muaquiua			x			Ruace, Gurue	03/11/2022
Agriculture	Hoyo Hoyo agribusiness	Head of the Workshop/Member of the Board	Edson Wagner			x			Ruace, Gurue	03/11/2022
Agriculture	District Services for Economic Activities - SDAE	Extensionist	Honorio Sinoi					X	Gurue	03/11/2022
Agriculture	District Services for Economic Activities - SDAE	Extensionist	Jacónias Verde						Gurue	03/11/2022
Agriculture	District Services for Economic Activities - SDAE	Extensionist	Tecnico Nakuru						Gurue	03/11/2022
Agriculture	Sotoma Association	President	Santos Paisone			x			Sevene / Lioma	14/03/2022
Agriculture	Sotoma Association	Facilitator	Cecilia Otakanera						Sevene / Lioma	14/03/2022
Agriculture	Sotoma Association	Treasurer	Rosa Horacio						Sevene / Lioma	14/03/2022

Agriculture	Sotoma Association	Counselor	Marta Quiniano				Sevene / Lioma	14/03/2022
Agriculture	Semi-commercial soybean producer	Soy producer	Abilio Novaela				Magige	14/03/2022
Agriculture	lacote Association - Soy producers, processors	President	Catrinque Laura		x		Magige	14/03/2022
Agriculture	lacote Association - Soy producers, processors	Vice President	Sebastiao				Magige	14/03/2022
Agriculture	lacote Association - Soy producers, processors	Secretary	Julia Antonio				Magige	14/03/2022
Agriculture	lacote Association - Soy producers, processors	Treasurer	Josina Nicuanta			877005668	Magige	14/03/2022
Agriculture			Celestina Rameque				Magige	14/03/2022
Agriculture			Inacio Francisco dos Santos				Gurue	15/03/2022
Agriculture	Clusa	Zambezia Extension Network Supervisor			x	879840572/ 847094043		
Agriculture	Network of Organizations for Environment and Sustainable Community Development of Zambezia (RADEZA)	Executive director / President of MOZDGM	Daniel Pereira			824321280/ 842975393/ 865442810	Quelimane	16/03/2022
Agriculture	Provincial Directorate of Agriculture and Fisheries	Director	Maui Fernando Remane				Quelimane	16/03/2022
Fishery		Fishermen, CCP processors, traders, inspectors, sampling extensionist, president of CCP, Bycatcher collector	Namucua		x	828942920/ 845858927	Quelimane	16/03/2022
			Manuel Momad, Ussene Ossufo, Cassamo Injoma, Rassul Alberto, Brasil					
	CCP - Malaua e MaverRane					872154066/865445130/840241353	Pebane - Zambézia	

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	- head office	extensionist	Alberto Picanha					Zambézia
Fishery	Extension post of Dogoro	Sampling extensionist	Ossumane Canate	865445130/ 840241353	x			Pebane - Zambézia
Fishery	SIDAE	Director	José Manuel Francisco.		x			Pebane - Zambézia
Fishery	Extension post of Therrepuane.	Sampling extensionist	Betinho Abdul Zacarias		x			Pebane - Zambézia
Fishery	Extension post of Idugo Island	Sampling extensionist	Celestino Molde Binane		x			Pebane - Zambézia
Fishery	WWF		Carlos Dionísio	8860203962	x			Pebane - Zambézia
Fishery	Provincial directorate of agriculture and fishery	Director	Fernando Namucua		x			Quelimane / Nicoadala - Zambézia
Fishery	Provincial directorate of agriculture and fishery	Head of fishery department	Américo Sumalt		x			Quelimane / Nicoadala - Zambézia
Fishery	Crown Fand Limitada	Manager and owner of the company	Franklin Raimundo, Wanck				x	Quelimane / Nicoadala - Zambézia
Fishery	Mozambique Xinhong	Manager	Mansur Mussa, Nercio Macassane				x	Quelimane / Nicoadala - Zambézia
Fishery	Taicom Mozambique Limitada	Representative of the company in Quelimane	Adelina Americo, Elias Jacobe				x	Quelimane / Nicoadala

							- Zambézia	
Fishery	National Research Fishery Institute	Technician		Marcos Rapazinho		x	Quelimane / Nicoadala - Zambézia	
Fishery	IDEPA - Zambézia	Head of IDEPA		Mário Daniel		x	Quelimane / Nicoadala - Zambézia	
Fishery	National Research Fishery Institute	HEAD OF IIP - Zambezia		Daniel Oliveria Mueleque		x	Quelimane / Nicoadala - Zambézia	
Fishery	Instituto Nacional de investigação Pesqueira	Technician		Zacarias João Secanhe		x	Quelimane / Nicoadala - Zambézia	
Fishery	National Research Fishery Institute	Technician		Jorge de Souza Mariano		x	Quelimane / Nicoadala - Zambézia	
Fishery	Fishery community of Zalala	Members of CCP, processors and traders.		Ussene Momade, Ossifo Manuel, Isac Paulo Agostinho, Bilal Atanásio Inácio, Castiano Rosene, Azirato Birdo,			Quelimane / Nicoadala - Zambézia	x



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## Annex 5 - Multi-Stakeholder Workshop Summaries/Notes

### Agriculture Sector: Summary of findings and observations

As part of the seminar to share the results of the Study on the situational analysis of opportunities and constraints for the implementation of voluntary commitments, a parallel session took place to discuss the levels of ambition, the goals to be achieved by 2032, good practices and conditions for their implementation. In the agriculture sector in Mozambique.

The session began with a presentation and discussion of the ambition levels, the respective low-level and high-level targets. Then, the good practices identified in the study and the conditions for their implementation in the Agriculture sector were presented and discussed.

level of ambition	Goal	contributions	Comments
low level of ambition	Overtake by 30% Programs and Projects that contribute to the reduction of deforestation, without compromising the income and food security of producer families	<ul style="list-style-type: none"> <li>It is necessary to carry out <b>baseline studies</b> to verify if there is a relationship between agricultural intensification and deforestation/slash and burn.</li> <li>Consideration should be given to carrying out <b>a baseline study</b> aimed at zoning areas suitable for agriculture to avoid agricultural intensification in areas of low productivity.</li> </ul>	<ul style="list-style-type: none"> <li>The district of Mocuba has been devastated by the production of soy and other legumes, which today has no more areas for expansion.</li> <li>However, fires are a recurrent practice.</li> </ul>
high level of ambition	Reduce forest conversion by 30%	<ul style="list-style-type: none"> <li>In addition to uncontrolled fires, the study should also consider the effect of <b>population growth on detachment</b>. The research team welcomed this contribution and recommends that it be a topic within the baseline studies to assess the <b>relationship between agricultural intensification and deforestation</b>.</li> </ul>	<ul style="list-style-type: none"> <li>Practices depend on people's education</li> <li>Availability of extension services</li> <li>At ECOFARM, for example, only circular irrigation areas are deforested. Surrounding areas remain intact</li> </ul>
	Adoption of practices in addition to the Regulation on Pesticides Management (decree no 6/2009), in 80% of the cultivated area, without significant increases in production costs	<ul style="list-style-type: none"> <li>The Government must zone and declare zones for organic farming and intensification farming;</li> <li>Specific legislation required for <b>organic agriculture</b></li> </ul>	<ul style="list-style-type: none"> <li>Ecofarm is certified for its products. The existence of intensified agriculture, with the use of agrochemicals, in the surrounding areas can jeopardize the company's certification.</li> <li>Ecofarm sensitizes its neighbors not to use agrochemicals so as not to affect their organic production area</li> </ul>

### Appreciation of good practices and conditions for their implementation

Low level of ambition for biodiversity	Good practices	intervener	facilitating conditions	restrictions
<b>Overcome by 30% programs and projects that contribute to the reduction of deforestation of forests, without compromising the income and food security of producer families</b>				
	Strengthen local structures to support the reduction of uncontrolled fires	Private sector, SDAE		Lack of knowledge
	Efficient use of inorganic fertilizers	Private sector, SDAE, input provider	legislation	Weak control, need for incentives
	Promotion of organic fertilizers	Private sector, SDAE, input provider		
	pesticide management	Extensionists, input provider, farmer	Existence of pesticide regulation	Lack of knowledge in the application of pesticides Lack of control in the implementation of the regulation on pesticides.
	Add semi-natural habitats	Producer, extensionist, associations (strengthen the extension)	Existence of ongoing projects	Lack of knowledge about the ecology of native species. Poor coordination between various sectors.
	Use of adapted and high-yielding crop varieties	Research, input provider, extension	Legislation, private sector, research	Taboos, professional vices. Seed price. Local seed production. Quality and logistical inspection costs.
	Wild seeds and agroforestry	Research, SDAE		Lack of knowledge of the biology of the species
high level of ambition	Good practices	intervener	facilitating conditions	restrictions
<b>Reduce conversion by 30% by 2032 the number of hectares of forest converted Adoption of practices in addition to the Regulation on Pesticides Management (decree no 6/2009), in 80% of the cultivated area, without significant increases in production costs</b>				
	Reduce conversion by 30% by 2032 the number of hectares of forest converted	Private sector, research, academia, extension	Existence of interested private institutions	Weak training and motivation of young people. Lack of knowledge and skills. Current deforestation rate

**Extractive Industry Sector: Summary of findings and observations**

The parallel session of the Extractive Industry Sector began with a presentation on the results of the study, particularly for the Extractive Industry sector.

After the presentation, a moment of discussion followed with the main actors in the sector, namely Green Lights, Kenmare, Total Energies, National Directorate of Industry, AQUA, and Independent Investigators, among others, with the main themes of Capacity Building and Awareness on Biodiversity and the Adoption of Biodiversity Standards as Values for the Development of the Extractive Industry in the Country.

The discussion had as its starting point the review of the CV proposal called good practices.

The first reaction of the participants was that many of the CVs contained metrics aspects already integrated into the environmental management plans and resettlement plans. However, after clarifying the objectives of the meeting and dispelling doubts about the aspects considered repetitive, it was possible to prepare the table below with a summary of the discussions that took place.

Scenarios	CV proposal	stakeholders	Comments	Opportunities / Constraints	success factors
Low level	Support and strengthen local community participation	International companies in the extractive industry	From the companies' perspective, this action is already practised by companies in the sector;	<p>Involvement of local communities, through the recruitment and training of local people to implement the projects;</p> <p>Adopt resettlement policies for local communities, establishing the best conditions taking into account their reality, this is because local communities do not identify with the resettlement standards offered, ending up selling their homes and returning to the areas where the projects or areas are implemented. of risk.</p>	<p>Support and strengthen the participation of communities;</p> <p>Establish partnerships with local communities through employability;</p> <p>Development of community resettlement areas;</p> <p>Increase in knowledge applied to Biodiversity</p>
		Local Communities	Independent researchers believe there is a need to strengthen the participation of local communities	<p>Communities do not feel benefited or covered by projects</p> <p>Community leaders, being the main focal points in the community, tend to benefit a certain group of the same community (family, friends, etc), causing another part of the community to have no benefit from the project's incentives;</p>	<p>Establishment of the reference environmental situation, where an environmental management study of biodiversity must be carried out;</p> <p>Increase in knowledge applied to Biodiversity</p>
		Government		Lack of human and financial resources for the implementation of the EMP, especially regarding the inspection and monitoring mechanisms of activities.	Financing scholarships for local communities

Low level	Promote public-private partnerships with the participation of civil society through strategic actions of financing and support of partnerships	all stakeholders	The need to include funding for local initiatives to replace fossil fuels was unanimous (eg production of biofuels that would later be used in the production process of the exploration companies)	Lack of local know-how to ensure the management of projects and their implementation  Increasing scrutiny of energy sources used in the production process leads companies to look for alternative sources. Local communities, properly trained, could be used as part of the solution by implementing more environmentally friendly fuel development projects.	Existence of openness on the part of companies to support and finance companies owned by the local community
Low level	Increase knowledge of the fauna, flora and marine ecosystem through applied studies	companies in the sector	Some companies are already financing studies and/or initiatives with this objective	Existing openness on the part of international companies to finance studies aimed at a better understanding of local biodiversity;  securing funding for studies on the impact of companies' activities on local and regional biodiversity becomes a major challenge	existence of a fund to finance empirical studies  approval of an annual budget by the companies for studies.
		Scientific community	There are some actions by the scientific community aimed at exploring "case studies" in the area, but they have had little dissemination.		
		local community	I did not have access to the main results of these investigations.		
High level	Creation of voluntary exclusion zones	operating companies	Proposal to include in the CVs the creation of exclusion zones in areas of operation, similar to what Kenmare did when it discovered a new species in its concession area.	The international movement for the creation of voluntary exclusion zones is gaining strength;  Examples already existing in Mozambique of similar actions	Appropriation of this CV as an integral part of company values

High level	Adoption of Biodiversity Standards as Values for the Development of the Extractive Industry in the Country	SMEs		<p>Comply with the agreements established for the implementation of projects;</p> <p>Respect Biodiversity conservation areas;</p> <p>Comply with resettlement plans</p> <p>Resize the mined lands and return the communities, with a management plan for these same areas;</p>	<p>Create a community communication and training program that incorporates biodiversity conservation issues, including their gain.</p> <p>Establish partnerships with local communities</p>
		Local Communities		<p>They must respect Biodiversity conservation areas and avoid practices that are harmful to Biodiversity, such as deforestation and uncontrolled fires</p> <p>They must proceed with the transfer of resized land to local communities (former landholders)</p>	<p>Create award programs for companies that have an environmentally sound stance, for example, create and award an environmental seal, within certain previously agreed parameters.</p>
		Government		<p>Reflect on the responsibility and role of government entities to support companies in the extractive sector</p> <p>Promote studies on the impact of mining and oil and gas activities on biodiversity</p>	<p>Promote community awareness programs on the importance of biodiversity conservation</p>



### **Fisheries Sector: Summary of findings and observations**

A presentation was made of the results obtained from the fisheries sector based on the report and the discussion of these ambitious options to discuss and identify opportunities and constraints that should be leveraged or addressed in future discussions for transformative change in the medium or long term and clarify the Pressure, Status, Impact and Responses of expected changes.

For this case, each voluntary commitment of this sector was discussed with the respective actors present in the room, about 20 to 25 participants with whom there was good participation and who somehow discussed the best practices, proposals, some findings, contributions and observations on voluntary commitments.

FINDINGS	CONTRIBUTIONS	COMMENTS
Indiscriminate use of harmful gear by Artisanal Fishermen endangers and affects fisheries (fishing areas)	Strengthen oversight	Participation of all the actors involved, however with more incidence the Government has its key and fundamental role
Poor government oversight	Educate and train artisanal fishermen and include them in the value chain	
Lack of knowledge about the preservation of the environment and specifically of resources	Private sector support in the training, training of artisanal fisheries actors (fishermen, processors and others)	Also, include primary and secondary school curricula.
Post-harvest loss (fish loss or spoiled fish)	The private Sector and Government should support the acquisition of equipment that provide these services to improve the quality of the product.	Participation of all the actors involved, however with more focus on the private sector and the Government.
Fishing fleets are Industrial and semi-industrial obsolete.	Restructuring and modernizing the fleet and improving safety at sea for the artisanal fishing fleet.	For the reduction of carbon dioxide levels and the cleaning of sea waters, in reducing the destruction of marine and coastal ecosystems.
Inefficiency in inter-institutional coordination and articulation within the Government and the private sector and between them.	Signing agreements and memoranda of understanding can improve this environment and facilitate the implementation of best practices and management.	In the Government, the creation of an institution that will deal specifically with BIODIVERSITY matters.  Memoranda and agreements are opportunities
Ineffective awareness of environmental degradation and destruction of marine and coastal ecosystems	Reinforce awareness, mobilization and awareness of matters related to the environment	Participation of all actors involved, however with more focus on the private sector, NGOs, CBOs and civil society
Lack of alternatives for artisanal fishermen during closed and closed seasons.	Create incentives and support programs to alternate fishing activities, eg. livestock, agriculture and aquaculture	Participation of all actors involved.
Lack of ownership of fishing resources and legislation related to this activity	Scope of the actors involved in this activity in participating in discussions on legislation and regulation of the sector, (Resource management plans, regulations, laws and other instruments)	Here the actors (fishermen, processors and traders, even some consumers) should be involved in all stages of preparation until the dissemination and implementation of the instruments

Massive destruction of mangroves and degradation of coastal areas (dunes and vegetation)	<p>Reinforce awareness, mobilization and awareness of the importance of Mangroves and their reforestation</p> <p>Support from the Government, NGOs, CBOs, civil society and the private sector, in the reforestation and repopulation of Mangroves and production of Seedlings.</p> <p>Responsibility for heavy sand mining companies.</p>	Participation of all the actors involved, however with more focus on the sector, the Government, the private sector and CBOs.
Weak or non-existent control over the migration of fishermen and coastal and riverside populations	Creation and implementation of programs on citizen fishermen and resettlements with control and inspection devices	Use of identification cards for fishermen and NUIs, etc. controlled by CBOs (CCP, Co-management Committees)
The inefficiency of monitoring programs and monitoring of resource management plans, fish, crab and others	Reinforce monitoring, follow-up and inspection of management plans and marine litter	
Inefficiency in the control and monitoring of the marine litter action plan.		
Lack of clarity in management and follow-up on future voluntary commitments	Clarify matters of management of future voluntary commitments, responsibilities and their evaluation.	
Lack of information on this matter in inland water areas (rivers, lakes, ponds and reservoirs)	Extend the scope of this study to some areas of inland waters (rivers, lakes, lagoons and reservoirs).	

### Final considerations

The findings raised here are evident in the report, however, during the discussions it became clear that these should be reinforced and extended to inland water areas, more specifically in rivers, lakes, ponds and reservoirs.

