



Republic of Mozambique
Ministry of Sea, Inland Waters &
Fisheries

Small-Scale Aquaculture Development Project (PRODAPE) in Mozambique

Environmental and Social Management Frameworks (ESMF)

Final Report

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LIST OF ACRONYMS

ADNAP		National Fisheries Administration
ARA	-	Regional Water Authorities
ARA CENTRO	-	Centre Regional Water Administration
ARA-SUL	-	Southern Regional Water Administration
ARA-ZAMBEZI	-	Zambezi Regional Water Administration
DGBH	-	Department of Watershed Management
DNFFB	-	National Directorate of Forestry and Wildlife
DNGRH	-	National Directorate of Water Resources Management
DOH	-	Department of Hydraulics Works
DPMAP		Provincial Directorate of Sea, Inland Waters & Fisheries
DRI	-	Department of International Rivers
EIA	-	Environmental Impact Assessment
ESIA		Environmental and Social Impact Assessment
ESMF		Environmental and Social Management Framework
ESMP		Environmental and Social Management Plan
FAO	-	Food and Agricultural Organization
FCC	-	UN Framework Convention on Climate Change
FFP		Fund for the Promotion of Fisheries
FRIEND	-	Flow Regime from International Experimental and Network Data
GoM		Government of Mozambique
GRI	-	International Rivers Office
HYCOS	.	Hydrological Cycle Observation System
IDEPA		National Institute of Fisheries and Aquaculture Development
IFAD		International Fund for Agricultural Development
IHP	-	International Hydrological Program
IIP		Fisheries Research Institute
ILA	-	International Law Association
INE	-	National Institute of Statistics
INIP		National Institute of Fish Inspection
IWRM	-	Integrated Water Resources Management
IUCN	-	International Union for the Conservation of Nature
JWC	-	Joint Water Commission
LIMCOM	-	Limpopo Watercourse Commission
MINEC		Ministry of Foreign Affairs and Cooperation
MITADER	-	Ministry of Land, Environment and Rural Development
MIMAIP		Ministry of Sea, Inland Waters & Fisheries
MOPHRH		Ministry of Public Work Housing and Water Resources
NCS	-	National Conservation Strategy
NGO	-	Non-governmental Organization
NWRMS	-	National Water Resources Management Strategy
NWRDP	-	National Water Resources Development Project
PCR		Physical Cultural Resources/Program for Climate Resilience
PPCR		Pilot Program for Climate Resilience
PRIMA	-	Progressive Realization of the IncoMaputo Agreement
PROCAVA		Inclusive Agri-food Value-chains Development Programme
PRODAPE		Small-Scale Aquaculture Development Project in Mozambique
PNDA	-	First National Water Development Project
SADC-HYCOS	-	SADC Hydrological Cycle Observing Systems
SADC	-	Southern Africa Development Community
TOR	-	Terms of Reference
TWM	-	Transboundary Water Management
UN	-	United Nations

UNEP	-	United Nations Environment Program
UNECE	-	United Nations Economic Commission for Europe
UNESCO	-	United Nations Educational Scientific and Cultural Organization
WRM	-	Water Resources Management
ZACPLAN	-	Zambezi River System Action Plan
ZAMCOM	-	Zambezi Watercourse Commission

Executive Summary

Introduction

This is the Executive Summary of the Environmental and Social Management Framework (ESMF) of the **Small-Scale Aquaculture Promotion Project**, better known as PRODAPE, which will be implemented by the Ministry of Sea, Inland Waters & Fisheries (MIMAIP), through the Institute for Fisheries and Aquaculture Development (IDEPA), with International Fund for Agricultural Development (IFAD) support, during the period 2019 and 2024. PRODAPE will continue and consolidate the developments initiated by PROPESCA and PROAQUA in the aquaculture subsector in the last few years.

The project will focus on the central provinces of Manica, Sofala, Tete and Zambezia and the northern provinces of Niassa, Cabo Delgado and Nampula. Within these seven provinces it will cover 23 districts.

PRODAPE geographical coverage



The ESMF will guide the screening of the proposed Project interventions (sub-projects) to ensure not only that they do not affect negatively the natural and social environment but also that project outcomes are optimized

through a careful attention to all aspects that would translate into problems, at all stages. The ESMF outlines several principles, which include: (i) a systematic procedure for participatory screening of sub-project sites and sub-project activities for environmental and social considerations; (ii) a step-by-step procedure for predicting the main potential environmental and social impacts of the planned sub-project activities; (iii) a generic environmental and social management plan for addressing negative externalities during sub-project implementation (planning, construction and operation); (iv) a step by step monitoring and evaluation system for implementation of mitigation measures; (v) an outline of recommended capacity building measures for environmental and social planning and monitoring of the sub-project activities; and (vi) a budget to ensure that the Project has adequate resources to meet its own interests, especially financial resources for the preparation, licensing and implementation of sub-projects Environmental and Social Impact Assessments (ESIAs), Environmental and Social Management Plans (ESMPs) and, where required, Resettlement Action Plans (RAPs).

The ESMF is prepared in compliance with the requirements of both the beneficiary Government of Mozambique (GoM) and the funding International Fund for Agricultural Development (IFAD). The ESMF is justified by the fact that at the stage of its formulation the exact location, number, specific scale of the developments to be undertaken, which could justify conducting the environmental and social impact assessments and corresponding environmental and social management plans and/or resettlement action plans, were not yet known.

In line with the categorization criteria adopted by IFAD, which in many aspects are like those of the GoM, PRODAPE is classified as Category B Project. Most, if not all the physical sub-projects, will fall under this environmental category and/or below, i.e. Category C. Category B projects require less stringent processes (simplified ESIA and ESMP, respectively) since the environmental and social impacts are easier to deal with; few if any of them have irreversible effects; and in most cases appropriate mitigation measures can be readily designed and implemented. Environmental and social best practices recommend that negative impacts be avoided and/or minimized, and that adequate and implementable mitigation and management measures be put in place early enough where avoidance is not feasible. This is consistently endorsed by PRODAPE's ESMF.

The ESMF sets the tone and will be used in combination with the Climate Risk Assessment (CRA) for the same project as well as for the **Inclusive Agri-food Value-chains Development Programme (PROCAVA)**, prepared separately to guide the project and its actors in dealing with the effects of climate change. PROCAVA is also funded by IFAD and will be implemented by the Ministry of Agriculture and Food Security (MASA) and it will cover 75 districts across the country.

In addition to the introduction the ESMF document comprises ten chapters, namely (i) description of the proposed project; (ii) policy and legal framework on environmental assessment in Mozambique and IFAD's SECAP; (iii) description of the environmental setting; (iv) significant environmental and social impacts; (v) analysis of alternatives; (vi) screening criteria and forms; (vii) environmental and social management plan; (viii) environmental and social monitoring plan; (ix) capacity building and training for environmental and social management; and (x) ESMF financial requirements and budget. Report references and a series of annexes are used to complement the issues presented and discussed throughout the document.

Secondary data review, interviews and discussions with key informants including experts in relevant project sectors and subsectors and other key informants in the field, a preliminary socioeconomic survey as well as feedback from a public consultation meeting that took place on the 1st of March 2019; review of similar projects, mainly lessons learned from PROPESCA and PROAQUA; direct observations in the project area; and Consultant's judgement, were the main sources of information to prepare the ESMF document.

Project Description and Implementation Arrangements

The project will support the development of freshwater pond and cage-based aquaculture as well as other interventions that will contribute to the development and sustainability of aquaculture in the targeted districts.

Project Development Objective: the main objective of the project is to contribute to poverty reduction and enhancing food security and nutrition among rural households (HHs) in the project area. The specific Project

Development Objective (PDO) is to increase production, consumption and income of rural HHs and other actors involved in the aquaculture value chain in the target area. PRODAPE comprises three main components, namely:

- **Component 1: Development of small-scale aquaculture production capacity:** this component will deal with improved access to aquaculture production inputs, which will involve a range of instruments and activities to ensure the establishment and consolidation of a local commercial input supply networks of fish feed and fingerlings, at competitive and affordable prices, based on a network of existing and emerging operators in the target provinces. The promotion of climate smart technologies and best practices will be an integral part of this component and will include environmentally sustainable forms of production, with emphasis on water needs and water quality, as well as the suitability of different agroecological zones for different aquaculture technologies. This component comprises four subcomponents: (i) develop fish seed production capacity; (ii) develop fish feed production capacity; (iii) develop smallholder aquaculture production capacity; (iv) mainstreaming nutrition and addressing social risks.
- **Component 2: Development of aquaculture business:** this component will focus on developing the knowledge and skills of processors and traders to improve the processing, handling and marketing of cultured fish. It will aim for quality and reliability in the value chain with the use of business partnerships among stakeholders, including the establishment of partnerships between inputs suppliers, processors and broader markets with smallholders. Key activities will include market surveys, training, technical assistance, demonstrations, exchange visits, equipment and improvements to market facilities. The component will also seek to improve handling practices related to hygiene and fish quality, improve the quality, hygiene and handling of fish in markets and increase demand for fish and fish products. A major focus of the component will be to facilitate access to financial services through REFP. This component will comprise two subcomponents, namely (i) develop business partnerships e.g., aquaparks; (ii) develop financial services; and (iii) Develop market linkages.
- **Component 3: Project management, institutional development and policy:** this component will provide for overall institutional framework for the project, its management, provision of support to strengthen the institutions responsible for small-scale aquaculture to fulfil their roles in project implementation and beyond. The component also warrants the provision of support to the development of sector policies and regulatory development. It comprises three main subcomponents (i) project management; (ii) institutional capacity building; and (iii) policy development.

Project Development Context

The project happens at a time when Mozambique is going through a period of economic and financial hardships after a remarkable growth between 1995 and 2013-2015. The project also happens in a country marked by considerable imbalances in the access to the benefits of development among its citizens and regions, a phenomenon that even during the period of commendable growth could not be addressed. More than 50% of the people are poor.

However, the country remains as one of the best endowed countries in Africa in terms of natural capital. It is drained by several important rivers, nine of which are international, with the Zambezi being the largest and most important river, the fourth-longest in Africa, and the largest flowing into the Indian Ocean from Africa. The Zambezi river is present in five of the project provinces, i.e. Niassa, Zambezia, Tete, Manica and Sofala. The country is also endowed with vast land resources, i.e. close to 40% (36 million ha) of the 800,000 km² of Mozambique territory are arable land. However, only 10% of the total arable land is under cultivation of which only 1% is in the hands of commercial agriculture. The remaining 99% of the cultivated land is in the hands of subsistence farmers and are distributed by close to 4.0 million small farms of slightly above 1 ha and less than 10 ha in size. Agriculture contributes 26% of total GDP and is the source of livelihood for 78% of the population, but due to the high dependence on hydrometeorological factors it displays low levels of productivity.

The fisheries sector contributes 2% to the GDP. Fishery production, including sea and inland fishing as well as aquaculture production, amounts to more than 151 thousand tons per year, with an economic contribution of

around USD 452 million and an average of USD 70 Million of exports per year. While the direct contribution of the sector to the GDP is relatively moderate, it has a considerable weight in food security and particularly access to animal protein (i.e. 50% of animal protein consumed in the country) by a significant proportion of the country's population in rural and urban areas, balance of payment, public revenues, employment and gender equity. Around 850,000 households, or about 20% of the population, rely on fisheries for part of their income and a larger proportion relies on fishing for subsistence and food security.

Despite a certain presence of commercial operators of different sizes, currently, aquaculture in Mozambique is mostly practiced by artisanal fish farmers for subsistence purposes, domestic consumption and limited surplus for domestic marketing.

Despite its recognized dynamism aquaculture subsector is still at its incipient stage and it has been developing rather slowly over the years. The subsector faces several constraints related to the lack of quality fingerlings/larvae, fish feed unavailability, access to financing, financial institutions' inability, lack of diversity of cultivated species, weak intersectoral coordination, lack of small and medium-sized enterprises, among others. PRODAPE precursors (e.g. PROPESCA and PROAQUA) took the first steps to reverse this situation and create the necessary conditions for the country to seize the vast opportunities it possesses to develop freshwater aquaculture.

The country experiences high levels of climate variability and extreme weather events (i.e. droughts, floods, and tropical cyclones), which when combined with the country's hypsometry translate into serious damages, losses of lives and several assets. This reflects negatively in the country's GDP and has the potential to interfere negatively with the development of aquaculture and PRODAPE if the necessary measures are not adopted. Droughts and floods, combined with soils, water, hypsometry require the adoption of well-thought mitigation measures in aquaculture (and agriculture) production. Because of the high vulnerability to climate risks a Climate Risk Assessment (CRA) for PRODAPE has been conducted together with the formulation of the ESMF. The CRA report, which will be used in conjunction with the ESMF presents details about the existing risks, impacts and recommended mitigation measures.

The seven provinces defining the project area combined represent 77% of the total population of the country, while the 23 PRODAPE targeted districts represent close to 12%. Approximately 51% of the country's population are women while young people between the ages of 15 and 45 (close to 40%) are the dominant age group, despite the incessant increase of those above 65 (3%) and strong presence of those below the age of 15 (45%). Notwithstanding their higher levels of education and technical qualifications young people are the most affected by unemployment, i.e. inability to get work in the formal sector of the economy. They tend to resort to a diversity of self-employment and informal ventures to counteract this phenomenon. This also means that some of them have significant business management experience and capital that could be beneficial to aquaculture if they can be attracted to the subsector. PRODAPE is designed to make dedicated efforts to attract women and the youth to embrace aquaculture across its value chain.

Legal and Regulatory Framework

From the environmental and social point of view the project adheres to the regulations and policies of both the GoM and IFAD.

▪ Government of Mozambique

The project will benefit from the enormous process of reform and streamlining of laws, regulations and institutions to promote sustainable development that Mozambique has been undertaking for more than two decades.

The developments are of high relevance in the management of PRODAPE and aquaculture development as they touch on land, water, biodiversity, social and economic aspects, which are important components in the subsector. These will be adhered to and applied systematically throughout all phases of project development.

Relevant laws and regulations are spread over several areas such as (i) Environmental Laws and Regulations, notably the Regulation on the Environmental Impact Assessment Process (54/2015); (ii) Fisheries and Aquaculture Laws, Regulations, Policies and Strategies; (iii) Land; (iv) Water; (v) Construction; (vi) Resettlement and Compensation; (vii) Healthy and Safety; (viii) Cultural Heritage; and (ix) Gender and Poverty. The ESMF presents the details about these instruments and related institutional setting and their applicability to the Project.

The project and the ESMF are cognizant though that despite the progress witnessed several weaknesses and risks/challenges remain to guarantee their consistent adoption such as incipient decentralization, excessive departmentalization; human and technological resources, inadequate flow of financial resources, deficient public-private cooperation; and discrepancies between modern and traditional management and communication systems.

▪ IFAD

To mainstream social, environmental and climate change in all its interventions to promote development, IFAD approved Social, Environmental and Climate Assessment Procedures (SECAP), of which the organization is now using the 2017 edition.

The procedures cover all phases of Project development and systematically identify the best entry points and interventions to ensure that not only the “not doing harm” is achieved, but also that development gains are maximized in whatever IFAD and its partners/beneficiaries are doing.

In line with the IFAD’s SECAP PRODAPE triggers mainly the following tools and methods (i) Climate risk analysis (CRA), which has been prepared separately and will be used in conjunction with the ESMF; (ii) Environmental and Social Impact Assessment (ESIA); (iii) Environmental and Social Management Framework (ESMF – this document); (iv) Environmental and Social Management Plan, of which a template for aquaculture projects is presented as an annex to this ESMF. PRODAPE also triggers (i) Cumulative Impact Assessment; (ii) Physical Cultural Resources Management Plan; (iii) relevant Guidance Statements such as (a) Fisheries and Aquaculture (Guidance Statement 4) as well as (b) Biodiversity; (c) Agrochemicals; (d) Forests Resources; (e) Water; (f) Development of Value Chains, Microenterprises and Small Enterprises; (g) Rural Finance; (h) Physical and Economic Resettlement; and (i) Community Health. These will be used to guide and address PRODAPE’s interventions in and around related specific areas. \

The ESMF also notes that although there has been increased harmonization between the GOM Regulations and the IFAD Environmental and Social Procedures, differences in certain areas and aspects remain. Whenever there are differences between national legislation and IFAD management procedures, the most explicit and highest standards will be applied. Under the proposed Project, whenever one does not regulate a specific aspect the other (more explicit) should apply. When one system offers safeguards’ standards considered lower than the other, then the highest standards will be applied.

Environmental and social concerns in the project area and mitigation of project impacts

Through public consultation and other forms of data collection it was possible to make a preliminary assessment of the environmental and social concerns of the people and other stakeholders in the project area. The following aspects, but not only, can be highlighted:

- **Siting of subprojects (aquaculture ponds and cages):** by design PRODAPE will limit production activities to freshwater aquaculture. However, since the project is likely to inherit interventions initiated under PROPESCA and PROAQUA and other development initiatives there is the possibility that pressure will be made for the project to extend its scope to interventions that are in saltwater areas. There is a need to decide on this and communicate it to relevant entities to act upon it swiftly;
- **Clearance of vegetation with special conservation status:** if the necessary efforts are not made there is the risk that the opening of aquaculture ponds will be done at the detriment of conservation of plant species with special conservation status, e.g. mangrove, in the case of these being developed in

saltwater areas. In addition to this being a non-recommendable practice this carries the risk of causing additional and/or consolidation of the destruction of the mangrove as more activities in and around the Aquaparks are developed;

- **Land insecurity:** in some cases, the aquaculture ponds are installed in areas where there is not enough clarity about land use rights. For subprojects to be run smoothly over time they must be installed in areas clearly earmarked for aquaculture developments. Land use rights (DUATs) must be obtained by the developers and preferably by the associations that will manage subprojects and/or be formally passed on to them;
- **Formal environmental and water licensing of subprojects:** certain subprojects are developed in relative isolation from other public entities responsible for the licensing of activities. Important sectors such as environment and water are not systematically involved (except for the installation and operation of cages in existing dams/reservoirs) in the design and licensing of the use of land, water and other general environmental aspects/components. This seems to apply to most subprojects. The underlying assumption seems to be that small-scale developments in the hands of informal operators do not require certain licenses (e.g. environmental licenses). However, even for Category C subprojects it will be fundamental under PRODAPE to apply and obtain explicit land, environmental and water licenses;
- **Staying within Category B or below and cumulative impacts:** to keep subprojects under Category B or C, and avoid them falling under Category A, attention must be paid to the potential of clustering developments in one single development area of influence or ecosystem. In line with project Categorization and expected production volumes per pond subprojects need to stick to **41.6 ponds** in a given area, producing two times per year to generate up to 100 ton of fish (the highest limit allowed for Category B Projects). More than that carries the risk of going beyond Category B and C and of falling under Category A. Initiatives pursuing more than 40 fishponds should be avoided;
- **Design standards for and construction of infrastructures:** although the general orientation of sticking to certain measurements (e.g. up to 500 m² for aquaculture ponds) is being adhered to, it is noticed that the design of aquaculture infrastructures (e.g. feed manufacturing units, cold rooms, ponds and cages themselves, etc.) does not follow any clearly defined standards. In general, no concrete and/or formally written designs and plans are prepared and executed accordingly. This goes hand in hand with the fact that currently there are no significant contractors/consultants with specialized experience in this area except for some emerging operators. Even acknowledging that it is likely to take a while for the subsector to develop its own set of such standards and implementing agents/contractors it is recommended that under the project actions be taken to ensure minimum quality standards across the board (i.e. design, construction, operation);
- **Adequate combination of environmental impact assessments and formulation of environmental and social management plans and subproject auditing:** in addition to starting new subprojects PRODAPE is likely to inherit a significant part of developments initiated by other projects (e.g. PROPESCA and other), which will be in different stages of development and completion. Most of these past subprojects if not all did not undergo any systematic environmental and social impact assessment and might have been developed in contravention of fundamental requirements in this sphere (e.g. site selection, site construction establishment, compensation for land and/or asset acquisition, prevention of the spread of STD including HI/AIDS, malaria and other preventable diseases; offering employment opportunities for local people including women and the youth, etc.). Yet all developments (old and new) should adopt a sound environmental and social process that is consistent with both the GoM and IFAD policies. All previous developments, irrespectively of their location, size, stage of development, will be subject to an environmental and social audit. The audits will be systematic and independent examination processes to ascertain the extent to which GoM and IFAD policies have been followed and where relevant recommend remedial actions, which will then be put in place;
- **Sustainability of operations:** sustainability can be defined as being the extent to which positive effects of a project can be expected to continue after termination of external assistance. For an intervention to be sustainable several requirements must be met. Among other aspects these include a systematic involvement of the project beneficiaries in all phases and activities of project design and implementation. The project must consider the preferences of the beneficiaries as well as their institutional and human capabilities to initiate and sustain interventions. A combination of measures including capacity building will be adopted to ensure sustainability of subprojects.

The ESMF provides an assessment of the above-mentioned impacts and other and provides generalized guidelines about their mitigation and management. It also takes note of the fact that even though the environmental and social impacts of PRODAPE will tend to be localized and of low/medium intensity, when combined with other issues, land, water and natural resources uses (i.e. climate change, traditional agriculture, forests, industry, mining, etc.) these impacts can be significant. This also has implications on project design including the planning, siting, design specifications, construction, operation and eventual decommissioning of project's subprojects.

The ESMF then presents more detailed (i) guidelines for subproject screening, preparation, appraisal, approval, implementation and monitoring, including the roles and responsibilities of the various agencies and a grievance redress mechanism to be used by project affected people and other project stakeholders in the presentation and adoption of corrective measures where grievances will occur; (ii) guidelines for preparing environmental and social management plans (iii) indications about the training and capacity building, technical assistance best suited for the project, including the approaches to be adopted; (iv) and ESMF monitoring requirements.

The above-mentioned sections of the document are practical in nature and are aimed at assisting all the agents/parties that will be active in the implementation of the project's environmental and social safeguards to deal with the various issues on a day-to-day basis.

ESMF Budget

Based on common practices and the moderate nature of the project's environmental and social expected impacts the ESMF estimates that 1.2 % of the total budget should be assigned to environmental and social management and ESMF implementation.

The total amount to cover all the work to be done under the ESMF implementation for the project stands at **US\$ 0.6 million (six hundred thousand North American Dollars)**. The funds will be distributed by the following main areas (i) Environmental and Water permits fees; (ii) DUATs; (iii) Training Safeguards HR at Central, Provincial and District level; (iv) Capacity building to Aquaculture Units (Central, Provincial and District); (v) Capacity to Aquaculture Farmers on Safeguards; (vi) Training on Safeguards at the ground level (cage/pond, etc.); (vii) Preparation of simplified ESIA and ESMP; (viii) Land Acquisitions (portions of land, crops and trees); (ix) Implementation (Contractor) and Supervision (Fiscal); (x) Safeguard external independent Audits; and (xi) Safeguard traveling costs (flights, trips, *per diem*, etc.).

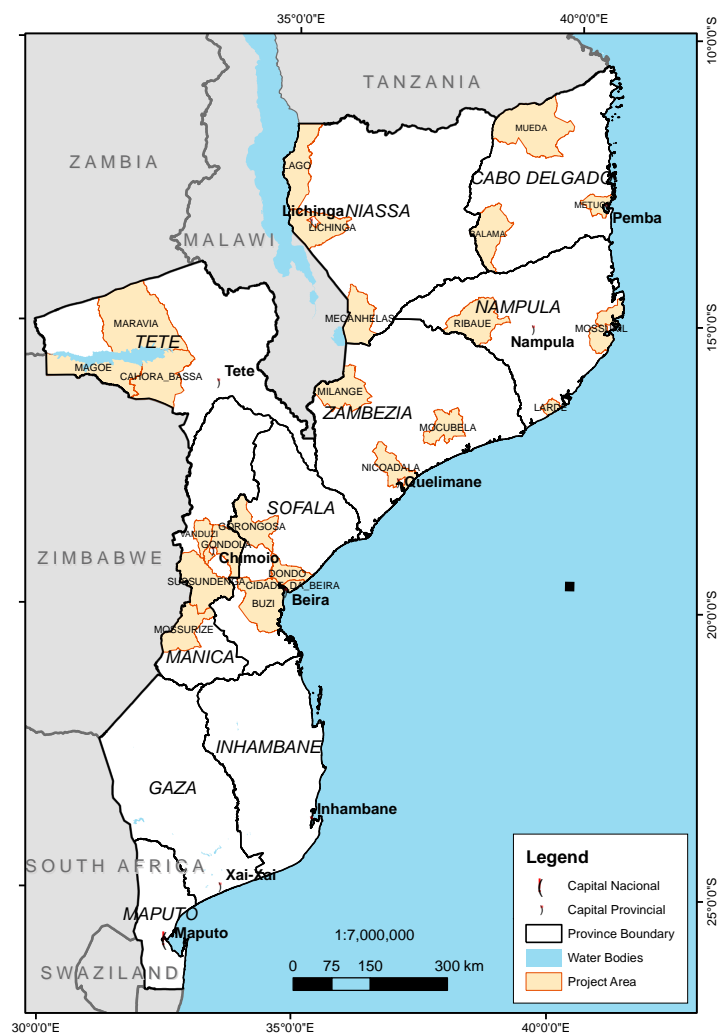
Sumário Executivo

Introdução

Este é o Sumário Executivo do Quadro de Gestão Ambiental e Social (QGAS) do **Projecto de Promoção de Aquacultura de Pequena Escala**, mais conhecido por PRODAPE, que será implementado pelo Ministério do Mar, Águas Interiores e Pescas (MIMAIP), através do Instituto Nacional de Desenvolvimento da Pesca e Aquacultura (IDEPA), com apoio do Fundo Internacional de Desenvolvimento Agrícola (FIDA), durante o período de 2019 e 2024. O PRODAPE continuará e consolidará os desenvolvimentos iniciados pelo PROPESCA e PROAQUA no subsector de aquacultura nos últimos anos.

O projecto irá concentrar se sobre as províncias centrais de Manica, Sofala, Tete e Zambézia e sobre as províncias nortenhas de Dentro destas sete províncias, o projecto cobrirá 23 distritos.

Cobertura geográfica do PRODAPE



O QGAS orientará a triagem das intervenções (subprojectos) do projecto proposto para garantir não apenas que elas não afectem negativamente o ambiente natural e social, mas também que os resultados do projecto sejam otimizados por meio de uma atenção cuidadosa a ser dada a todos os aspectos que se poderiam traduzir em problemas. em todas as etapas do seu desenvolvimento.

O QGAS descreve vários princípios, que incluem: (i) um procedimento sistemático para a triagem participativa dos locais dos subprojectos e actividades dos subprojectos para integrar considerações ambientais e sociais; (ii) um procedimento faseado para prever os principais potenciais impactos ambientais e sociais das actividades planificadas dos sub-projectos; (iii) um plano de gestão ambiental e social genérico para lidar com as externalidades negativas durante a implementação dos subprojectos (planificação, construção e operação); (iv) um sistema faseado de monitorização e avaliação da implementação de medidas de mitigação; (v) um esboço das medidas de capacitação recomendadas para a planificação ambiental e social e monitorização das actividades dos subprojectos; e (vi) um orçamento para assegurar que o Projecto tenha recursos adequados para atender aos seus próprios interesses, especialmente recursos financeiros para a preparação, licenciamento e implementação das Avaliações de Impacto Ambiental e Social (AIASs), Planos de Gestão Ambiental e Social (PGASs) e, onde for necessário, Planos de Acção de Reassentamento (PARs).

O QGAS é preparado em conformidade com os requisitos do beneficiário Governo de Moçambique (GdM) e do Fundo Internacional para o Desenvolvimento Agrícola (FIDA). O QGAS justifica-se pelo facto de que no estágio da sua formulação a localização exacta, número e escala específicos dos empreendimentos a serem levados a cabo, o que poderia justificar a realização de avaliações de impacto ambiental e social e preparação dos correspondentes planos de gestão ambiental e social e/ou planos de acção do reassentamento., ainda não eram conhecidos.

Em conformidade com os critérios de categorização adoptados pelo FIDA, que em muitos aspectos são semelhantes aos do GdM, o PRODAPE é classificado como sendo um Projecto de Categoria B. Muitos, se não todos os subprojectos ou intervenções físicas, irão enquadrar-se nesta categoria ambiental e/ou abaixo dela, ou seja, Categoria C. Os projectos da categoria B exigem processos menos rigorosos (de AIAS e PGAS simplificados, respectivamente), uma vez que os seus impactos ambientais e sociais são mais fáceis de gerir; poucos, se algum deles, têm efeitos irreversíveis; e na maioria dos casos, medidas de mitigação apropriadas podem ser prontamente concebidas e implementadas. As melhores práticas ambientais e sociais recomendam que, onde o evitar não seja viável. os impactos negativos sejam evitados e/ou minimizados, e que medidas de mitigação e gestão adequadas e implementáveis sejam postas em prática suficientemente a tempo. Isto é consistentemente endossado pelo PRODAPE.

O QGAS estabelece a base e será usado em combinação com a Avaliação de Risco Climático (ARC) para o mesmo projecto, bem como para o **Programa Inclusivo de Desenvolvimento de Cadeias de Valor Agroalimentar (PROCAVA)**, preparado separadamente para orientar o projecto e os seus actores quando se tratar de lidar com os efeitos das mudanças climáticas. O PROCAVA também é financiado pelo FIDA e será implementado pelo Ministério da Agricultura e Segurança Alimentar (MASA) e vai cobrir 75 distritos em todo o país.

Para além da introdução o documento do QGAS compreende dez capítulos, nomeadamente (i) descrição do projecto; ; (iv) impactos ambientais e sociais ; análise de alternativas; ; ; . Referências de documentos e uma série de anexos são usados para complementar as questões apresentadas e discutidas ao longo do documento.

Análise de dados secundários, entrevistas e discussões com informantes-chave, incluindo especialistas em sectores e subsectores relevantes do projecto e outros informantes-chave no campo, um levantamento socioeconómico preliminar, bem como o feedback de uma reunião de consulta pública que teve lugar em Março de 2019, revisão de projectos similares, principalmente lições aprendidas do PROPESCA e PROAQUA; observações directas na área do projecto; julgamento do consultor, constituíram-se nas principais fontes de informação para preparar o documento do QGAS.

Descrição do projecto e arranjos de implementação

O projecto apoiará o desenvolvimento de tanques de aquacultura de água doce e aquacultura baseada em gaiolas bem como outras intervenções que contribuam para o desenvolvimento e sustentabilidade da aquacultura nos distritos alvo.

Objectivo de Desenvolvimento do Projecto: O principal objectivo do projecto é o de contribuir para a redução da pobreza e melhorar a segurança alimentar e nutricional entre os agregados familiares (AFs) rurais na área do projecto. O Objectivo específico de Desenvolvimento do Projecto (ODP) é o de aumentar a produção, o consumo e a renda dos AFs rurais e outros actores envolvidos na cadeia de valor da aquacultura na área alvo. O PRODAPE é composto por três componentes principais, nomeadamente:

Componente 1: Desenvolvimento da capacidade de produção de aquacultura de pequena escala: esta componente vai lidar com o melhoramento do acesso a insumos de produção aquícola, que envolverá uma série de instrumentos e actividades para assegurar o estabelecimento e consolidação de uma rede local de fornecimento de componentes comerciais de alimentos para peixes e alevinos, a preços competitivos e acessíveis, baseados numa rede de operadores existentes e emergentes nas províncias alvo. A promoção de tecnologias e melhores práticas inteligentes do ponto de vista climático será parte integrante desta componente e incluirá formas de produção ambientalmente sustentáveis, com ênfase nas necessidades de água e qualidade da água, bem como a adequação das diferentes zonas agroecológicas para diferentes tecnologias de aquacultura. Esta componente compreende quatro (i) desenvolvimento da capacidade de produção de alevinos; (ii) desenvolvimento da capacidade de produção de ração para peixes; (iii) desenvolvimento da capacidade de produção de aquacultura por parte dos pequenos produtores; (iv) integração da nutrição e abordagem dos riscos sociais.

Componente 2: Desenvolvimento de negócios de aquacultura: esta componente irá concentrar-se no desenvolvimento do conhecimento e habilidades dos processadores e comerciantes para melhorar o processamento, manuseio e comercialização de peixes cultivados. Ela terá como objectivo a qualidade e a fiabilidade na cadeia de valor, com o uso de parcerias comerciais entre as partes interessadas, incluindo o estabelecimento de parcerias entre fornecedores de insumos, processadores e mercados mais amplos com os pequenos produtores. As principais actividades incluirão pesquisas de mercado, formação, assistência técnica, demonstrações, visitas de intercâmbio, equipamentos e melhorias nas instalações dos mercados. A componente também procurará aprimorar as práticas de gestão relacionadas com a higiene e qualidade dos peixes, melhorar a qualidade, higiene e manuseio do pescado nos mercados e aumentar a demanda por peixes e produtos de pescado. Um dos principais focos da componente será facilitar o acesso aos serviços financeiros através do Projecto de Financiamento Empresarial Rural (PFER/REFP). Esta componente compreenderá três subcomponentes, ou seja: (i) desenvolver parcerias de negócios, por exemplo, aquaparkes; (ii) desenvolver serviços financeiros; e (iii) Desenvolver ligações de mercado.

Componente 3: Gestão de projectos, desenvolvimento e política institucional: esta componente tratará do quadro institucional geral do projecto, a sua gestão, prestação de apoio para fortalecer as instituições responsáveis pela aquacultura de pequena escala para cumprirem os seus papéis na implementação do projecto e desenvolver acções que vão para além disso. A componente também garante o fornecimento de apoio ao desenvolvimento de políticas sectoriais e desenvolvimento do quadro regulatório. É composta por três subcomponentes principais: (i) gestão de projectos; (ii) capacitação institucional; e (iii) desenvolvimento de políticas.

Contexto de Desenvolvimento de Projectos

O projecto ocorre num momento em que Moçambique atravessa um período de dificuldades económicas e financeiras após um crescimento notável entre 1995 e 2013-2015. Ele também acontece num país marcado por consideráveis disparidades no acesso aos benefícios do desenvolvimento entre os seus cidadãos e regiões, fenómeno que, mesmo durante o período de crescimento louvável, não pode ser alterado. Mais de 50% das pessoas são pobres.

No entanto, o país continua a ser um dos mais bem-dotados em África em matéria de capital natural. O país é drenado por vários rios importantes, nove dos quais são internacionais, com o Zambeze a ser o maior e mais importante rio, o quarto mais longo da África, e o maior que desagua no Oceano Índico, em África. O rio Zambeze está presente em cinco das províncias do projecto, ou seja, Niassa, Zambézia, Tete, Manica e . O país também é dotado de vastos recursos de terra, ou seja, cerca de 40% (36 milhões de hectares) dos 800.000 km² do território de Moçambique constituem-se em terras aráveis. No entanto, apenas 10% do total das terras aráveis é que está sob cultivo, das quais apenas 1% está nas mãos da agricultura comercial. Os 99% restantes das terras cultivadas estão nas mãos de agricultores de subsistência e são distribuídos por cerca de 4,0 milhões de pequenas propriedades de pouco mais de 1 ha e menos de 10 ha de tamanho. A agricultura contribui com 26% do total do PIB e é a fonte de subsistência para 78% da população, mas devido à alta dependência de factores hidro-meteorológicos, ela apresenta baixos níveis de produtividade.

Field Code Changed

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O sector das pescas contribui com 2% do PIB. A produção pesqueira, incluindo a pesca marítima e do interior, bem como a produção aquícola, ascendem a mais de 151 mil toneladas por ano, com uma contribuição económica de cerca de USD 452 milhões e uma média de USD 70 milhões de exportações por ano. Embora a contribuição directa do sector para o PIB seja relativamente modesta, tem um peso considerável na segurança alimentar e, em particular, no acesso à proteína animal (ou seja, 50% da proteína animal consumida no país) por uma proporção significativa da população do país em zonas rurais e urbanas, balança de pagamentos, receitas públicas, emprego e equidade de género. Cerca de 850.000 agregados familiares, ou cerca de 20% da população, depende da pesca para a obtenção de parte da sua renda e uma proporção maior depende da pesca para subsistência e segurança alimentar.

Apesar de uma certa presença de operadores comerciais de diferentes tamanhos, actualmente, a aquacultura em Moçambique é praticada principalmente por piscicultores artesanais para fins de subsistência, consumo doméstico e excedente limitado para comercialização no mercado interno.

Apesar do seu reconhecido dinamismo, o subsector da aquacultura encontra-se ainda na sua fase incipiente e tem vindo a desenvolver-se de formabastante lenta ao longo dos anos. O subsector enfrenta vários constrangimentos relacionados com a falta de alevinos/larvas de qualidade, indisponibilidade de rações para peixes, acesso a financiamento, incapacidade das instituições financeiras, falta de diversidade de espécies cultivadas, fraca coordenação intersectorial, falta de pequenas e médias empresas, entre outros. Os precursores do PRODAPE (por exemplo, PROPESCA e PROAQUA) deram os primeiros passos para reverter essa situação e criar as condições necessárias para que o país possa aproveitar as vastas oportunidades que possui para desenvolver a aquacultura de água doce.

O país passa por elevados níveis de variabilidade climática e eventos climáticos extremos (por exemplo, secas, inundações e ciclones tropicais), que quando combinados com a hipsometria do país se traduzem em sérios danos, perdas de vidas e de vários activos. Isso reflecte-se negativamente no PIB do país e tem o potencial de interferir negativamente no desenvolvimento da aquacultura e do PRODAPE se medidas necessárias não forem adoptadas. Secas e inundações, combinadas com solos, água e hipsometria, exigem a adopção de medidas de mitigação bem pensadas na produção aquícola (e agrícola). Por causa da alta vulnerabilidade a riscos climáticos foi conduzida uma Avaliação de Riscos Climáticos (ARC) para o PRODAPE juntamente com a formulação do QGAS. apresenta detalhes sobre os riscos existentes, impactos e medidas de mitigação recomendadas.

As sete províncias que definem a área do projecto combinadas representam 77% da população total do país, enquanto os 23 distritos alvo do PRODAPE representam cerca de 12%. Aproximadamente 51% da população do país é constituída por mulheres enquanto os jovens entre os 15 e 45 anos (perto de 40%) são a faixa etária dominante. Apesar do aumento incessante dos cidadãos acima de 65 anos (3%) e da forte presença de pessoas com menos de 15 anos (45%). Não obstante os seus níveis mais elevados de educação e qualificação técnica, os jovens são os mais afectados pelo desemprego, ou seja, pela incapacidade de acesso a emprego no sector formal da economia. Eles tendem a recorrer a uma diversidade de formas de trabalho autónomo (autoemprego) e empreendimentos informais para neutralizar esse fenómeno. Isso também significa que alguns deles têm experiência em gestão de negócios e capital significativos que poderiam ser benéficos para a

aquacultura, caso eles possam ser atraídos para o subsector. O PRODAPE prevê envidar esforços para atrair mulheres e jovens a adoptarem a aquacultura em toda a sua cadeia de valor.

Legal e Regulatório

Do ponto de vista ambiental e social, o projecto segue os regulamentos e as políticas do GdM e do FIDA.

▪ Governo de Moçambique

O projecto irá beneficiar do enorme processo de reforma e harmonização de leis, regulamentos e instituições para promover o desenvolvimento sustentável que Moçambique vem empreendendo há mais de duas décadas. Os desenvolvimentos são de grande relevância na gestão do desenvolvimento do PRODAPE e da aquacultura, uma vez que eles dizem respeito à terra, água, biodiversidade, aspectos sociais e económicos, que são componentes importantes no subsector. Estes serão respeitados e aplicados de forma sistemática em todas as fases do desenvolvimento do projecto.

As leis e regulamentos relevantes estão distribuídos por várias áreas, tais como (i) Leis e Regulamentos Ambientais, com destaque para o Regulamento sobre o Processo de Avaliação de Impacto Ambiental (54/2015); (ii) Leis, Regulamentos, Políticas e Estratégias de Pesca e Aquacultura ; erra; gua; Construção; Reassentamento e Compensação; aúde e Segurança ; Património Cultural; e (x) Género e Pobreza. O QGAS apresenta os detalhes sobre esses instrumentos e o ambiente institucional relacionado assim como a sua aplicabilidade ao Projecto.

O projecto e o QGAS estão, no entanto, cientes de que apesar dos progressos testemunhados ainda permanecem várias deficiências e riscos/desafios para garantir a sua adopção coerente como é o caso da descentralização incipiente, departamentalização excessiva; recursos humanos e tecnológicos, fluxo inadequado de recursos financeiros, deficiente cooperação público-privada; e discrepâncias entre os sistemas modernos e tradicionais de gestão e comunicação.

▪ FIDA

Para integrar as questões ambientais, sociais e de mudanças climáticas em todas as suas intervenções na promoção do desenvolvimento, o FIDA aprovou os Procedimentos de Avaliação Social, Ambiental e Climática (SECAP), dos quais a organização agora está a usar a edição de 2017.

Os procedimentos cobrem todas as fases do desenvolvimento do Projecto e identificam sistematicamente os melhores pontos de entrada e intervenções para assegurar que não apenas se alcance o “não prejudicar”, mas também que os ganhos de desenvolvimento sejam maximizados em qualquer intervenção do FIDA e seus parceiros/beneficiários.

Em conformidade com o SECAP do FIDA o principalmente as seguintes ferramentas e métodos (i) Análise de Risco Climático (ARC), que foi preparado separadamente e irá ser utilizado em conjunto com o QGAS (ii) Avaliação de Impacto Ambiental e Social (AIAS); (iii) Quadro de Gestão Ambiental e Social (QGAS - este documento); (iv) Plano de Gestão Ambiental e Social, do qual um modelo para projectos de aquacultura é apresentado como um anexo a este QGAS. O PRODAPE também desencadeia (i) Avaliação de Impacto Cumulativo; (ii) Plano de Gestão de Recursos Culturais Físicos; (iii) Declarações de Orientação relevantes, tais como (a) Pesca e Aquacultura (Orientação 4) bem como (b) Biodiversidade; groquímicos; lorestais; gua; Desenvolvimento de Cadeias de Valor, Microempresas e Pequenas Empresas; ; (h) Reassentamento Físico e Económico; e (i) Saúde da Comunidade, que serão usados para orientar e abordar as intervenções do PRODAPE em áreas específicas relacionados com essas temáticas.

O QGAS também observa que, embora tenha havido maior harmonização entre os Regulamento do GdM e os Procedimentos Ambientais e Sociais do FIDA, ainda permanecem diferenças em certas áreas e aspectos. Sempre que houver diferenças entre a legislação nacional e os procedimentos de gestão do FIDA, os padrões

mais explícitos e mais elevados serão aplicados. No âmbito do Projecto proposto, sempre que um dos quadros não regule um aspecto específico, o outro (mais explícito) deverá ser aplicado. Quando um sistema oferece padrões de segurança considerados mais baixos do que o outro, os padrões mais altos serão aplicados.

Preocupações ambientais e sociais na área do projecto e mitigação dos impactos do projecto

de consulta pública e outras formas de recolha de dados, foi possível fazer uma avaliação preliminar das preocupações ambientais e sociais das pessoas e outras partes interessadas na área do projecto. Os seguintes aspectos, mas não apenas estes, podem ser destacados:

- **Localização de subprojectos (tanques e gaiolas de aquacultura):** por definição, o PRODAPE limitará as suas actividades de produção à aquacultura em água doce. No entanto, como o projecto provavelmente herdará intervenções iniciadas sob o PROPECA e PROAQUA e outras iniciativas de desenvolvimento, existe a possibilidade de que seja feita pressão para que o Projecto amplie o seu escopo para integrar intervenções em áreas de água salgada. Existe uma necessidade de decidir sobre isso e comunicar a decisão às entidades relevantes para se agir rapidamente sobre isso;
- **Destruição de vegetação com estatuto especial de conservação:** se esforços necessários não forem feitos, existe o risco de que a abertura de tanques de aquacultura seja feita em detrimento da conservação de espécies de plantas com estatuto especial de conservação, por exemplo, mangais, principalmente em relação a projectos desenvolvidos em áreas de água salgada. Para além disso ser uma prática não recomendável implica o risco de provocar a consolidação adicional e/ou a destruição do mangal à medida que mais actividades dentro e em torno dos Aquaparks forem sendo desenvolvidos;
- **Insegurança da terra:** em alguns casos, os tanques de aquacultura estão instalados em áreas onde não há clareza suficiente sobre os direitos de uso da terra. Para que os subprojectos sejam executados sem problemas ao longo do tempo, eles devem ser instalados em áreas claramente destinadas aos empreendimentos de aquacultura. Os direitos de uso e aproveitamento da terra (DUATs) devem ser obtidos pelos promotores e preferencialmente pelas associações que irão gerir os subprojectos e/ou serem formalmente repassados a eles;
- **Licenciamento ambiental e de uso da água formais dos subprojectos:** certos subprojectos são desenvolvidos em relativo isolamento em relação a outras entidades públicas responsáveis pelo licenciamento de actividades. Sectores importantes tais como ambiente e recursos hídricos não são sistematicamente envolvidos (excepto no que respeita à instalação e operação de gaiolas em barragens/reservatórios existentes) na concepção e licenciamento do uso da terra, água e outros aspectos/componentes ambientais gerais. Isso parece aplicar-se à maioria dos subprojectos. O pressuposto subjacente parece ser o de que desenvolvimentos de pequena escala nas mãos de operadores informais não exigem certas licenças (por exemplo, licenças ambientais). No entanto, mesmo para os subprojectos da Categoria C, será fundamental, sob o PRODAPE, aplicar e obter licenças explícitas de terra, ambiente e água;
- **Manter as intervenções dentro da Categoria B ou abaixo e impactos cumulativos:** para manter os subprojectos na Categoria B ou C e evitar que entrem na Categoria A, deve-se prestar atenção ao potencial de agrupamento de desenvolvimentos numa única área de influência ou ecossistema. De acordo com a categorização do projecto e volumes de produção esperados por tanque os subprojectos devem limitar-se aos **41,6 tanques** numa determinada área, produzindo duas vezes por ano para gerar até 100 toneladas de peixe por ano (o limite mais alto permitido para Projectos de Categoria B). Mais do que isso acarreta o risco de se ir para além da Categoria B e C e de se cair na Categoria A. Iniciativas que abarquem mais do que 40 tanques de peixe devem ser evitadas;
- **Normas de concepção e construção de infra-estruturas:** embora a orientação geral de se aderir a determinadas medidas (por exemplo, até 500 m² para tanques de aquacultura) esteja a ser geralmente cumprida, constata-se que a concepção de infra-estruturas de aquacultura (por exemplo, unidades de fabrico de alimentos, câmaras frigoríficas, tanques e gaiolas, etc.) não segue padrões claramente definidos. Em geral, não são preparados e executados projectos e planos concretos e/ou formalmente escritos. Isso vai de mãos dadas com o facto de que actualmente não há empreiteiros/consultores significativos com experiência especializada nesta área, excepto no que respeita a alguns operadores

emergentes. Mesmo reconhecendo que é provável que demore um pouco de tempo para que o subsector desenvolva o seu próprio conjunto de padrões e agentes/prestadores de serviços de implementação, recomenda-se que, sob as acções do Projecto, sejam tomadas medidas para garantir padrões mínimos de qualidade (projectção/desenho, construção, operação);

- **Combinação adequada de estudos de impacto ambiental e formulação de planos de gestão ambiental e social e auditoria aos subprojectos:** para além de iniciar novos subprojectos é de esperar que o PRODAPE herde uma parte significativa dos desenvolvimentos iniciados por outros projectos (por exemplo PROPESCA e outros), que se encontram em diferentes estágios de desenvolvimento e conclusão. A maioria desses subprojectos anteriores, se não todos, não passou por nenhuma avaliação sistemática de impacto ambiental e social e pode ter sido desenvolvida em violação dos requisitos fundamentais nessa área (por exemplo, selecção de locais, estabelecimento de estaleiros, compensação por aquisição de terras e/ou activos e prevenção da disseminação de DTS, incluindo HIV/SIDA, malária e outras doenças evitáveis, oferta de oportunidades de emprego para a população local, incluindo mulheres e jovens, etc.). No entanto, todos os desenvolvimentos (antigos e novos) devem adoptar um processo de gestão ambiental e social sólido que seja consistente com as políticas do GdM e do FIDA. Todos os desenvolvimentos anteriores, independentemente da sua localização, tamanho, estágio de desenvolvimento, estarão sujeitos a uma auditoria ambiental e social. As auditorias serão processos de análise sistemática e independente para determinar em que medida as políticas do GdM e do FIDA foram seguidas e, onde for relevante, recomendar acções correctivas, que serão seguidamente postas em prática;
- **Sustentabilidade das operações:** a sustentabilidade pode ser definida como a medida em que os efeitos positivos de um projecto podem continuar após o término da assistência externa. Para que uma intervenção seja sustentável, vários requisitos devem ser atendidos. Entre outros aspectos, estes incluem um envolvimento sistemático dos beneficiários do projecto em todas as fases e actividades da concepção e implementação do projecto. O projecto deve considerar as preferências dos beneficiários, bem como as suas capacidades institucionais e humanas para iniciar e sustentar intervenções. Uma combinação de medidas, incluindo a capacitação, será adotada para garantir a sustentabilidade dos subprojectos.

O QGAS fornece uma avaliação dos impactos e outros sistemas e mecanismos mencionados acima e fornece directrizes generalizadas sobre a sua mitigação e gestão. Também toma nota do facto de que, embora os impactos ambientais e sociais do PRODAPE devam tender a ser localizados e de baixa/média intensidade, quando combinados com outras questões, por ex. usos da terra, água e recursos naturais (ou seja, mudanças climáticas, agricultura tradicional, florestas, indústria, mineração, etc.) esses impactos podem ser significativos. Isso também tem implicações na concepção do projecto, incluindo na planificação, localização, especificações dos projectos, construção, operação e eventual desactivação dos subprojectos do Projecto. Por outro lado, o QGAS apresenta directrizes mais detalhadas sobre (i) triagem, preparação, avaliação, aprovação, implementação e monitorização de subprojectos, incluindo os papéis e responsabilidades das várias agências e um mecanismo de reparação de reclamações a ser usado pelas pessoas afectadas pelo Projecto e outras partes interessadas do Projecto. a apresentação e adopção de medidas correctivas onde as reclamações ocorrerão; ii) directrizes para a elaboração de planos de gestão ambiental e social; (iii) indicações sobre formação e capacitação, assistência técnica mais adequadas ao Projecto, incluindo as abordagens a serem adoptadas; (iv) e requisitos de monitorização do QGAS.

As secções acima mencionadas do documento são de natureza prática e destinam-se a ajudar todos os agentes/partes interessadas e envolvidas que estarão activos na implementação das salvaguardas ambientais e sociais do Projecto para lidar com as várias questões no dia-a-dia.

Orçamento do QGAS

Com base nas práticas comuns e na natureza moderada dos impactos ambientais e sociais esperados do projecto, o QGAS estima que 1,2% do orçamento total deva ser atribuído à gestão ambiental e social e à implementação do WGAS.

O montante total para cobrir todo o trabalho a ser realizado na implementação do QGAS do projecto é de **US \$ 0,6 milhões (seiscentos mil dólares norte-americanos)**. Os recursos serão distribuídos pelas seguintes áreas principais: (i) taxas de licenciamento ambiental e de água; (ii) DUATs; (iii) Formação de RH a nível central, provincial e distrital em salvaguardas; (iv) Capacitação das Unidades de Aquacultura (Central, Provincial e Distrital); (v) Capacitação dos aquicultores Agricultores em Salvaguardas; (vi) Formação em salvaguardas na base (gaiola / tanque, etc.); (vii) Preparação de AIAS e PGAS simplificados; (viii) Aquisições de Terras (porções de terra, culturas e árvores); (ix) Implementação (Empreiteiros) e Supervisão (Fiscal); (x) Auditorias independentes externas das salvaguardas; e (xi) Custos de viagens (voos, viagens, diárias, etc.) relacionados com as salvaguardas.

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1. Introduction

1.1. Background

Mozambique's economy is dependent on agriculture¹ and fisheries, with the bulk of the jobs and the livelihoods of more than 70% of the population being associated with these two sectors. The productivity of both sectors in Mozambique are highly dependent on weather conditions and is generally low. Rainfed and subsistence low-inputs practices characterize the agriculture and fisheries sectors.

In these two sectors the Government of Mozambique (GoM) has been working towards transforming these activities from subsistence to commercial levels by bringing in a business approach in the way they are practiced. In fisheries and aquaculture, the GoM is updating its Aquaculture Development Strategy 2008-17 through the five-year Aquaculture Development Action Plan (PADA), which is expected to begin in 2019. PADA is based on three pillars: (i) increased aquaculture production, productivity and competitiveness; (ii) improved access to markets and financial services; and (iii) institutional development.

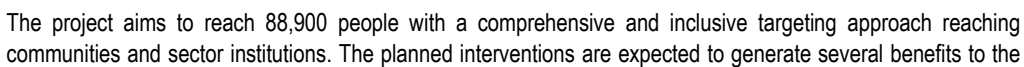
In view of the foregoing, GoM has sought funding from the International Fund for Agricultural Development (IFAD) to implement the **Small-Scale Aquaculture Development Project (PRODAPE)** for a period of 5 years (2019/2024). PRODAPE is expected to benefit from the lessons learnt during the implementation of PROPESCA² and PROAQUA³ and play a crucial role in the consolidation of their experiences. Through PRODAPE investments will be made for the country to develop: (i) fish seed, fish feed and smallholder aquaculture production including mainstreaming nutrition and addressing social risks in general; (ii) aquaculture business partnerships e.g., establishment of aquaparks, financial services, and market linkages, as a way of transforming aquaculture into a significant subsector in the country's economy and social development

As illustrated in [Error! Reference source not found. Figure 1-1](#), below, [Error! Reference source not found. Error! Reference source not found.](#) the project will focus on the central provinces of Manica, Sofala, Zambezia and Tete and the northern provinces of Niassa, Cabo Delgado and Nampula covering a total of 23 pre-selected districts. Starting with 6-8 districts with the highest potential, the Project will progressively expand as technical capacity is developed and basing its implementation on lessons learnt and on-ground experiences.

¹ i.e. over 26% of the GDP of the country is derived from this activity.

² Artisanal Fisheries Promotion Project (ProPESCA) – IFAD Loan 822-MZ. The project covered the entire Mozambican coast and represented an investment of US\$45 million over a seven-year period.

³ Promotion of Small Scale Aquaculture Project (PROAQUA – 2013-2017) was a grant administered by IFAD with the European Union (EU) as main financier alongside with the GoM with a total budget of EUR 2,250,000. Its development objective was to increase consumption and sales of fish by small-scale fish farming households in 3 districts of Manica Province (Gondola, Mossurize, Sussundenga) and Gorongosa district located in the Sofala Province.



targeted people in the selected areas. However, if the necessary precautions and mitigation measures are not applied systematically the interventions can translate into serious environmental and social problems including aggravating the negative effects of climate change.

In line with the requirements of both the GoM and IFAD, the various physical and procedural developments related with the design, construction and operation of aquaculture infrastructures and equipment as well as of all the systems and mechanisms in and around aquaculture will be done with strict observance of sound management of the project receiving natural and social environmental components.

1.2.Environmental and Social Management Framework for PRODAPE

At the stage of the preparation of the project's ESMF the exact location, number, specific scale of the new and even existing aquaculture interventions that will be inherited by PRODAPE from previous projects/programmes, which could justify conducting the site-specific environmental and social impact assessments (and corresponding environmental and social management plans), were not yet known. The final selection and design/construction/operation specifications will be clarified on a later stage. Under such circumstances the preparation of the Environmental and Social Management Framework (ESMF) is considered the most appropriate management instrument for IFAD funded projects to lay the basis of the safeguards operational approach that will be followed during PRODAPE's implementation in compliance with IFAD's SECAP and the GoM's requirements.

The Environmental and Social Management Framework (ESMF) makes a general characterization of the project's natural and social receiving environment and it will be a guide to the screening of the proposed Project interventions (sub-projects) to ensure that they do not affect negatively the natural and social environment. The ESMF outlines several principles, which include:

- A systematic procedure for participatory screening for sub-project sites and sub-project activities for environmental and social considerations;
- A step-by-step procedure for predicting the main potential environmental and social impacts of the planned sub-project activities;
- A generic environmental and social management plan for addressing negative externalities during sub-project implementation (planning, construction and operation);
- A step by step monitoring and evaluation system for implementation of mitigation measures;
- An outline of recommended capacity building measures for environmental and social planning and monitoring of the sub-project activities; and
- A budget to ensure that the Project has adequate resources to meet its own interests, especially financial resources for the preparation and implementation of sub-projects Environmental and Social Management Plans (ESMPs), Environmental Licences and, if needed, Environmental and Social Impact Assessments (ESIAs) and Resettlement Action Plans (RAPs).

Under the ESMF it is stipulated that PRODAPE subprojects should (i) carry out integrated assessment to identify the environmental and social impacts, risks, and opportunities; (ii) conduct effective community engagement through disclosure of subproject-related information and consultation with local communities on matters that directly affect them; and (iii) manage environmental and social performance throughout their life.

1.3.Structure of this Report

In addition to this introductory chapter this document comprises ~~ten~~eleven chapters, namely (i)

- (i) Description of the Proposed Project;
- (ii) Policy and Legal Framework on Environmental Assessment in Mozambique and SECAP;

- (iii) Description of the Environmental Setting;
- (iv) Significant Environmental Impacts;
- (v) Analysis of Alternatives;
- (vi) Screening Criteria and Forms;
- (vii) Environmental and Social Management Plan;
- (viii) Environmental and Social Monitoring Plan;
- (ix) Capacity Building and Training for Environmental and Social Management;
- (x) ESMF Financial Requirements and Budget; and
- (xi) Conclusions and Recommendations.

The preparation of this document was based on a combination of methods of data collection and processing, from the following main sources (i) secondary data review; (ii) interviews and discussions with key informants including experts in relevant project sectors and subsectors (fisheries, agriculture, water resources management and public infrastructure) and other key informants in the field (~~Annex 8~~ Annex 8) as well as from a major public consultation meeting that took place in Maputo, on the 1st of March 2019, as detailed in ~~Annex 1~~ Annex 1; (iii) socioeconomic survey and impact assessment; (iv) review of similar projects and lessons learned, mainly PRPOESCA and PROAQUA; (v) direct observations in the project area; and (vi) Consultant's judgement. The document should also be read in combination with the Climate Risk Assessment Report for PRODAPE and PROCAVA, which has been prepared at the same time and contains more details about the issues related with climate change.

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2. Description of the Proposed Project

PRODAPE will seek to address key constraints identified in the aquaculture value chain with the aim of generating positive impacts among rural households. The project will support the development of freshwater pond and cage-based aquaculture.

2.1. Project Objectives, Components and Allocation of Funds

2.1.1. Project Objectives

PRODAPE's objective is to contribute to poverty reduction and enhancing food security and nutrition among rural households (HHs) in the project area. The specific Project Development Objective (PDO) is to increase production, consumption and income of rural HHs and other actors involved in the aquaculture value chain in the target area. This will be achieved through two components: a) development of small-scale aquaculture production capacity; and b) development of aquaculture as a business. The project covers seven provinces and 23 districts as depicted in [Figure 1-1](#).

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The project will adopt a progressive implementation approach, whereby operations will start in a first batch of 6-8 districts with the highest potential, in line with criteria agreed upon with IDEPA, considering favourable aspects such as: (i) environmental climatic and natural resource conditions for aquaculture; (ii) water bodies with sufficient water for aquaculture; (iii) potential markets; (iv) high poverty levels, food and nutrition insecurity; and (v) access roads. The ESMF will be a tool to guide the criteria for prioritizing project districts and selection of implementation sites, putting less emphasis in the areas of high environmental risks. The implementation of activities at community level will also follow a progressive approach through the incremental reach of beneficiaries in targeted communities. The ultimate target is to reach 88,900 people made mainly of the poor and vulnerable groups, such as HHs severely affected by HIV, headed by women, children, the elderly and differently abled people.

2.1.2. Project Components

PRODAPE PDO will be achieved through two intertwined investment components and a third one on project management and institutional and policy development, with the following structure and main contents:

Component 1: Development of small-scale aquaculture production capacity

Improved access to aquaculture production inputs, which will involve a range of instruments and activities to ensure the establishment and consolidation of a local commercial input supply networks of fish feed and fingerlings, at competitive and affordable prices, based on a network of existing and emerging operators in the target provinces. The promotion of climate smart technologies and best practices will be an integral part of this component and will include environmentally sustainable forms of production, with emphasis on water needs and water quality, as well as the suitability of different agro-ecological zones for different aquaculture technologies. This component comprises the following subcomponents:

Sub-component 1.1: Develop fish seed production capacity

To address the identified constraint formed by seed production, PRODAPE will promote collaboration between public and private sector players. Quality seed development from proven strains produced under proper biosecurity conditions will include traditional fish species produced in the country such as: a) Mossambicus tilapia (*Oreochromis mossambicus*); b) Nile tilapia (*Oreochromis niloticus*); c) Tilapia rendalli (*Tilapia rendalli*); d) Tilapia shiranus (*Oreochromis shiranus*); e) Chambo (*Oreochromis karongae*); and f) African catfish (*Clarias gariepinus*). This will be done taking into consideration the current geographic distribution of each species/sub-species and avoid the introduction of exotic ones into new areas.

PRODAPE will support the development of hatcheries in selected locations based on the notion of *centrality* and *concentration*. Project support will be based on the capacity of the various private operators who are already

engaged in this activity and need to scale up or improve their production capacity and/or quality to match increasing demand for fish seed. Efforts will be made to establish one main hatchery in each target province. The establishment of Public Private Partnerships (PPPs) will be given priority to mobilize resources, build technical capacity and sustain established hatcheries.

Knowledge generated countrywide (e.g. from Inhambane and Gaza Provinces including from Aquaculture Research Centre (CEPAQ)) will be mobilized to serve this objective.

Sub-component 1.2: Develop fish feed production capacity

Mozambique relies on imported aquafeed that originates mainly from South Africa, Mauritius and Zimbabwe. This translates into elevated costs. PRODAPE will support the development of fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs. Efforts will be made to link this aspect with IFAD's crop value chain project, *Inclusive Agri-Food Value-Chain Development Programme* (PROCAVA), to support: (i) on-farm feed formulation for smallholder farmers with 1-3 ponds to supplement fish nutrition and quality; (ii) entrepreneurial "cottage" fish feed production among small and medium scale producers; and (iii) large commercial fish feed production through PPPs to achieve economies of scale and lower production costs. The project will also assess the possibility for existing poultry/ livestock feed producers (e.g. in Maputo and Tete) to set up fish feed production lines within existing operations.

Sub-component 1.3: Develop smallholder aquaculture production capacity

Beneficiaries will receive support in the form of contributions towards capital costs, training, and access to inputs and markets. In working with smallholder farmers, the project will promote two fish production technologies, namely, earthen ponds and cage farming, as follows: (i) **Earthen ponds**. PRODAPE will support the construction of earthen ponds among rural smallholders of a standard size of 500 m². When beneficiary HHs are interested the project will provide necessary technical know-how to integrate fish farming and HH agricultural (plant and animal production) activities. Beneficiaries will receive different levels of support in the construction of one pond, in line with their socioeconomic status/capacity: poorer HHs (40%) will receive higher levels of "subsidy", including coverage of all construction costs but will be required to participate in the construction of their pond in the absence of labour constraints at HH level. Private sector operators will be contracted by the project for the execution of these works. HHs capable of mobilizing labour to dig their own ponds (60%) will receive tools and technical advice to do so from the project; (ii) **Cage farming**. Cage farming will be promoted by the project in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds. The project will support the construction of the cages, which will be contingent on the development and approval of regulatory guidelines, determination of the water body's carrying capacity and other water management factors.

Irrespective of the technology used, smallholder producers will be organized under two models, as follows: (i) **Integration of smallholders in aquaparks**. Under this model, smallholders and medium/large-scale producers will be linked to medium level private-sector entrepreneurs for inputs and market access. Aquaparks can entail the location of all relevant players in a common location but does not constitute a prerequisite. Small-scale producers are however likely to all be in the same physical space; (ii) **Organization of smallholders into clusters**. Where aquaparks do not exist, smallholder fish farmers will be selected in specific areas to organize themselves into clusters. The project will facilitate participatory processes leading to the creation of cluster groups of approximately 20-25 fish farming households but will allow beneficiaries to choose how and which beneficiaries to associate with. The approach aims to facilitate effective skills acquisition along with coordinated production and marketing among smallholder farmers. Clusters will be in contiguous locations.

Sub-component 1.4: Mainstreaming nutrition and addressing social risks

The objectives of this subcomponent are to: (i) mainstream nutrition in the aquaculture value chain; and (ii) address social risks faced by targeted aquaculture producing households.

Chronic malnutrition among children in Mozambique is widespread. Improving food security and nutrition from fish is one of the Fisheries Master Plan 2010-19 development objectives, which this subcomponent will seek to achieve through interventions at two levels: (i) at community level, i.e., in the production pathway (farmers as producers and consumers); and (ii) in the market pathway, developing an enabling and safe environment for increased demand of fish and value-addition to fish products (to be described in component 2). **Addressing social risks among aquaculture producing HHs.** Whether organized under clusters, as part of aquaparks, or in large water bodies, smallholder fish farmers face greater challenges than the rest of the actors in the value chain due to their socio-economic vulnerability. Engagement in aquaculture will require both individual effort and group organization to address common challenges and take advantage of opportunities. The *Social Mentoring* intervention aims to support farmers in this respect by working at two levels:

Component 2: Development of aquaculture business

A major part of the support to be provided under this component will focus on developing the knowledge and skills of processors and traders to improve the processing, handling and marketing of cultured fish. It will aim for quality and reliability in the value chain with the use of business partnerships among stakeholders, including the establishment of partnerships between inputs suppliers, processors and broader markets with smallholders. Key activities will include market surveys, training, technical assistance, demonstrations, exchange visits, equipment and improvements to market facilities. The component will also seek to improve handling practices related to hygiene and fish quality, improve the quality, hygiene and handling of fish in markets and increase demand for fish and fish products. A major focus of the component will be to facilitate access to financial services through REFP. This component will comprise two subcomponents.

Sub-component 2.1: Develop business partnerships e.g., aquaparks

Aimed at promoting aquaculture business through partnerships to facilitate access to inputs, markets and other services, in line with what is specified under sub-component 1.3.

Aquaparks will be given special attention, given that they constitute a key strategy for aquaculture development in Mozambique, and of the PADA 2018-2022⁴. An aquapark is a physical continuous space of land or water near a permanent water source comprising a set of land-based ponds or cages with a minimal area, which can have infrastructure and production support services (research, fingerling and feed production units), intended for aquaculture activities, individual or collective. The notion of “aquapark” should not be considered in a restrictive way: an aquapark may not group all facilities in the same contiguous area, the important factor being that all services are situated within easy reach of farmers. The aquapark approach is valid for both pond and cage culture. Aquaparks implementation strategy is based on PPPs that promote satellite activities around well-established commercial aquaculture ventures to provide goods and services to small and medium-sized farmers. However, the same concepts will be applied, as possible to smallholders grouped in clusters, where aquaparks do not exist.

In PRODAPE target districts possible linkages could be explored for fish farmers and value chain entrepreneurs to: (1) access markets for aquaculture fish as part of the World Food Programme (WFP) diversified diets food baskets e-voucher scheme used in the organization’s emergency response and school feeding programs; and (2) access technical assistance in the context of nutrition marketing and demand generation through market place support activities offered by the Mozambique Scaling-Up Nutrition Business Network platform.

Sub-component 2.2: Develop financial services

Lack of access to finance has been identified as one of the factors contributing to the slow growth of smallholder aquaculture and enterprises across the aquaculture value chain in Mozambique. To overcome both supply and demand side constraints, the project will facilitate the provision of appropriate, affordable and sustainable financial and business support services. Financial services for PRODAPE beneficiaries across the aquaculture

⁴ Plano de Acção para o Desenvolvimento da Aquacultura 2018-2022 (under review).

value chain will be provided through the REFP, which will be implemented by the National Investment Bank (BNI). PRODAPE, in liaison with REFP, will develop a value chain financing model offering financial products that meet the needs of the various value chain actors, such as: (i) **PCRs** community based financial institutions, which introduce financially excluded communities to a culture of savings and credit as well as equipping them with financial literacy skills; (ii) **Graduation Fund** to be used to support very poor project beneficiaries (i.e. the last mile or the bottom end of the income pyramid) to 'graduate' out of poverty. The fund provides support to very poor rural households that are not bankable in their current financial and socio-economic state. Specific opportunities for its use will be assessed in the first year of project operations; (iii) **Crowding-in Fund (CIF)** that will offer a tripartite cost-sharing with matching grant mechanism to enable entrepreneurs and small and medium businesses to engage in the expansion of aquaculture production or in support/post-harvest activities along the value chain. It will be done based on approval of bankable propositions that do not attract full private sector financing; (iv) **Line of Credit (LoC)** to be set up to be accessed and utilized by small and medium scale investors who are ready to expand and intensify their aquaculture farming and other aquaculture value chain enterprises; and (v) **Climate/weather index-based insurance for smallholder farmers**. During the first year of operations, PRODAPE will assess the degree to which financial institutions are willing and able to provide project beneficiaries with a weather/climate index-based insurance to cover natural calamities. This assessment will include the possibility of conducting a small pilot to assess the viability, functionality and demand for such products.

Sub-component 2.3: Develop market linkages

This sub-component will develop market linkages to improve cultured fish handling, collection, marketing and distribution. The focus is to ensure high quality fish, mainly fresh but also processed, reaches consumers. Interventions will be concentrated at strategic locations such as clusters of small-scale fish farmers, aquaparks and major fish trading points.

A detailed market and product development study will be carried out in order to: i) identify current and future demand for freshwater fish at national and regional level; ii) analyse the potential impact of increased aquaculture production on the fish market; and iii) identify further opportunities for market development. PRODAPE expansion will be tailored to match fish demand.

One of the crucial aspects for cultured fish is its production costs as there is high competition with cheap imported fish. Better input supply and culture management should make it possible to reduce the production cost of farmed fish and thus make it more competitive. In the medium term, a national marketing campaign including fish safety standards may help to brand and position national farmed tilapia. PRODAPE will also promote a new production concept of harvesting fish of smaller size, which has higher margins, for which there appears to be demand at present in the Mozambican market.

Component 3: Project management, institutional development and policy

This component will provide for overall institutional framework for the project, its management, provision of support to strengthen the institutions responsible for small-scale aquaculture to fulfil their roles in project implementation and beyond. The component also warrants the provision of support to the development of sector policies and regulatory development. It comprises three main subcomponents.

Sub-component 3.1: Project management

From an institutional point of view: (i) MIMAIP is the government entity responsible for the project; (ii) IDEPA is responsible for the overall coordination of project implementation both vertically (through the DPMAIPs) and horizontally through sector entities such as The Fisheries Research Institute (IIP), CEPAC, the Fund for the Promotion of Fisheries (FFP), the National Institute of Fish Inspection (INIP), the National Fisheries Administration (ADNAP) and other sectors for the coordinated implementation of specific activities that fall beyond the sector's technical capacity (BIN/FRSP, the Ministry of Public Works and Housing (MOPH), the National Roads Administration (ANE), MISAU, SETSAN, the Ministry of Mineral Resources and Energy

(MIREME), Electricity of Mozambique (EDM)); and (iii) the sector provincial directorate (DPMAIPs) in each province targeted by PRODAPE is responsible for the overall implementation of the project and supervision and provision of technical support in the implementation of activities by district administrations/District Services for Economic Activities (SDAEs).

Details of the Project Implementation Arrangements including operation of the Project Coordination Unit (PCU) are presented in the following Subchapter 2.2 below.

Sub-component 3.2 Institutional capacity building

The sub-component aims to strengthen the institutional and technical capacities of IDEPA, and other sector institutions involved in planning, implementation and monitoring of small-scale aquaculture in Mozambique warranting adequate biosafety and biosecurity.

IDEPA's specific attributions include development of policies and strategies, studies, statistic systems, operational research, development of aquaculture infrastructure and M&E. Key challenges faced by IDEPA include: (i) human resource limitations due to budgetary constraints faced by the GoM; (ii) weak linkages and procedures following the sector's institutional reorganization with DPMAIPs currently assuming attributions previously assumed by the extinct IDEPA delegations; and (iii) limited technical capacity.

To address these gaps and ensure adequate capacity for project management and the achievement of project goals, PRODAPE will: (i) recruit staff to the PCU and its running expenses; (ii) provide the necessary technical assistance at national level to support the development of skills and policies and ensure adequate project management; (iii) recruit technical and extension personnel to support project implementation at DPMAIP and SDAE level and cover all related costs, to meet project needs; (iv) meet project related transport and office equipment needs; (v) develop training material and provide trainings at all levels; (vi) support the set-up of district administration for small-scale aquaculture that covers at least licensing, enforcement and extension service; (vii) reviewing the role of institutions dealing with small-scale aquaculture, including organic statutes and regulations, staff tables and careers; (viii) ensure that cross-cutting issues such as social inclusion, gender, nutrition, environment and climate change adaptation/mitigation are mainstreamed across the project; (ix) provide assistance in setting up M&E and Knowledge Management (KM) systems; and (x) support operational research activities for the development of aquaculture production in Mozambique.

Given PRODAPE's focus on the engagement of rural smallholders in production activities and that most of the work to be done in developing fish farming and its value chain will be carried out by the extension staff based in SDAEs and technical staff at DPMAIPs, major emphasis will be given to strengthening the capacities at these levels, including: (i) production and consolidation of specific aquaculture training and extension material, as a complement to the materials already available for aquaculture issues and others, which includes climate/environmental aspects tailored to the project's specific local conditions; (ii) training of technical staff at DPMAIPs and district extension workers of the SDAEs on fish culture, climate smart aquaculture solutions and environmental best practices, processing and marketing, business development and group enterprise, communication/extension skills, social inclusion and social risk management, among others.

Sub-component 3.3: Policy development

The project will support and provide technical advice to the sector authorities to develop strategies, frameworks and policies to strengthen the environment for climate smart aquaculture. These activities will be supported by project-supported staff at IDEPA and the commissioning of consultancy assignments. Activities will include reviews, workshops and other discussions for policy development support, expected to result not only in the consolidation of the policy environment but also to improve practices and efficiencies at all levels.

Specific issues to be addressed under this sub-component will include: (i) the elaboration of an agroecological map of suitable zones for aquaculture development, which will contribute to more accurate site identification while also providing a base for future operations in the aquaculture sector; (ii) development of biosecurity protocols; (iii) development of operating guidelines for cage culture (carrying capacity, regulations, delineation of

maps, and strategic environmental and social impacts assessments for cage culture and the use of reservoirs for aquaculture); (iv) development of guidelines for effective PPPs for aquaculture development; (v) setting up of a pilot statistic system and periodic census for small scale inland aquaculture to be gradually extended to other districts; (vi) developing other policy and legal prescriptions to stimulate the development of the aquaculture value chain, including the review and update of aquaculture regulations, protocols and Best Management Practices (BMPs) and social inclusion strategies to promote the involvement of poor/vulnerable HHs, women and youth in aquaculture nationwide.

More details about the programme components and operation modalities can be seen in the Project Design Report (PDR)⁵.

2.1.2.1. Components that Justify the ESMF

In line with the GoM and IFAD's environmental and social management regulations all the project interventions, i.e. (processual and physical) must be planned, implemented and monitored in a way that avoids, minimizes and mitigates any possible negative impacts while optimizing all the positive outcomes. It is mainly the physical components foreseen under components 1 and 2 that justify the formulation of this ESMF. These will be mainly in the form of:

- development of hatcheries in selected locations (the focus will be on establishing one main hatchery in each target province);
- development of fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs;
- construction of earthen ponds among rural smallholders of a standard size of 500 m²;
- installation of cage farming in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds;
- organization of smallholder operators into aquaparks and clusters to develop their activities in and around the above-mentioned production units;
- development and/or facilitation for the development of infrastructures and services to facilitate market linkages for fish products (inputs and outputs).

2.1.2.2. Subprojects Ineligible under the Project

As it will be better explained in subsequent chapters, in order to maintain the project at SECAP Category B, certain types of projects will not be eligible, i.e. those that:

- Involve the significant conversion or degradation of critical natural habitats (e.g. mangroves, forests, wetlands; etc.);
- Are in locations that are ecologically sensitive such as forests, wetlands, and other unique habitats;
- Are in gazetted national parks, wildlife reserves, controlled hunting areas or forest reserves;
- Involve sub-projects which need large-scale land acquisitions from communities.

Financing of Genetic Modified Organisms will need to comply with the Mozambican legislation and will need an in-depth analysis of their beneficial or negative impacts before a decision on financing will be taken. The project will support only selective breeding of specific species to promote good traits but no introduction of new genes.

Although cage aquaculture farming schemes may be developed in dams, PRODAPE, as such, will not be directly involved in the financing and operation of such as dams. Focus will be on using existing dams or those to be developed by other developers.

⁵ IFAD (October 2018)

Clear selection criteria for the collaboration with communities/investors have been developed in this ESMF with the objective of minimizing adverse environmental impacts as well as the risks of significant social impacts, including the degradation of environmental components and/or conflicts over land and other natural resources.

2.2. Project Implementation Arrangements

The Ministry of Sea, Inland Waters & Fisheries (MIMAIP) will be the government entity responsible for the project. In its current format this ministry was established in 2015. The fisheries sector operated for many years as a state secretariat before it was elevated to the position of a ministry in 1994/95 in combination with the agricultural sector. It was then established as a stand-alone ministry from 1999 to 2014/15, whereupon the current MIMAIP was established.

The National Institute of Fisheries and Aquaculture Development (IDEPA), established in 2016, after the establishment of the MIMAIP, will be responsible for the overall coordination of project implementation both vertically (through the Provincial Directorates (DPMAIPs) and horizontally through sector entities (The Fisheries Research Institute (IIP)/CEPAQ, the Fund for the Promotion of Fisheries (FFP), the National Institute of Fish Inspection (INIP), and the National Fisheries Administration (ADNAP) and other sectors for the coordinated implementation of specific activities that fall beyond the sector's technical capacity (BIN/FRSP, the Ministry of Public Works and Housing (MOPH), the National Roads Administration (ANE), MISAU, SETSAN, the Ministry of Mineral Resources and Energy (MIREME), Electricity of Mozambique (EDM)).

Ultimately the sector provincial directorates (DPMAIPs) in each province targeted by PRODAPE will be responsible for the overall implementation of the project, supervision and provision of technical support in the implementation of activities by district administrations, mainly the District Services for Economic Activities (SDAEs). SDAEs and SDPIs will liaise with the communities and aquaculture farmers as well as other actors in aquaculture value chain to form working groups and stimulate the preparation and implementation of sub projects.

To fulfil project coordination and monitoring responsibilities, IDEPA will have the support of a Project Coordination Unit (PCU). The unit will be composed of a Coordinator, a Financial/Contracts Manager, Accountants, a Monitoring and Evaluation (M&E) Specialist, a Knowledge Management Specialist, an Aquaculture Specialist (with environmental and climate expertise to ensure that environmental and social safeguards requirements are implemented/adhered throughout the project period) and a Value Chain Specialist. In addition, the project will recruit other technical specialists who will be integrated into the IDEPA departments and provide technical support at headquarter and field level to warrant high technical standards in the implementation of project activities; this will include support in the areas of aquaculture, nutrition, climate, environmental and social issues.

Based on the recent experience of PROPESCA a Focal Point for PROPADE will be identified in each target DPMAIP. The PRODAPE Focal Point will be directly subordinated to the Provincial Director and will be responsible for overall project planning, coordination, implementation and monitoring with provincial and district players. The Focal Point will also be responsible for streamlining communications between sub-national levels and the IDEPA-based PCU.

Experience shows that the use of an incentive system based on performance indicators, covering the staff working in the institutions implementing externally supported projects contributes to project success. In another IFAD supported project, this system has targeted a selected number of people with a salary increase of around 30%. PRODAPE will include an incentive system reaching IDEPA, as well as relevant DPMAIPs and SDAEs with the use of an incentive scale that is higher than comparative government scale especially for junior cadre staff. The system will benefit those directly responsible for the actual implementation of PRODAPE activities.

The project shall establish a National Project Steering Committee (NPSC) to serve as its governing body. It shall be chaired by the Permanent Secretary of the MIMAIP and made up of representatives of MASA, the Ministry of Industry and Trade (MIT), civil society organizations, ADNAP, the Directorate of Research, Planning and

Infrastructure (DEPI), IIP, FFP, INIP, the Directorate of Maritime and Fisheries Policies (DIPOL), Fisheries School and Fisheries Organizations and the Ministry of Land, Environment and Rural Development (MITADER). The Steering Committee will provide strategic guidance towards the achievement of project objectives and contribute to the higher-level sector policy and strategic goals. It will also be responsible for review and approval of Annual Workplans and Budgets (AWPBs) and annual reports. Steering committee sessions could eventually constitute a point of the agenda of the MIMAIP Coordinating Councils chaired by the Minister.

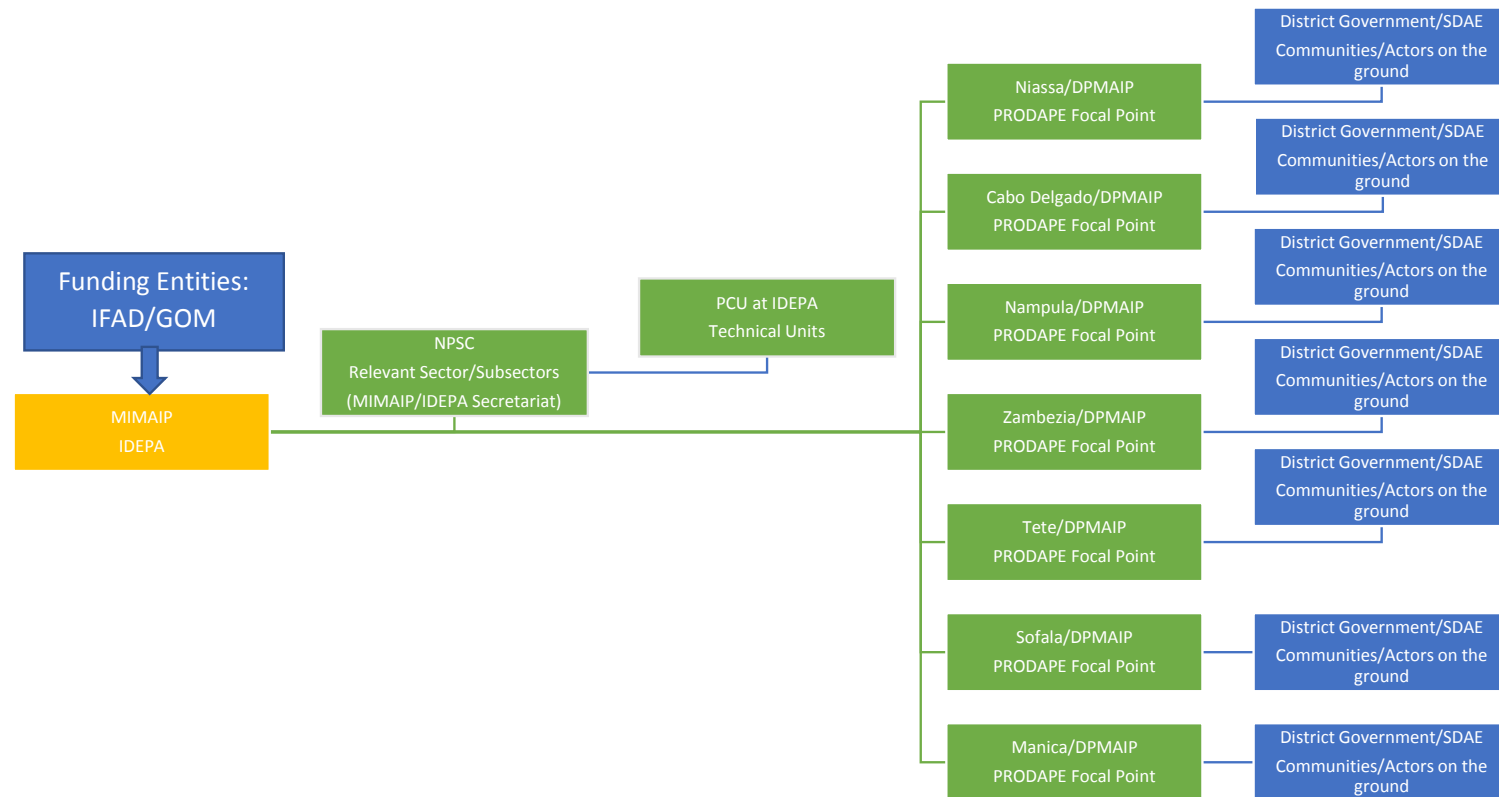
Steering Committees will also be established at provincial and district levels. These Steering Committees will focus mainly on strategic issues, the review of local AWPBs and project monitoring. Provincial and district level Steering Committee meetings for PRODAPE could be integrated in provincial and district government meetings chaired by Provincial Governors/Provincial Permanent Secretaries and District Administrators with the participation of DPMAIPs, SDAEs, IDEPA/PCU, as relevant.

Diagram 2-1 ~~Diagram 2-4~~ is a graphic representation of the main units and lines of communication to be adopted to implement PRODAPE.

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Chapters 3 and 10 present more details about the institutional setting and institutional strengthening requirements that will inform PRODAPE operation.

Diagram 2-1: Institutional arrangements for project implementation



3. Policy and Legal Framework on Environmental Management in Mozambique and SECAP

3.1. Mozambican Legal and Institutional Framework

In December 2015 Mozambique approved its third regulation on the environmental (and social) impact assessment process (DM 54/2015). This is an important instrument in environmental management in Mozambique. The first regulation had been approved in 1998 and the second in 2004. In a sense, it can be said that the country has now entered its third stage of legal reform in the management of environmental issues.

In the same way as many other African countries the process gained a new impetus after the Rio Conference on Sustainable Development, in 1992. From there on the reform process has been under implementation in the form of: (a) adherence to and adoption of a series of international and regional environmental and social protection and conservation conventions and protocols; (b) approval of a significant set of legislation with direct and indirect implications on environmental and social protection; (c) creation of specific public institutions or strengthening of existing ones dedicated to both environmental and social management. PRODAPE will be managed in line with the existing framework.

It is not possible to cover all the aspects in this document. Reference is made only to those considered relevant under PRODAPE and should be used with an open attitude to ensure that other aspects that are not directly covered but that may become relevant during project implementation are adequately considered.

3.1.1. Legal Framework

3.1.1.1. Adherence to International and Regional Conventions and Protocols

General principles:

Mozambique has been adhering to a series of international legal instruments that relate to the need of being proactive in environment protection and conservation. Under line 2 of article 18 of the country's Constitution, the rules of international law have the same value in domestic law and once ratified by the Parliament and Government they become constitutional normative acts. Considering line 1 of article 18, *"treaties and international agreements duly approved and ratified, are enacted in the Mozambican legal order"*.

Important international and regional treaties and conventions ratified so far include:

- **The UN Convention on Biodiversity ratified by Resolution n.º 2/94, of 24 of August:** this is aimed at "the conservation of biological diversity, the sustainable use of its components and fair and equitable sharing of benefits arising from the use of genetic resources, including by appropriate access to genetic resources and appropriate transfer of relevant technologies, taking into account all rights over those resources and technologies, as well as through adequate funding". This international instrument advocates the conservation of ecosystems and natural habitats and maintenance and recovery of viable populations of species in their natural surroundings. It is an essential foundation for the creation, development and protection of conservation areas in the country, which sometimes can be endangered by carrying out operations such oil and gas and other industrial operations without due regard to the provisions of environmental legislation;
- **Convention on the Protection, Management and Development of Marine and Coastal Environment in East Africa, ratified by Resolution n.º 17/96, of 26 of November:** it highlights a series of measures to protect and conserve the marine and coastal environment of the Party States, particularly in terms of preventing and combating pollution and the protection of the regions' flora and fauna against the growing threats caused by many human activities. In Mozambique it is estimated that close to 60% of its population lives along the coastal areas. This translates into considerable pressure on the natural resources in these areas;

- **African Convention on Nature and Natural Resources Conservation ratified by the Parliament's Steering Committee through Resolution n.º 18/81, of 30 December:** is aimed at ensuring the conservation, use and development of land, water, forest and wildlife resources of Member States, bearing in mind not only the general principles of nature conservation, but also the best interests of the communities themselves;
- **Protocol related to Wildlife Conservation and its application in the SADC, ratified by Resolution n.º 14/2002, of 5 of March:** it is aimed at establishing common approaches and support to conservation and sustainable use of wildlife resources relating to the effective enforcement of laws in the region and within the domestic laws of each Party State;
- **SADC Revised Protocol on Shared Watercourses, of August 2000:** it establishes a series of steps (13) to be followed in the management of water courses shared by more than one-member state in the SDAC region⁶. The main objective is maintaining unity and cohesion of each watercourse, balance between the various aspects of water use and management (social, economic, environmental, etc.), increased cooperation, coordination and harmonization among States in the region and particularly those sharing specific watercourses, amicable resolution of disputes including recourse to courts where amicable settlement is not achieved as well the operational aspects that assist in the materialization of these principles;
- **Ramsar Convention on Wetlands of International Importance, ratified by Resolution No. 45/2003 of 5 November:** under this Convention countries, including Mozambique, prepare a list of Wetlands of International Importance. The governments commit themselves to sustainably use such areas by promoting territorial planning, policy development and publication of legislation, management actions and education, as well as the proper and effective management of such areas in an integrated approach *vis a vis* international cooperation particularly regarding transboundary wetlands, the shared wetland systems, common species and development projects that may affect wetlands;
- **Resolution n.º 21/81, of 30 of December, by the Cabinet that turns Mozambique into an UICN member:** among other aspects this resolution is aimed at encouraging and facilitating cooperation amongst governments, international organizations and people interested in nature conservation and global resources;
- **25-27 September 2015 and the Sustainable Development Goals of September 2015 (2015-2030):** as with the MDGs (2000-2015) Mozambique is a subscriber of the SDG covering 17 action areas or Objectives in which Objective 1 and 2 refer to the elimination of "Poverty" and "Hunger", while Objectives 5 and 14 deal with "Gender Equality" and "Life Below Water", respectively, just to name some of the objectives that are relevant for this project.
- **Climate Change and COP 21:** Mozambique is one of the 196 countries that signed and ratified the new international agreement in Paris, in December 2015, to reduce greenhouse gas emissions to contain global warming to 2°C or below. COP 21 was a decisive meeting, 3 years after the end of the commitment period of the previous international agreement, the Kyoto Protocol (COP 3). The country's Intended Nationally Determined Contribution (INDC), of September 2015, is clear about the fact the country's mission is to "reduce climate change vulnerability and improve the wellbeing of Mozambicans through the implementation of concrete measures for adaptation and climate risk reduction, promoting mitigation and low-carbon development, aiming at sustainable development, with the active participation of all stakeholders in the social, environmental and economic sectors"

Other important international and regional conventions and protocols ratified by the Mozambican State include:

⁶ Mozambique shares water courses only with SDAC member states.

- Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer (Resolution No. 8/93 of 8 December);
- United Nations Framework Convention on Climate Change – UNFCCC (Resolution No. 1/94 of August 24, 1994);
- Kyoto Protocol (Resolution No. 10/2004 of 28 July);
- Convention on International Trade in Endangered Species – CITES (Resolution No. 20/81 of December 30);
- Cartagena Protocol on Biosafety (Resolution No. 11/2001 of 20 December);
- United Nations Convention to Combat Desertification and Drought (Resolution No. 20/96 to November 26);
- Stockholm Convention on Persistent Organic Pollutants and (POPs) (Resolution No. 19/96 of November 26, 1996);
- Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal (Resolution 18/96 to November 26, 1996);
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Resolution 10/2009 of 29 September. The Convention entered into force in Mozambique in July 2010)

3.1.1.2. Approval of Domestic Policy and Legal Instruments

General Legislation

The Constitution

Mozambique's 2004 Constitution includes two fundamental environmental pylons, namely: "the right of every citizen to live in a clean environment and the responsibility to protect this right" as well as recognition of environmental protection as a public interest.

The country's fundamental law contains a series of general legal provisions aimed at preventing and controlling pollution and erosion; integration of environmental concerns into sectorial policies; promotion of the integration of environmental values in educational policies and programs; ensuring the rational use of natural resources while maintaining their capacity for renewal, ecological stability and the rights of future generations. It is also concerned with the promotion of land use planning with a view to ensure an adequate location of activities and a sensible socio-economic development.

The Government Five-Year Programme (2015-2019) establishes the priorities and actions to be implemented during the entire length of the Government's mandate (5 years). This plan established five priorities which also underpin the development of the aquaculture sector. Table below shows the relation between this plan and relevance to aquaculture development/PRODAPE proposed interventions.

Table 3-1: Priorities, strategic objectives and priority actions of GoM's five-year plan related to aquaculture development

Priority	Strategic objective	Priority actions
III. Promote employment and increase productivity and competitiveness	i) Increase production and productivity in all sector with emphasis to agriculture	o) Promote fishery and aquaculture technology transfer; p) Promote training to fishers, processors, traders and small-scale aquaculture farmers on handling and

Priority	Strategic objective	Priority actions
		management techniques and fishery conservation;
	iii) promote national primary products value chains ensuring integration of local content	c) Promote construction of industrial parks, aqua parks, regional centres for fingerlings production and other facilities to support development of the productive sector. k) Expand fisheries laboratories network. l) Establish mechanism for certification of aquaculture production.
IV. Development of economic and social infrastructures	ii) Improve and expand important road and bridges for socioeconomic development.	
	viii) Expand and modernize fisheries, railways, ports, airport, communication and logistics infrastructures	a) To build and rehabilitate fisheries and aquaculture support infrastructures.

Environmental Laws and Regulations

There has been an extensive development of environmental laws and regulations. [Table 3-2](#) presents a summary of those that are relevant for this project.

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Table 3-2: Relevant environmental legislation

Legislation	Description	Relevance
GENERAL		
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 socio-economic development and environmental protection. To achieve the above objective, the policy must ensure, among other requirements, the management of natural resources in the country and the general environment - to preserve its functional and production capacity for the present and future generations.	All developers are responsible for ensuring that all their proposed activities conform to this policy to ensure environmental sustainability of the project.

Legislation	Description	Relevance
Law 20/97 Environmental Law	<p>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.</p> <p>The Environment Act lays the foundation for there to be damage prevention and environmental protection. As far as the implementation of infrastructure is concerned, Article 14, clause 1 states that “the implementation of infrastructure for any other purpose which, by their size, nature and location, can cause significant negative impact on the environment is outlawed, ...”. This is especially applicable for zones susceptible for erosion or desertification, wetlands, environmental protection areas, and other ecological sensitive zones.</p>	<p>This law determines the relevance of environmental protection and prevention of any harm that may be caused to any of the environmental components by project development.</p>
ENVIRONMENTAL IMPACT ASSESSMENT		
Decree No. 54/2015 Regulation on the Environmental Impact Assessment Process	<p>It establishes the rules to be followed for environmental licensing of any activity to be carried out on national territory. This applies to PRODAPE subprojects.</p>	<p>This regulation forms the ESIA for project environmental licensing processes that should be followed. All provisions of this piece of legislation will need to be followed during project implementation in relation to all relevant interventions.</p> <p>Diagram 3-1 makes a summary of the process</p>
Decree No. 129/2006 General Guidelines for Preparation of Environmental Impact Assessment	<p>Details the procedures for conducting an environmental impact study, and the format, structure and content of the environmental impact assessment report. The purpose of this decree is to standardize the procedures to be followed and the presentation of the environmental impact assessment report.</p>	<p>The environmental impact study report must comply with the specifications of this Decree.</p>
Decree No. 130/2006 General Directive for the Public Participation Process	<p>Details the procedures to be followed in the consultation process within the environmental impact assessment process. The purpose of this Decree is to ensure maximum participation of those concerned and affected by the project during the environmental impact assessment process</p>	<p>All public participation processes must follow the procedures issued by this Decree</p>
Decree No. 25/2011 Regulation of the Environmental Audit Process	<p>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.</p>	<p>Once the project is authorized, the developer must have in place a functioning, frequent and independent internal audit system, irrespective of the public environmental audit that the project may be subject to under this decree. Article 7 (1) of Decree stipulates that at least one private environmental audit per year for Category A and Category B projects, should be conducted to guarantee environmental sustainability and verify the degree of implementation of the ESMP.</p>

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Legislation	Description	Relevance
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.	The project will be subject to inspections by MITADER during its implementation in order to verify compliance with the environmental management plan and environmental legislation. The developer must cooperate with such inspections.
EMISSIONS AND AIR QUALITY		
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.	The project must meet the maximum permissible limits of air quality standards established under this regulation, so as not to harm the environment. The project must comply with the standards of water quality and effluent emissions, considering emissions allowed by law, so as not to harm the environment. Any proposed action should consider the levels permitted under this decree. The violation of such is liable to a fine.
Decree No. 67/2010	Proposes Changes to Decree No 18/2004, which are included in Annexes I and V, referred to in Article 7 and 16 of the previous decree. This legal instrument amends and adds new standards for environmental quality to be considered in any activity in the country.	Idem.
WASTE AND POLLUTION		
Law 20/97 Environmental Law	Article 9 of this law proscribes the production and disposal of toxic substances or pollutants in the soil, subsoil, water or atmosphere as well as imposing a ban on any activities that may accelerate any form of environmental degradation beyond the limits set by law.	The project should implement the provisions of this Regulation. Measures to prevent any form of pollution beyond the limits set by the regulations must be taken.
Decree 13/2006 Regulation on Waste Management	This regulation operationalizes the intent of the environmental law. Establishes the legal framework for waste management in Mozambique. The purpose of this legal provision is to establish rules for the generation, transfer and disposal of solid waste. Article 5 classifies waste into two categories: hazardous and non-hazardous. The management of hazardous waste is assigned to the MITADER, including the management of licenses. Only registered and licensed companies and entities can collect, transport and handle hazardous waste in appropriate locations.	The project should implement measures for the better management of solid waste in accordance with this Regulation.

Fisheries Laws, Regulations, Policies and Strategies

The most important is the **Fisheries Act** (Law 03/90, of 26th September updated in 2013 by Law n.º 22/2013 of November 1st): the purpose of this Law is to establish the legal framework for fishing activities and complementary fishing activities with a view to the protection, conservation and sustainable use of national aquatic biological resources.

Specific aspects of the fisheries policy include:

- a) the management, conservation and adaptation of fishing fleet capacity to fishery resources and the environment; the monitoring and surveillance of fishing activities;
- b) the promotion and development of marine and freshwater fisheries and aquaculture;
- c) processing of fishery products;
- d) promotion of national business;
- e) the sanitary control of fishery products;
- f) the objectives of fisheries research and extension;
- g) participatory management and the valuing of the traditional knowledge of local fishing communities;
- h) the development of infrastructure for complementary fisheries activities;
- i) promoting the development and development of small-scale fisheries;
- j) the marketing of fishery and aquaculture products.

Fisheries activities are classified into:

- (a) Extractive – based on catching with or without processing on board or the collection of fishery resources in the maritime and continental waters,
- (b) aquaculture – based on the breeding and keeping in captivity, with human intervention, of aquatic species.

Supporting activities are subdivided into:

- (a) processors - those relating to canning, drying, smoking, brining, freezing and other processing of fishery products;
- (b) marketing - those relating to the first sale of fishery products and
- (c) port services - those involving boat docking, unloading and loading of fishery products or goods and inputs for fishing and aquaculture;
- (d) construction and manufacturing - those relating to the construction and ship repair and the manufacture of fishing nets, artefacts, sizing and other accessories.

It also specifies that the development of any of the fisheries activities requires authorization in line with specifications set forth in this Law and other applicable regulations (Article 11, point 3.).

Aquaculture

Regarding Aquaculture the law stresses that:

The use and exploitation of land and waters that are part of the public domain, necessary for the development of aquaculture, are subject to the legal regimes of the respective resources (i.e. land and water).

It also stresses that

The Government shall define the general guidelines for the management and development of marine and freshwater aquaculture and shall adopt such measures as may be necessary, including:

- (a) the definition of the species to be cultivated and the permissible aquaculture production systems;
- (b) areas with potential for the development of aquaculture;
- (c) the preparation of research, experimentation, demonstration and extension programs;
- (d) the rules and regulations to be followed in introducing species and in controlling diseases;
- (e) the conditions to which aquaculture enterprises must be subject;
- (f) standards for the use of chemicals, feed and veterinary drugs.

It also highlights that “it is the responsibility of the Government to establish the planning, registration of facilities and conditions for the exercise of aquaculture activities” (Article 57, points 1 and 2).

Article 58 indicates that:

1. The construction of tanks and other facilities for aquaculture is permitted.

2. Industrial and semi-industrial constructions require authorization from the competent institutions.
3. Tanks and other facilities for subsistence aquaculture do not require authorization.

While Article 59 stresses that

“The catching of species in facilities licensed for the practice of aquaculture is part of the aquaculture production process and is not subject to the provisions relating to fishing”

Particularly regarding mangroves Article 63 indicates that:

1. The destruction of mangroves is prohibited for the installation of aquaculture establishments.
2. The use of mangrove areas is only allowed for the construction of water pumping stations, water inlet channels: for fixed installation and/or anchorage in land or for the cultivation of species whose habitat is the mangrove, through the commitment of the replacement the destroyed mangrove and its prediction in the technical and environmental impact study.

Finally, in its three parts, Article 64 states that:

1. The construction and operation of aquaculture facilities shall be subject to prior authorization, licensing and payment of fees constituting State revenue and presentation of the project environmental impact study.
2. The Government establishes the conditions of authorization, licensing and taxation.
3. The construction and operation of subsistence aquaculture facilities shall not be subject to the obligations laid down in paragraph 1 of this Article.

The law then deals with other aspects of business in the fisheries sector and subsector such as market facilities, quality certification, inspection, etc. Most of these are common to those prevailing in construction and operation of infrastructures and quality assurance in general.

Fisheries Master Plan (2010-2019)

This instrument follows the previous Fisheries Master Plan (PDP I), 1999-2005, that have contributed significantly in institutional arrangements of fisheries sector, to improving living standard of smallholders and notably in capacity building. Taking this into account, the PDP II (2010-2019) was prepared aiming to increase the fisheries sector (including aquaculture) benefits to the country, as follows:

- i. Increasing sector contribution (through fish) to food security and nutrition;
- ii. Improving of living standards of artisanal fishing and small-scale aquaculture communities;
- iii. Increasing the contribution of commercial fisheries and aquaculture to the achievement of national economic and social development objectives; and
- iv. Increasing the sector's net contribution to the country's balance of payments.

PRODAPE interventions will be decisive for achieving objectives 1 and 2 of PDP II, but some to significant contribution for achieving objectives 3 and 4, respectively.

This instrument, which is in the process of being updated relies essentially on six pillars, namely:

1. Restructuring the industrial and semi-industrial shrimp fishing fleets;
2. The diversification and growth of industrial and semi-industrial fishery production;
3. The growing role of private initiative as the engine of national development and the corresponding reduction of state intervention in the productive sphere;
4. The construction of a Public Fisheries Administration focused on policies and strategies, development plans, fisheries legislation, creation of a favourable economic environment for investment and arbitration of conflicts;

5. Increasing well-being in artisanal fishing communities; and
6. The development of human resources

Pillars from 3 to 6 are of high relevance for PRODAPE.

Policy and Implementation Strategy (1996) deals with the general issues related with the maximization of economic benefits whilst ensuring sustainable harvesting of the resource.

Other regulatory instruments relevant for fisheries and aquaculture include:

- Aquaculture regulation (2001) meant to regulate Law No 3/90 of 26 September, Law of the Fisheries, with regard to the practice of aquaculture. Among other aspects it deals with (i) the identification of aquaculture development regions and areas; (ii) specification of measures, management and development policies to be established for aquaculture activities, aquaculture species or aquaculture regions;
- Aquaculture development strategy (2008-2017)- To guarantee that natural resources with potential to aquaculture are sustainably exploited and contribute to poverty alleviation;
- Heavy metals and antibiotics control and monitoring plan (2007);
- Environment contaminants control & monitoring plan (2008);
- Reviewed the code of investment incentives (2009);
- Shrimp research and training laboratory (2009);
- Protocols for cooperation with universities;
- Review of the legal framework (2009).

Water

Legislation	Description	Relevance
Law 16/91 Water Law	States that the use of public water basin as a management unit, is based on the principle of user pays and polluter pays. The use of water requires an authorization by the regional administration of water that oversees the basin through license (short term) or lease (long term). The Water Act also emphasizes prevention and control of water pollution and soil protection.	The Developer has the responsibility to implement measures to prevent pollution of water resources during and after project implementation. If there is any discharge to be made in shallow waters, an authorization by the respective ARA subject to a fee is required. These precautionary and management measures will apply to aquaculture (e.g. cage farming) undertakings
Decree 26/91 of November 14 – creation of ARAs	Creates 5 regional water administrations for all country and defines the territorial boundary between them.	Defines the correspondent ARA has responsibility on water resource management in which the dams will be located.
Resolution 46/2007 of August 21 Water Policy	States the following short term (2015) and long term (2015) objectives: (1) satisfaction of basic human needs; (2) improve sanitation to prevent waterborne diseases; (3) economic development; (4) environmental conservation; (5) drought and flood vulnerability reduction; and (6) promotion of peace and regional integration.	All objectives of water policy are to be considered in the project.
Water resource management strategy (approved in 22nd ordinary session of Ministry Council, August 21 of 2007)	The main objective of the national water resource management strategy is to implement the water policy objectives. Related to the project is presented in: Chapter 2 – Water Resource Management. On this subject, the following strategic objectives are related to the project: 2.5 – Hydraulic infrastructures and 2.8 – Drought Management. The main actions in this	Development of project is in same line as stated in this strategy.

Legislation	Description	Relevance
	<p>strategy is to build and rehabilitate small dams in short term (<5 years) and built and manage medium and large dams in medium (5-10 years) and long term (>10 years).</p> <p>2.9 – Water and Environment. Ensure that proposed infrastructures such as dams along the rivers do not threaten ecological services. One of important strategic actions is to ensure ecological flow according to downstream needs and avoid elimination of small floods or compensate with small artificial discharges reviewing constantly the operation rules.</p> <p>2.10 – Water quality and pollution control. Actions: adopt polluter-pay approach, promote environmental impact assessment in any development initiatives along the water course, and monitor compliance of effluent discharges.</p>	
Decree 43/2007 of October 30 2007 - Regulation on water License and concession	<p>Regulates the private water utilization licensing process. It also applies to discharge of effluents. This regulation prioritizes the water supply for human consumption and sanitation above all other uses. No license or concession would be issued if environment is affected negatively. According to this regulation, ARAs are responsible to issue licenses and monitor implementation of contracts.</p> <p>Article 26 specifies that license and concession regime for hydraulic infrastructures (include dams) must observe existing and expected specific regulations.</p>	
Decree 47/2009 of October 07 2009 - Regulation on small dams	<p>This regulation is the only regulation related specifically to dams in the country. It applies to design, construction, exploration and maintenance of small dams (max. 15m height and 1 million m³ of storage capacity).</p> <p>It emphasizes that for other type of dams the respective ARA must receive request for authorization purposes.</p>	Applicable.
Regulation on dam safety (under preparation)	<p>This regulation is still under preparation. Defines the DNGRH and ARAs as overall responsible entities to implement and monitor its implementation. Also defines participation of other institutions such as Engineer Laboratory of Mozambique, National Institute of Disaster Management, Consulting Commission for Dam Safety, as well as project developer.</p>	Awaiting enactment

Construction

Legislation	Description	Relevance
Ministerial Diploma n.º 77/2015 of May 22 Regulation of civil works activity licensing	<p>Defines the requirements and conditions for exercise, modification suspension and termination of the contractor activity in Mozambique.</p> <p>The contractor must have authorization (Alvara (trading license)) of specific Category</p> <p>There are five categories, namely:</p> <ul style="list-style-type: none"> a) Category I – Buildings and Monuments, Category II - Urbanization Works, Category III – Roadways; b) Category IV – Electrical installations in buildings; c) Category V – Hydraulic infrastructures for the project; d) Category VI – Water perforations and intakes <p>In addition to the staff schedule the regulation also specifies the minimum equipment that contractors must possess</p>	<p>Depending on the type of infrastructures to be developed construction activity must be done by registered/licensed contractors according to the procedures presented in this regulation.</p>
Decree 5/2016 of March 8 Regulation of Contracting of Public Works, Supply of Goods and Provision of Services to the State	<p>Specifies the procedures for tendering a public construction service.</p>	<p>If project is to be public investment, procedures for tender must comply with this regulation.</p>
Decree 94/2013 of December 31 Regulation of contractor and civil works consultant activity	<p>Establishes norms to the contractors and civil works activity in Mozambique. Civil works are divided into the following categories: (1) buildings and monuments; (2) urban works; (3) communications; (4) building electrical installations; (5) hydraulic infrastructures; (6) foundations and water intakes.</p>	<p>Procedures for operation of consultant and contractors must follow this regulation.</p>

Land and Spatial Planning

Legislation	Description	Relevance
Law No. 19/97 of October 1 Land Law	<p>Defines the rights of people who use the land, indicating the details of the rights based on customary claims and procedures to acquire titles for its use and benefit communities and individuals.</p>	<p>The project must respect the land use rights of communities. If any activity (such as agriculture, housing, trade, etc.) is disturbed by the project, the parties affected should be compensated accordingly.</p>

Legislation	Description	Relevance
Decree 66/98 of December 8 Land Law regulation	Operationalizes the objectives of the Land Law. Defines total protection areas reserved for nature conservation and protection status, as well as partial protection zones, which may be granted land use titles and where activities cannot be implemented in the absence of a license. The partial protection areas include, among others, the strip of land with 50m wide from the edge of the lakes and rivers' historic maximum, the 250m strip of land wide around the reservoirs, 100m bandwidth on the coast and estuaries.	This regulation defines zones of total and partial protection. In these areas, land use is restricted. The Developer must meet these regulatory requirements.
Decree No. 19/2007 of July 18 Land Planning Law	Is intended to guide the spatial planning of the territory recognizing the rights of citizens enshrined in the Constitution. Article 20 refers to the expropriation of private property belonging to or used by the communities due to activities of public interest or necessity/usefulness. In these cases, fair compensation must be paid to cover, among others the loss of tangible and intangible assets, disturbance of social cohesion and loss of productive assets.	The Developer must consider fair compensation when it becomes necessary to expropriate private property.
Decree No. 23/2008 of July 1 Regulation of Land Use Planning Act	Establishes the legal systems of land-use planning instruments at national, provincial, district and municipal levels.	All procedures for possible expropriation for dam construction should be followed.
Decree No. 60/2006 of Urban Land Use Regulation	Features in Chapter X procedures for expropriation for purposes of spatial planning.	The Developer should consider the guidelines in introducing the planned infrastructure in the municipality areas, specially laying distribution network pipes.

Resettlement and Compensation

The National Resettlement and Compensation Regulation is better discussed below. The gap between the National Resettlement Regulation and the SECAP and the Guidance Statement on Physical and Economic Resettlement GS13 is also briefly discussed below.

Healthy and Safety

Legislation	Description	Relevance
Law No. 23/2007 Labour Law	<p>Applies to legal relations of subordinate work established between employers and workers, national and foreign, of all industries operating in the country. Chapter VI provides the principles and safety rules, hygiene and health of workers.</p>	<p>The project should ensure that employees carry out their activities in good physical and environmental conditions. Inform them about the risks of their work and instruct them on proper compliance with health and safety standards at work. Developers/contractors must also provide first aid in case of accident, sudden illness, poisoning or illness.</p> <p>The developer/contractor in cooperation with the unions shall inform the competent organ of labour administration on the nature of work accidents or occupational diseases, their causes and consequences, after making consultation and registration.</p>
Decree No. 62/2013 Approves the Regulation establishing the Legal Regime of Occupational Accidents and Diseases and repeals Legislative Decree 1706 of 19 October 1957	<p>Prevention of occupational accidents and diseases. The employer shall adopt the measures prescribed in laws and regulations relating to the prevention of occupational accidents and diseases, and shall, among other measures, train workers on professional risk prevention standards</p>	<p>The Regulation applies to employees, national and foreign, on behalf of third parties, as well as to managers, directors, managers and the like.</p> <p>The Regulation does not apply to officials and agents of the State and Local Authorities. It is of relevance to PRODAPE subprojects</p>
Law No. 5/2002 Law of Protection of Workers with HIV/AIDS	<p>Sets out principles designed to safeguard all employees and employment seekers to not be discriminated against in the workplace or when applying for jobs because they are suspected or have contracted HIV/AIDS. Article 8 provides that an employee who is infected with HIV in the workplace, as part of their professional occupation, in addition to compensation they are also entitled to, adequate medical care aimed at easing their state of health, according to the Labour Law and other applicable legislation, funded by the employer.</p> <p>HIV testing to workers, job seekers to assess them during their application, job maintenance or for promotion purposes is prohibited. All testing is voluntary and should have worker's consent.</p>	<p>The developer/contractor must train and guide all workers to carry out their tasks even if they are infected with HIV-AIDS.</p> <p>The developer/contractor must raise awareness among workers to prevent, and to know their status on HIV/AIDS and disseminate information about the disease and on how to prevent it.</p>

Legislation	Description	Relevance
Decree No. 45/2009 Regulation on the General Labour Inspectorate	Lays down rules on inspections, under the control of the legality of work. Article 4 paragraph 2 provides for employer's responsibility in the prevention of occupational health and safety risks of the employees.	Developer/contractor must meet the requirements. In the case of inspection, the developer/contractor should help and provide all necessary information to the inspectors.

Cultural Heritage

Legislation	Description	Relevance
Decree 42/90 Regulation of Funeral Activity	<p>Stipulates that the burial of corpses in rural areas can be done in cemeteries or other places approved by the Authorities. But too often there are family cemeteries or even within the properties.</p> <p>No reference is made regarding the transfer of corpses in rural areas, that development projects should comply with. It is assumed that traditional leaders should be consulted to define appropriate burial sites and traditional practices to be followed for this purpose.</p>	Under the practice recommended by this decree, the Developer should refer to local community leaders about the existence of graves along the areas of work or implementation of the new sections of road. If so, recommendations for relocation in compliance to traditional practices should be observed.
Law 10/88 Cultural Protection Law	Is aimed at legally protecting property and cultural and intangible heritage of Mozambique. Under this law, the material cultural heritage includes monuments, groups of buildings (of historical, artistic or scientific value), places (of archaeological, historical, aesthetic, ethnological or anthropological importance) and environments (physical and biological formations of interest).	Some artefacts can be found during construction. If this happens, the Contractor shall immediately notify the relevant authority.

3.1.1.2.1. The Environmental and Social Impact Assessment Process

Due to its strategic position in the current national environmental and social management framework in the and its expected recurrence under PRODAPE subprojects environmental and social management (including licensing and operation), this regulation deserves additional notes in this review. These are summarized below.

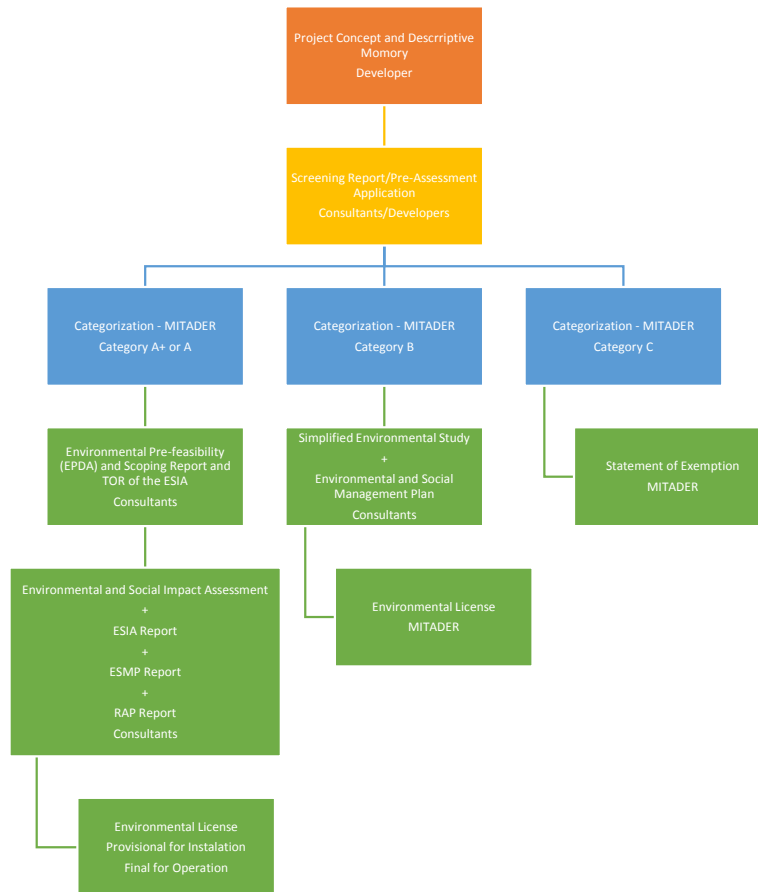
The Environmental Impacts Assessment (EIA) Regulation, was approved by Decree 54/2015 to regulate the same process

Mozambique has developed comprehensive regulations to cover the ESIA process, which are included in the Regulation of the Process for Environmental Impact Assessment. In many aspects the regulations are in line with the world's environmental and social management best practices, including IFAD recommendations and procedures.

In addition to providing consistency to the precautionary measures that should be taken in environmental and social management as well as optimizing sustainability of interventions, there are three main specific objectives of any ESIA exercise:

- Screening and scoping of the proposed developments in terms of their potential impacts on the natural and social receiving environment, indicating both the beneficial outcomes and adverse effects. The initial screening is meant to determine the scope of the Environmental and Social Impacts Assessment (ESIA) required prior to approval of interventions. If any investment is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented (Category A), the ESIA will be more stringent than if the investment has impacts which are less adverse, site-specific, mostly reversible and where adequate mitigation measures can be designed (Category B). For investments with multiple subprojects, this screening is often done in the form of a checklist of potential impacts included in standard Environmental and Social Management Frameworks (ESMFs). The new Decree (54/2015), which was enacted on the 1st of April 2016 has introduced a new category, which is A+ followed by a simple Category A. The two Category A projects (i.e. A+ and A) include all the interventions that require stringent ESIA process due to their expected severe impacts. One of the differences is that A+ projects should be reviewed by independent (and more professional) evaluators, while simple A projects are expected to be reviewed by the normal review process that has been in use, comprising mainly MITADER technicians and those of other sectors (e.g. agriculture, mining, energy, fisheries, water, etc.) seen as relevant in each specific project case. Under the new Decree the two A Category projects are required to assess their impact on biodiversity and present and plan to offset any potential biodiversity losses. Screening is done by the Provincial Directorates of Land, Environment and Rural Development (DPTADER), while projects under Category A and A+ are then supervised by the central MITADER and Category B and C (exemptions) are the domain of the provinces.;
- The actual Environmental Impacts Assessment (ESIA), which assesses the potential impacts of the investment in detail and evaluates alternatives.
- Proposal of measures to be taken in order to avoid, mitigate and/or eliminate adverse effects both at the planning, design and installation stages, and during operation and eventual decommissioning of the project. This is generally done in the form of an Environmental and Social Management Plan (ESMP), which is normally an intrinsic part of the ESIA.

Diagram 3-1: The ESIA process in Mozambique



The Scoping Exercise, ESIA and the Environmental and Social Management Plan (ESMP) are components of importance in any EA process. Scoping primarily explores fundamental issues and identifies any potentially significant positive and negative environmental (and social) impacts associated with the proposed development, helping to determine the scope of the Environmental and Social Impacts Assessment. An ESMF and an ESMP include in an annex Environmental and Social Clauses (ESC), which serves as a guide for the contractor during construction. One of these clauses is the “Chance Find Procedure” mentioned earlier. These ESC should be included in the bidding documents and in Constructions Companies Contracts for systematic compliance during project construction. Annex 16 provides an example of the ESC that can be adjusted to the project’s subprojects.

The ESIA regulation also foresees that the Draft Scoping/TOR and Draft ESIA/ESMP should be subject to public debate with the objective of:

- Keeping Interested and Affected Parties (PI&As) informed about key issues and findings of each stage of the ESIA;
- Gathering concerns and interests expressed by various project stakeholders;
- Obtaining contributions/opinions from stakeholders in terms of avoiding/minimizing possible negative impacts and maximize positive impacts of the project; and

- Supporting the social dialogue and identifying from the onset, stakeholders' perceptions and expectations. This can contribute to the action planning and effective communication to minimize the impacts of the project. The process also allows for rethinking the project's technical aspects

Specific public participation aspects are regulated by Diplomas 129/2006 and 130/2006 and other related regulatory instruments.

The following potential fisheries/aquaculture activities are included as Annex II (Category A), III (Category B) and IV (Category C) of the Decree N.º 54/2015 that regulates the environmental impact assessment process:

- **Annex II (Category A)**
 - Industrial fisheries that translate into increased pressure on natural resources;
 - Aquaculture interventions with production of more than 100 ton/annually
- **Annex III (Category B)**
 - Fisheries processing industries
- **Annex IV (Category C)**
 - Installation of cold rooms

The regulation also includes an Annex V that deals with fatal issues, which, among other aspects expressly indicates that investments will not be allowed in:

- Totally protected areas, except where those investments are promoted by the entity that oversees such areas;
- Conservation areas classified as such;
- Areas with the following characteristics:
 - Presence of species critically in danger;
 - Presence of a series of endemic/restricted species;
 - Presence of migratory species;
 - Crucial areas for key eco-systemic services at national, provincial and district levels.

PRODAPE has been classified as Category B under IFAD regulations, which are substantially like those of Mozambique, as it will be seen below. The preliminary assessment conducted as part of the formulation of this ESMF confirms that for small-scale and household/local associations production schemes envisaged by PRODAPE this classification is not only adequate but also recommended. Activities under this Category "have potential limited adverse environmental and/or social risks and impacts that individually or cumulatively, are few, generally site-specific, largely reversible, and readily addressed through mitigation measures". The predominant institutional set-up in and around PRODAPE subprojects is assessed to be adequate to manage this kind of activities and/or below (i.e. Category C). Any interventions with the potential of triggering "significant adverse environmental and/or social risks and impacts that, individually or cumulatively, are diverse, irreversible, or unprecedented", which could be classified under Category A have the potential of overstressing local capabilities and of translating into aggravated environmental and social risks. Unless where other actors (e.g. public or private investments/investors) can be brought in, it is recommended that efforts be made to ensure that PRODAPE subprojects are designed, implemented and operated to consistently conform to this categorization and/or below, i.e. Category C. For instance, they should not produce more than 100 ton/annually.

Resettlement Issues

Even though PRODAPE is not expected to proceed with land acquisition and involuntarily resettlement, it is important to make a quick review of what the Mozambican legislation establishes about this phenomenon.

Decree 54/2015 of the Environmental and Social Impacts Assessment Process, which governs the EIA process in Mozambique, says very little about resettlement, except that Article 20, points b) and c), indicate that an environmental license for construction (point b)) will be issued after approval of the ESIA/ESMP and RAP for projects that require resettlement and that an environmental license for operation (point c)) will also be issued upon approval of the of the ESIA/ESMP and RAP for projects that require resettlement. Annex I from this regulation, which specifies the factors that determine the classification of a project under Category A+ also indicates in its point b) that projects located in populated areas that require resettlement will fall under Category A+. Seen from a different perspective this also means that projects with resettlement implications fall under Category A+ i.e. the most stringent category.

After many years of not having a single instrument to guide resettlement planning and action on August 8, 2012 the Cabinet approved **Decree 31/2012**, the new “*Regulation on the Resettlement Process Resulting from Economic Activities*”. This regulation fills a longstanding void in this regard. However, as it stands, this new regulation contradicts a lot with the best practices adopted to deal with this phenomenon from various angles/domains as highlighted below

- *Article 15* indicates that a Resettlement Action Plan is part of the Environmental Impact Assessment, as per Decree 45/2004⁷, of September 29 of the latter process;
- *Decree 31/2012* makes no provision of a Framework as a starting point in situations where project intervention area's footprints are not known; nor does it provide (i) basic characteristics to trigger resettlement, (ii) entitlement eligibility criteria, and/or (iii) room for grievance redress mechanism upon which Project Affected People (PAPs) can rely upon for peaceful resolution of their concerns.

Moreover, for the most of this Decree, it seems worth stressing out that its practical implications are still to be tested and assessed. Preliminary indications are that it does not solve the need to be specific in certain areas of the resettlement process, which continue to be spread over a series of legal documents. Thus, it will continue to be necessary to creatively combine those documents to devise the best measures to be adopted in relation to specific issues. Mozambique legislation guiding involuntary resettlement is spread over a series of legal documents dealing with land, general rights, compensation, etc. To counteract potential inconsistencies derived from using laws and regulations that are not always easy to harmonize, most of the resettlement procedures undertaken to date by development initiatives in Mozambique have followed international guidelines as would be the case of IFAD's Policies and particularly the Guidance Statement on Physical and Economic Resettlement GS13. This approach is systematically endorsed by the Government, as one of the IFAD member-countries. The Policies cover the involuntary taking of land, as well as restriction of access to means of livelihood.

Under IFAD policies, whenever an investment is likely to result in involuntary resettlement, a Resettlement Action Framework (RPF) should be prepared by the borrower (see Subchapter 3.2.1., below), defining the principles, organizational arrangements, criteria for eligibility and compensation, grievance redress mechanisms and monitoring processes to be adopted. Once the Social Screening process (also included in the ESMF's environmental and social screening form – ESSF) has determined with certainty that resettlement will be needed, a Resettlement Action Plan (RAP) is further prepared, approved and implemented prior to the physical implementation of the activities involving such a phenomenon. Chapter 8 of this document presents more details about the step-by-step process to be followed, to conform to both sets of legislation, i.e. GoM and IFAD.

3.1.1.2.1. Climate Change

As specified in the country's Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCCC), in Paris, 2015 the main mission is to “reduce climate change vulnerability and improve the wellbeing of Mozambicans through the implementation of concrete measures for adaptation and climate risk reduction, promoting mitigation and low-carbon development, aiming at

⁷ This provision remains valid under the current DM 54/2015, governing the same process.

sustainable development, with the active participation of all stakeholders in the social, environmental and economic sectors". The National Adaptation Plan (NAP (2015-2019)) is being updated to make it more responsive to increase local resilience, fighting poverty and identifying opportunities for adaptation and low-carbon development at community level through its mainstreaming in the process of district planning and budgeting. Evaluation shows that the goal has not been accomplished in 2014, and thereby requires delaying the term of the first phase to 2019.

In the medium (2020 to 2025) and long (2026 to 2030) terms Mozambique intends to update its NAP in which the goals will be like those in the shorter term, but referring to the provincial and national levels, respectively. Therefore, from 2020 to 2025, the country intends to increase its resilience at the provincial level and to include adaptation in that scope of planning and from 2026 to 2030 to do the same at the national level, achieving in this way the vision of the NCCAMS – "A prosperous and climate change resilient Mozambique, with a green economy in all social and economic sectors".

The strategic actions to be included in the NAP are:

- Reduce climate risks through the strengthening of the early warning system and of the capacity to prepare and respond to climate risks;
- Improve the capacity for integrated water resources management including building climate resilient hydraulic infrastructures;
- Increase the effectiveness of land use and spatial planning (protection of floodplains, coastal and other areas vulnerable to floods);
- Increase the resilience of agriculture, livestock and fisheries, guaranteeing the adequate levels of food security and nutrition;
- Increase the adaptive capacity of the most vulnerable groups;
- Reduce people's vulnerability to climate change related vector-borne diseases or other diseases;
- Ensure biodiversity's protection
- Reduce soil degradation and promote mechanisms for the planting of trees for local use;
- Develop resilient climate resilience mechanisms for infrastructures, urban areas and other human settlements and tourist and coastal zones;
- Align the legal and institutional framework with the NCCAMS;
- Strengthen research and systematic observation institutions for the collection of data related to vulnerability assessment and adaptation to climate change;
- Develop and improve the level of knowledge and capacity to act on climate change; and Promote the transfer and adoption of clean and climate change resilient technologies.

3.1.2. Institutional Framework for Fisheries/Aquaculture and Environmental and Social Management

3.1.2.1. Fisheries and Aquaculture Management

As briefly described above, after many mutations in 2015 the GoM established the Ministry of Sea, Inland Water and Fisheries (MIMAIP), as the government entity responsible for fisheries and aquaculture, among other responsibilities.

In 2016 the National Institute for Fisheries and Aquaculture Development (IDEPA), was established. This is a public institution with legal personality and administrative autonomy, created by Decree No. 3/2016, February 10, under the Article 4 (1) (g) of the presidential Decree No. 2/2016 of 20 May. IDEPA resulted from the merge of the National Institute of Aquaculture and the National Institute of Small-Scale Fisheries Development and aims to promote the development of fisheries and aquaculture as well as coordinate the activities of experimentation, demonstration and extension of fishing activities.

IDEPA is currently doing the Review, Improvement and Completion of Aquaculture Development Strategy and Action Plan which aims to solve the issues that limit the development of aquaculture and capitalize on existing opportunities that can increase the sub-sector's contribution to GDP, employment, export earnings and taxes.

3.1.2.2. Environmental and Social Management

In the same way as with the legal and regulatory framework the GoM has been undertaking significant institutional adjustments in terms of definitions and adaptations on the ground to manage environment and the operation of the various sectors and coordination among these sectors.

In 1994 the GoM established the then Ministry for the Coordination of Environmental Affairs (MICOA), which after more than twenty years with this denomination was renamed as the Ministry of Land, Environment and Rural Development (MITADER), in January 2015.

MITADER is the central government institution in the implementation of the policies on land, forest and wildlife, environmental management, conservation areas and rural development. The statutes were approved by resolution 6/2015 of 26th June, which define its main mandates. Main areas of intervention include policy formulation, general promotion, planning, research/technologies, investment in infrastructures and other relevant areas, regulation, inspection/audit, extension/education/awareness creation, etc. MITADER's relevant mandates for this project are presented in [Table 3-3](#), below.

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Table 3-3: Mandates of MITADER and relevance to the project

Legislation	Description	Relevance
Resolution 6/2015 of 26 th June, Article 3)	In the field of land administration and management	Formal request of the land to implement the project.
	ii) Establish and implement guidelines and procedures for land use administration, inspection and monitoring	
	In the field of environment	Request for environmental license should follow guidelines and procedures established by MITADER. See sub-chapter Error! Reference source not found.5-2-3 Regulation on Environmental Impact Assessment Process (Decree 54/2015 of 31 st December)
	xi) ensure effective implementation of bilateral and multilateral agreements to respond to challenges in environmental sectors.	All agreements must be considered, especially if water is to be transferred from one country to another.

In addition to the Ministry of Environment itself, the understanding of environment as a crosscutting subject coordinated by the then MICOA (1994-2015) and now MITADER (2015-ongoing) has led to the definition of environmental line ministries to integrate the other ministries/sectors that deal directly with the main environmental components, i.e. soil and subsoil, water, air and the biotic components (plant and animal). In general, these can also be subdivided into two major categories:

- (i) Those depending directly on natural resources as their main source of raw materials (inputs) comprise:
 - a) Agriculture (land and forests)
 - b) Fisheries (fishery resources)
 - c) Mines (mineral resources)
 - d) Public works, housing and water resources (water and land)
- (ii) Those whose outputs depend largely on the supply of environmental services comprise:

- a) Energy (water, mineral resources, biotic elements for bio fuels, etc.)
- b) Tourism (landscape and wildlife)
- c) Health (water and infrastructures)

At present, the list of environmental line ministries includes, but it is not limited to:

- a. **Energy** (integrated in the Ministry of Mineral Resources and Energy (MIREME)): energy production and distribution (electricity, fuels and renewable energy);
- b. **Agriculture** (Ministry of Agriculture and Food Security (MASA)): plant and animal production, forests and wildlife, land and cadastre, agricultural irrigation and agricultural research and extension;
- c. **Health** (Ministry of Health (MISAU)): health including environmental health as part of public health;
- d. **Mining/Mineral Resources** (MIREME – see above): Geology, mines and fossil fuels;
- e. **Public Works, Housing and Water Resources** (Ministry of Public Works, Housing and Water Resources (MOPHRH)): water, buildings, roads and bridges, housing and urbanization;
- f. **Tourism** (Ministry of Tourism and Culture (MTC)): tourism and respective hotel industry as well as conservation areas related with tourism;
- g. **Fisheries** (Ministry of Sea, Inland Waters and Fisheries (MIMAIP)): Fisheries' management and inspection, fisheries research and technologies.

In addition to exploring all the synergies within MIMAIP itself, at all levels and subsectors and units, PRODAPE operations will have strong relations with most of these sectors and ministries and particularly with (i) land and territorial planning (MITADER); (ii) agriculture and food security (MASA); (iii) public works (roads and bridges and construction in general) and housing (buildings) and water resources management (MOPHRH); (iv) trade and commerce (markets) and energy (MIC/MIREME/EDM), etc.

The operations will involve public and private entities and a solid coordination between institutions at all levels, i.e. central, provincial, district, local and community. [Annex 2](#) provides more details about the institutional framework and the roles and responsibilities of the various institutions likely to be actively involved in PRODAPE operations.

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Despite the enormous progress that has been made in both implementation and institutional adaptation the country continues to face significant challenges to make its environmental and social management instruments and practices more responsive to the ultimate interests of adopting a sound management of its natural and social base. GoM environmental and social laws including resettlement and climate change continue to be spread over a multiplicity of documents, which, very often, makes it difficult to use them in a consistent way. IFAD has its SECAP, which has been object of improvement over the years. SECAP tries to cover all relevant aspects and processes in a single document. In the specific case of Mozambique, on the ground one of the weaknesses is related with the processes downstream the issuing of environmental licenses, which are rather weak. This is an area that requires serious strengthening including putting in place the various systems and procedures to make developers, public and private, more compliant with sound environmental and social management requirements.

Main weaknesses and risks/challenges include but are not limited to:

- **Incipient decentralization:** despite the strong official advocacy and real efforts to promote decentralization, it is noted that there is still an excessive attachment to centralized action to the detriment of the decentralization that would place local and, above all, districts and municipalities in the driving seat in the planning, budgeting and implementation of development actions and processes. Ongoing practices are continually undermining the development of local capacities and consequently the development of responsive interventions to local circumstances and needs (WB, 2009⁸). Weaknesses also translate into an inability to integrate development initiatives across different sectors in favour of departmentalization (see below);

⁸ World Bank and Muzima J. D. (2008): Chapter 1. Introduction to Urbanization and Municipal Development in Mozambique: The Lessons from the First Decade. World Bank (Urban and Water Group. East and Southern Africa)

- **Excessive departmentalization:** that render integrated and inter-sectoral actions difficult to achieve due to lack of incipient dialogue and common action between departments and development sectors;
- **Human and technological resources:** significant limitations in the quantity and quality of human resources, especially of those in the public sector to carry out the various functions of promotion and regulation of development. The lowest levels (provinces, districts, municipalities and communities) are the hardest affected by this limitation;
- **Financial resources:** inadequate financial resources and chronic deficit/budgetary dependence resulting in irregularities and inadequate flows of financial resources for various purposes;
- **Poor public-private cooperation:** there is still frequent lack of harmonization and tensions between the public and private sector roles and other non-public actors (e.g. NGOs/CSOs) in the development of the various activities;
- **Discrepancies between modern and traditional management and communication systems:** managers must continuously find ways of accommodating and assimilating traditional systems and indigenous knowledge systems into modern principles and practices. Clearly, in most cases, there are two worlds that need to find ways of harmoniously working together.

Under this project MIMAIP/IDEPA will work as the implementing entity in close collaboration and with MASA, MITADER, MOPHRH, MIREME, MIC, etc. which will also have the licensing, assistance and supervisory role in relation to land, environment, water resources, energy, trade and industry. They will also work with the other actors that are of relevance for the subsector as highlighted above.

3.2. IFAD's Social, Environmental and Climate Assessment Procedures (SECAP)

3.2.1. Overview of SECAP

In its quest to mainstream social, environmental and climate change in all its interventions to promote development, in 2015⁹, IFAD approved its first Social, Environmental and Climate Assessment Procedures (SECAP). The organization is now using the 2017 edition of this instrument.

The procedures cover all phases of Project development and systematically identify the best entry points and interventions to ensure that not only the “not doing harm” is achieved, but also that development gains are maximized in whatever IFAD and its partners/beneficiaries are doing.

Of relevance for PRODAPE is the fact that under SECAP the following elements are mandatory:

1. All projects entering the pipeline are subject to an environmental, social and climate risk screening, and are assigned a risk category for environment and social standards (A, B, C) and for climate vulnerability (high, moderate, low). The findings from the assessments, along with subsequent analyses and assessments, must be reflected in the project's SECAP review note. Projects with environment and social category “C” and climate risk “low” do not require any further analysis;
2. All category B projects must have a SECAP review note, including a matrix of the Environmental and Social Management Plan (ESMP) at the design stage. The identified social and environmental risks and opportunities management measures must be reflected in the project design and the project design report. The ESMP matrix must be integrated into the project's implementation manual or developed as a stand-alone guidance document for the project management unit late in the design stage or early in implementation. PRODAPE has been classified as Category B Project and this ESMF recommends that for most of the household and small-scale initiatives to be developed this categorization be pursued consistently on the ground to be in line with the correspondent management capabilities of the actors involved (local men, women and youth and their associations, contractors as well as local authorities

⁹ Approved by the Executive Board in December 2014 and became effective on 1 January 2015.

- (mainly districts) and to ensure sustainability of the operations. This ESMF establishes the matrix of the ESMP to be consistently reflected in the subsequent stages of the project development, notably subproject design, implementation, operation and monitoring;
3. All category A projects must have an Environmental and Social Impact Assessment (ESIA) at the design stage (or relevant stage of implementation). The draft and final ESIA reports and other relevant documents must be disclosed in a timely and accessible manner at the quality assurance stage (or other stages during project implementation);
 4. Climate Risk Classification:
 - a. For all projects with a “moderate” climate risk classification, a basic climate risk analysis must be conducted during the project design stage and included in the SECAP review note. Adaptation and mitigation measures must be mainstreamed into the project design and project design report;
 - b. For all projects with “high” climate risk classification, an in-depth climate risk analysis must be conducted during project design and adaptation, and risk-mitigation measures must be mainstreamed into the project design and project design report.

From the Climate point of view, the PRODAPE has been classified as high risk, hence the commissioning of the in-depth Climate Risk Assessment (CRA), which was also conducted in parallel with this ESMF and the results were used to enlighten measures to be adopted to manage climate change implications on the project. The CRA confirms the adequacy of the classification.

3.2.1.1. Tools and Methods to Conduct SECAP Assessments

SECAP covers the entire programme/project cycle and relies on several tools and methods to ensure that social, environmental and climate considerations are adequately considered in project design, implementation, operation and monitoring. [Table 3-4](#), below, lists the most relevant tools and methods applicable for PRODAPE and briefly explains context of applicability.

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Table 3-4: Relevant SECAP tools and methods for PRODAPE

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
1	Strategic Environmental and Social Assessment	It is a key means of integrating environmental and social considerations into policies, plans and programmes, particularly in sector decision-making and reform	Relevant but it is not mandatory and was not applied under PRODAPE
2	Climate risk analysis	Aimed at identifying and mitigating risks resulting from climate change to IFAD investment projects and to enhance existing opportunities to improve results	A CRA is being conducted for PRODAPE. The country and sector (fisheries) strongly justify conducting a CRA to optimize interventions
3	Environmental and Social Impact Assessment (ESIA)	Aimed at identifying and assessing the potential impact of the proposed project on biophysical, social and other relevant aspects, evaluate alternatives and options, and design the most appropriate mitigation, monitoring and management measures to reduce risks and enhance opportunities	In its capacity as Category B Project, ESMF and accompanying ESMP were the mandatory tools for PRODAPE (see below). In line with this stipulation PRODAPE subprojects requiring ESIA would not be eligible, in its capacity of Category B Project.
4	Environmental and Social Management Framework (this document)	Aimed at examining the risks and impacts when a project consists of a programme and/or series of subprojects and the affected persons, risks and impacts cannot be determined until the programme or subproject details have been identified	The 7 provinces and 23 districts preliminary selected for PRODAPE will accommodate several subprojects, whose specifications are not known at this stage. This ESMF will set the principles, rules, guidelines and procedures to assess the environmental and social risks and impacts for projects and subprojects. The ESMF includes all the elements outlined in Chapter 1 and

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
			developed throughout this document
5	Environmental and Social Management Plan	<p>The ESMP details: (i) the measures to be taken during the implementation and operation of a project/subproject to eliminate or offset adverse environmental and social impacts, or to reduce them to acceptable levels; and (ii) the actions needed (monitoring/supervision/reporting requirements), implementation arrangements, institutional responsibilities, time schedule and costs to implement the measures.</p> <p>The ESMP is required for all category A and B projects. The ESMP is typically presented as a section of the ESIA/ESMF, but for category B projects it is part of the SECAP review note in the form of a matrix</p>	A typical ESMP for aquaculture projects is presented as part of the ESMF. In the same way as with the ESIAs, downstream the process and depending on the complexity of specific subprojects specific ESMPs might be required and prepared.

Other tools, mainly dealing with specific features of a project include, but are not limited to:

Table 3-5: Other relevant SECAP tools

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
1	Cumulative Impact Assessment	This instrument that considers cumulative impacts of the project in combination with impacts from other relevant past, present and reasonably foreseeable developments, as well as unplanned but predictable activities enabled by the project that may occur later or at a different location	In order to better harmonize PRODAPE subprojects with the broader environment in which they will be developed (e.g. avoid/minimize conflicts and optimize synergies) cumulative impact assessments will be conducted. This ESMF includes a first level of such an assessment. The exercise will continue systematically in the subsequent stages
2	Physical Cultural Resources Management Plan	<p>The Physical Cultural Resources (PCR) Management Plan is aimed at avoiding, minimizing, mitigating and monitoring any potential adverse impact on cultural heritage resources (movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes) that have archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance at the local, national or international levels. The Physical Cultural Resources Management Plan supports the preservation of PCR (whether these resources are legally protected or not or previously disturbed) and includes provisions for managing "chance finds" of PCR during project implementation.</p> <p>In line with these principles, SECAP's Guidance statement 9 – Physical cultural resources reaffirms IFAD's commitment to identifying and protecting PCR in all its operations.</p>	<p>PCR will be applied during the entire cycle of the development of PRODAPE subprojects, notably during construction phase, for the "chance finds", which specifies that in case that during construction an important artefact is found, construction should be stopped, and the responsible Mozambican authorities are warned and involved in an investigation of the site. Construction can only resume after the green light has been given by the responsible Mozambican authorities.</p> <p>Especially because under the project there will be civil works involving earth movements in areas that have not been under the influence of human activity for long periods, in its several sections this ESMF makes provisions to ensure that adequate measures are considered to minimize the negative impacts that loss of important cultural resources could occur.</p>

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
3	Resettlement Action Framework	<p>This instrument is developed for projects with subprojects or multiple components that cannot be identified before project approval but have the potential to result in economic and physical resettlement. It sets out the principles, rules, guidelines and procedures to assess the social and livelihoods risks and impacts. It contains measures and plans to reduce, mitigate and/or offset adverse risks and impacts; provisions for estimating and budgeting the costs of such measures; and appropriate roles, responsibilities and capacity for managing, mitigating and monitoring social and livelihood concerns related to the project. The RAF may also be appropriate where there are valid reasons for delaying the implementation of the resettlement, on condition that the sponsor or party provides an appropriate and concrete commitment for its future implementation. The draft RAF and accompanying relevant documents are disclosed for stakeholder feedback at the quality assurance stage prior to finalization.</p> <p>RAF is complemented by IFAD's Guidance statement 13 – Physical and economic resettlement (under revision) to assist programme/project managers to deal “with activities or interventions that could imply physical relocation or any change in land use and livelihoods options resulting from an investment supported by IFAD that could negatively impact on some elements of IFAD's target groups and the wider communities where they are found”.</p>	<p>PRODAPE is not assessed as having potential to trigger involuntary resettlement. Thus, the preparation of a RAF was not considered a requirement.</p> <p>Involuntary resettlement has the potential of permanently impoverishing entire families and communities.</p> <p>It is generally accepted that the most effective measure for avoiding disruption of people's lives and livelihoods is to avoid taking their land in the first place. Involuntary resettlement can often be avoided by exploring all viable alternative designs for an investment. Involuntary resettlement should be avoided to the extent possible and minimized if it cannot be avoided completely.</p> <p>Where permanent or temporary land acquisition is unavoidable, a RAP or an ARAP¹⁰ is required. The RAP will specify the procedures for land acquisition, compensation and economic assistance of project-affected people (PAPs). The RAP will consider several principles and objectives to at least restore, and preferably improve, the standards of living of PAPs to levels prevailing before displacement had occurred.</p> <p>This ESMF contains several provisions meant to highlight the importance of avoiding/minimizing resettlement in all stages of PRODAPE subproject development and/or turning it into a development opportunity where it will be unavoidable.</p>
4	Guidance Statements	<p>SECAP comprises several guidance statements, which cover a multiplicity of technical reference guidelines with specific examples of Good International Industrial Practices (GIIP) that must be followed in the development and implementation of projects financed by the IFAD. These guidelines, in a total of 14, cover a range of areas and in relation to this project, in addition to the Fisheries and Aquaculture (Guidance Statement 4), are presented as having interests those relating to: (i) Biodiversity; (ii) Agrochemicals; (iii) Forests Resources; (iv) Water; (v) Development of Value Chains, Microenterprises and Small Enterprises; (vi)</p>	<p>Main risks to be managed in aquaculture development as per the Guidance Statement include but are not limited to:</p> <ol style="list-style-type: none"> Conversion of wetlands and clearing of coastal vegetation Poor aquaculture siting Changes in hydrology Introduction of invasive and exotic species Overfishing Impacts on human and animal health <p>The assessment of potential impacts of</p>

¹⁰ Where impacts on the entire displaced population are minor (minor means that the affected people are not physically displaced and less than 10 percent of their productive assets are lost), or fewer than 20 households are displaced, an abbreviated resettlement plan may be prepared (Guidance Statement 13 of the IFAD's SECAP).

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
		<p>Rural Finance; (vii) Physical and Economic Resettlement; and (vii) Community Health.</p> <p>The broad environmental objectives for IFAD fisheries and aquaculture sector interventions are to: (i) strengthen fisheries management and the tenure rights of fishing communities to common pool resources; (ii) introduce ecosystem approaches for both fisheries and aquaculture; (iii) restore and develop protected areas; (iv) promote integrated coastal and marine resource management to ensure sustainable fishing practices; (v) invest in retraining and education for fishers to create alternative employment opportunities; and (vi) encourage sustainable forms of aquaculture¹¹.</p> <p>Moreover, through investments in fisheries and aquaculture IFAD seeks to achieve the following social, economic and environmental outcomes:</p> <ul style="list-style-type: none"> ▪ increase food production; ¶ improve nutrition for fishing and fish farming communities, surrounding communities and extending to the national level; ▪ increase incomes and employment opportunities, including for youth and women; ▪ improve the health and quality of life in fishing communities; ▪ increase national trade and exports of fisheries and aquaculture products; ▪ reduce the immigration of young fishers to urban areas; ▪ provide access to financial services for small-scale fishers and fish farmers; ▪ preserve and strengthen habitats that are important for rejuvenating fish stocks, such as mangroves and coral reefs; ▪ enhance access to knowledge and sustainable fisheries and aquaculture technologies; ▪ strengthen policies and institutions for fisheries resource management, tenure and access rights of local people; and ▪ enhance resilience of coastal communities against climate 	<p>aquaculture projects and the model environmental and social management plan presented in this ESMF presents more details about these issues and measures recommended for adoption under PRODAPE.</p>

¹¹ IFAD's Guidance statement 4 – Fisheries and aquaculture (IFAD's Environment and Natural Resource Management Policy (2011))

N.º	Strategic level	Tools and methods	Relevance/applicability for PRODAPE
		<p>change and other shocks by incorporating climate change impacts in the design of new fisheries and aquaculture projects.</p> <p>This ESMF and the ESIA/ESMP that will follow will systematically mainstream different aspects of the above-mentioned guidance statements.</p>	

3.2.2. IFAD's Environmental and Social Impact Assessment Process

IFAD defines the "Environmental and social impact assessment (ESIA)" as "a process or tool based on an integrated assessment where the scale and type of potential biophysical and social impacts of projects, programs and/or policy initiatives, are predicted, acknowledged and evaluated. It also involves evaluating alternatives and designing appropriate mitigation, management and monitoring measures to manage the predicted potential impacts". It is part of the organization's SECAP and the environmental and social management systems (ESMS).

The ESIA is an instrument which is applied mainly at the activity level, i.e. programmes, projects and subprojects and under this Project, it will be mainly attached to subprojects since the Project will be assessed and planned based on the Environmental and Social Management Framework (ESMF, i.e. this document) and the Climate Risk Assessment (CRA, i.e. a standalone document prepared at the same time as this ESMF).

The ESIA process is also fundamental in the achievement of IFAD's policy objectives in relation to a programme/project, which consist of:

- a) Avoiding, and where avoidance is impossible, mitigating adverse impacts to people and the environment;
- b) Enhancing equitable access to development benefits; and
- c) Giving due consideration to vulnerable populations, groups, and individuals (including women, children, and people with disabilities, and people marginalized by virtue of their sexual orientation or gender identity), local communities, indigenous peoples, and other marginalized groups of people and individuals that are affected or potentially affected by project activities.

Depending on the level of risk and severity of impacts activities are structured into three main categories, namely:

- (a) **Category A:** Activities with potential significant adverse environmental and/or social risks and impacts that, individually or cumulatively, are diverse, irreversible, or unprecedented;
- (b) **Category B:** Activities with potential limited adverse environmental and/or social risks and impacts that individually or cumulatively, are few, generally site-specific, largely reversible, and readily addressed through mitigation measures; and
- (c) **Category C:** Activities with minimal or no adverse environmental and/or social risks and/or impacts.

For Categories A and B projects a systematic process of impact identification and assessment is conducted, and management/mitigation/optimization plan is prepared to deal with the identified negative and positive impacts.

The scope and depth of the environmental and social assessment will be proportional to the level of risks and impacts and determined in the screening and by the specific requirements of the applicable environmental and social safeguards. For Category A activities that are anticipated to have significant environmental and social impacts, a full and comprehensive ESIA and ESMP will be required. For Category B activities with limited impacts, a fit-for-purpose ESIA and an ESMP, with a more limited focus as may be appropriate, that describes the potential impacts, as well as appropriate mitigation, monitoring and reporting measures will be required. Category C activities should have no expected significant environmental and social impacts and therefore may

not require any assessments, although a pre-assessment or screening should confirm that the activities are indeed in Category C. Nonetheless, being a category C project doesn't necessarily prevent a project from ensuring adequate monitoring of both environmental and social aspects of projects that are beyond safeguards. This is consistent with IFAD's quest to not only "**not do harm but also maximize benefits**".

An ESMP that contains the measures to manage and mitigate the identified risks and impacts is prepared for Categories A and B projects.

The mitigation of impacts in its turn is hierarchically organized with the aim to:

- (i) Anticipate and avoid adverse risks and impacts on people and the environment;
- (ii) Where avoidance is not possible, adverse risks and impacts are minimized through abatement measures;
- (iii) Mitigate any residual risks and impacts; and
- (iv) Where avoidance, minimization or mitigation measures are not available or enough, and where there is enough evidence to justify and support viability, design and implement measures that provide remedy and restoration before adequate and equitable compensation of any residual risks and impacts.

The ESMP will be integrated into the overall planning, design, resourcing, and execution of the project/subproject activities and be reflected in the accredited entities' environmental and social management system that involves project managers (general and environmental and social specialists), private environmental practitioners and environmental authorities.

The ESMP is a dynamic document, which is subject to change as more issues come to light and is intended to give more details to all project stakeholders about the environmental and social conditions and their obligations regarding the project.

The Project has been classified as Category B according to IFAD's SECAP, as a significant majority of sub-projects under components 1 and 2 will fall under this environmental category. On the other hand, according to Mozambique environmental regulation, most of the sub-projects will fall within category B, while some others will fall under Category C. As per both Mozambican and IFAD regulations Category B projects require less stringent processes (simplified ESIA if applicable and ESMP, respectively) since the environmental and social impacts are relatively easier to deal with; few if any of them have irreversible effects; and in most cases appropriate mitigation measures can be readily designed. Environmental and social best practices recommend that negative impacts be avoided and/or minimized, and that adequate and implementable mitigation and management measures be put in place early enough where avoidance is not feasible.

From IFAD's point of view, in aquaculture the ESIA and ESMP should be mainly concerned with:

- **Poor aquaculture siting:** the siting of ponds in valleys and lowlands interferes with other water uses, such as irrigation, washing, drinking and urban expansion;
- **Changes in hydrology:** water quality is affected by stagnation, acidification, and pond effluents if fish farming is poorly practiced and regulated;
- **Invasive and exotic species:** the introduction of invasive and exotic species can result in damage or extinction of native fish populations through predation and the spread of diseases and parasites, and genetic impacts through the escape of non-native and genetically modified organisms (GMOs);
- **Overfishing:** some forms of aquaculture production increase (e.g. carnivorous aquaculture species, which depend on high-protein feed formulated from a blend of other low value fish) – rather than reduce – the pressure on ocean fish stocks;

3.2.3. Impacts on human and animal health: the use of antibiotics and other chemicals to control fish diseases and parasites in aquaculture can have very serious negative impacts on the health of both animals and people. **Brief Comparison between the GoM and the IFAD Policies and Guidelines**

Although the GoM has considerably improved its Environmental Regulations thus harmonizing those to International Standards, differences between the National Regulation and IFAD's SECAP in certain areas and aspects remain, as summarized below. The explicit and highest standards will be applied. Under the proposed Project, whenever when one does not regulate a specific aspect the other should apply. When one system offers safeguards' standards considered lower than the other, than the highest standards will be applied.

Table 3-6: Gap assessment and comparison of legislation between Mozambique and IFAD requirements

Issue	Mozambique Legislation	IFAD safeguard requirements	Gaps/Bridging
Dispersed laws and regulations	The laws and regulations governing environmental, social and climate change processes are scattered throughout several documents, formulated at different times and contexts, which at times also contradict each other and make it difficult for practitioners to use and harmonize them to deal with specific issues	IFAD's Social, Environmental and Climate Assessment Procedures (SECAP) are precisely designed to better mainstream environmental, social and climate change considerations into a programme/project cycle. They are meant to assist programme staff and project teams, who are responsible for developing, implementing and supervising IFAD-supported projects, followed by government entities executing IFAD's investments in a way that is consistent and relatively easy to follow	The dispersion under the GoM regulatory set up is a considerable constraint. Whenever relevant SECAP will be used to establish and facilitate how the various GoM instruments should be harmonized
Framework documents for environmental, social and climate change management	The Mozambican legal framework does not consider framework assessment and management related with interventions (programmes) whose footprint is unknown at any given stage of development	As seen above IFAD adopts a number of instruments to make preliminary assessments and management guidance for interventions whose footprint is not yet clear such as ESMF, RAF and CRA. The ESMF will be disclosed on the IFAD's website and at national level as per SECAP guidance.	Prior assessment and management guidance have been recognized as valuable management tools. They assist in the identification of issues (natural, social, institutional) that should be optimized to ensure consistent and sustainable management of an intervention. This is the role to be played by this ESMF and accompanying CRA.
Project categorization	ESIA is required by Environment Law N° 20/97 of October 7, 2007 and Decree N° 54/2015. The Regulation for the EIA process classifies the projects into 4 categories: A+ and A require a full EIA subject to review by external and domestic professional assessors, respectively for A+ and A. A Simplified EIA is required for category B and no EIA is required for Category C.	IFAD's SECAP requires a full ESIA for all projects screened as Category A. For Category B projects, some form of environmental assessment is required, usually less rigorous than a full ESIA and often taking the form of an Environmental and Social Management Plan (ESMP). Beyond screening, no further ESMF/ESIA or ESMP or RPF/RAP action is required for a Category "C" project	Despite some minor differences there are no significant differences between the two sets of legislation. However, while IFAD assigns a category to an entire programme/project, the GoM legislation focus solely on individual subprojects, i.e. a full programme/project categorization under the national system is currently not available. The same applies to a lack of frameworks (e.g. for environmental and social management and resettlement) from the GoM side The project-by-project approach adopted under the GoM framework makes it difficult to adopt a common approach to subprojects that are part of the same programme/project. Under PRODAPE IFAD's

Issue	Mozambique Legislation	IFAD safeguard requirements	Gaps/Bridging
Resettlement and project categorization	Under the GoM regulations, particularly DM 54/2015 all interventions requiring people to be involuntarily resettled fall automatically under Category	Under IFAD's SECAP, projects and programmes dealing with resettlement or economic displacement could be part of category A or B. In the latter the probability of resettlement is low and the subproject's ESMP and Project Design Document will indicate the consultation processes leading to Free Prior and Informed Consent (see below) for reaching agreement with those affected and mitigation and monitoring measures required to ensure that those affected will not be negatively impacted	categorization for the general project will be adopted and subprojects of the same nature and characteristics will be tackled generally in same way in terms of environmental and social management without ignoring the specificities of each one of them. IFAD's categorization will be adhered to. Experiences abound in the country where minor resettlement implications have been dealt with as Category B project with evident success.
<u>Public participation, engagement and disclosure</u>	<u>Specific public participation aspects are regulated by Diplomas 129/2006 and 130/2006. However, most of the GoM regulations on environment, socioeconomic aspects, land, water, etc. require full engagement of different stakeholders in project development</u>	<u>IFAD's SECAP requires that "meaningful consultation by communities (especially targeted groups) and stakeholders that are likely to be affected by IFAD's operations ... to be sought throughout the Project and project life cycle, commencing as early as possible in the programme and project development process. The objective ... is to ensure the communities contribute to the development of management plans and provide feedback on the draft ESIA report and other relevant documents, ensure broad community support to the project..."</u>	<u>There are no meaningful differences between the two sets of legislation and public engagement, participation and disclosure of information/documents will be sought out throughout all phases of project development</u>
Involuntary Resettlement Definition	GoM regulations do not make a concise distinction between voluntary (agreed/negotiated) and involuntary resettlement. They also do not explicitly indicate	IFAD's SECAP and Guidance statement 13 – Physical and economic resettlement makes a clear distinction between the two phenomena. After and adequate Free,	All forms of resettlement will be avoided under PRODAPE. Thus, the project does not have a specific framework for resettlement as it has for environmental and social and climate change issues (also see below).

Issue	Mozambique Legislation	IFAD safeguard requirements	Gaps/Bridging
	what is covered under resettlement	Prior and Informed Consent FPIC process, people potentially involved in the resettlement can agree on being relocated and/or selling or relinquishing access to assets, against fair and timely compensations for their losses. Resettlement is also defined in broad terms. It covers all forms of land and asset acquisition including the efforts made to restore livelihoods	Where resettlement will be unavoidable the FPIC and the do- no-harm principles will be followed consistently
Planning/general framework	GoM regulations (e.g. DM 31/2012) focus on projects as such and their implications on resettlement. The importance of avoiding/minimizing this phenomenon is not adequately considered	IFAD advocates that resettlement should be avoided or minimized wherever possible	Resettlement should be avoided or minimized where possible by exploring aspects of design and even project implementation and this is what is going to be adhered to in all stages of PRODAPE development
Specification of the minimum number of public meetings to be held as part of preparation and approval of the resettlement action plan	Decree 31/2012 requires at least 4 public meetings to be prepared/held in the context of the preparation and approval of a resettlement action plan	IFAD procedures emphasize the need to engage in a comprehensive and deep communication and participation process to ensure that PAPs participate fully in all phases of the resettlement process	There is no minimum or maximum number of meetings. Where resettlement will be required as many meetings as necessary will be held to ensure the full participation of PAPs in the design of resettlement actions and measures to compensate and replace livelihoods and their satisfactory implementation
Specification of the rights and places where PAPs should live after being resettled	Decree 31/2012 indicates that, especially in case of physical displacement, the PAPs must be installed in a place with specified characteristics, including the characteristics of land, of the soils, and of characteristics of the replacement houses	The essential aspect in the light of IFAD's procedures is that PAPs must be compensated in a fair and participatory manner and that corresponds to their genuine interests and those of the people who represent them. It is also essential that living standards become equal to or higher than those that prevailed before the resettlement action	Above all, because this project does not provide for the relocation of HH houses from one point to the other, the essence of IFAD procedures, i.e. "restoring livelihoods to a level equal to or greater than that prevailing before resettlement" will be consistently followed, together with the FPIC. Under IFAD the latter is applicable even where an activity does not have resettlement implications.
National guidelines and standards exist for Occupational Health and	OHS legislation in place (Law No. 23/2007 of 1 August 2007) and implementation is under responsibility of Ministries of Labour and,	SECAP includes Guidance Statement 14 to deal with typical occupational health issues resulting from agriculture, fisheries,	In addition to being too general Mozambique's OHS do not have specific standards for management of wastes, and noise emissions for different industries. Therefore,

Issue	Mozambique Legislation	IFAD safeguard requirements	Gaps/Bridging
Safety (OHS).	Health. Safety standards guidelines for Environmental Quality and Effluent Emission are in place (Degree No. 18/2004 of 2 June 2004)) and the implementation is under responsibility of MITADER.	<p>aquaculture and forestry projects and these include (i) traumatic injury; (ii) respiratory illnesses; (iii) noise-induced hearing loss; (iv) cancer and other disorders from exposure to chemicals; (v) zoonoses; (vi) dermatoses; (vii) heat and cold stress; and (viii) musculoskeletal disorders.</p> <p>The ultimate objective is to guarantee that all the aspects of the natural, social and institutional environment are creatively combined to safeguard people and community health and safety. This is in line with the World Health Organization (WHO) definition according to which health is a multidimensional concept which "encompasses a complete state of physical, mental, and social well-being and not merely the absence of disease or infirmity".</p>	UN (WHO) standards will be applied. National environmental standards (Decree No. 18/2004 of 2 June 2004 developed for other industries (air emissions, power industry, and plastic exist) and can be applied, where relevant. The multidimensional concept to health should be adopted in all phases and activities of the programme.
Grievance and Complaints Mechanism	Besides what is contained in the general legislation on the responsibilities of local authorities, e.g. in Resettlement the Resettlement Committees in addressing the various resettlement issues, no reference is made to mechanisms for complaints and grievances in connection with environmental and social processes	An appropriate and accessible grievance redress mechanism must be established in all projects	IFAD procedures are more specific on the grievance redress mechanism and offers considerable protection to PAPs in case of non-compliance with the principles behind all environmental and social issues

4. Description of the Environmental and Social Setting

4.1. Mozambique in General

This chapter provides an overview of the country's development context, its main natural and social traits, the position of fisheries and agriculture in national development, and selected information about the provinces in the project area.

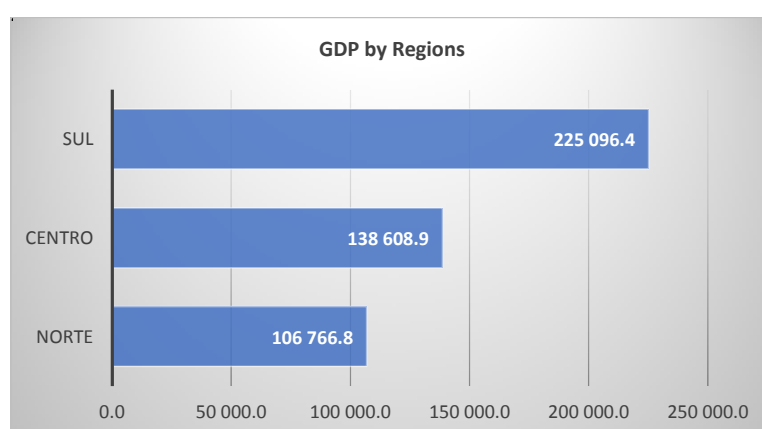
With 49% of the country's total wealth being made of natural capital, as opposed to an average of 24% in the other sub-Saharan African countries, Mozambique is one of the most endowed countries in Africa in terms of natural resources (AFD, 2009).

Some of the important international rankings of the country are:

- Human Development Index (United Nations) 181 out of 188 countries (2016)¹²;
- Peace Index (Institute for Economics and Peace) 78 out of 163 (2017)¹³;
- Ranking of global competitiveness (World Economic Forum) 133 out of 138 (2017)¹⁴;
- Doing Business Classification 138 out of 190 (2017)¹⁵.

There are also regional imbalances in development with the southern provinces of the country (except for Gaza province) representing about 48% of the national GDP, while Maputo City itself, which covers only 5% of the total population, represents 18% of the total GDP. The central (29%) and northern (23%) regions come in the second and third positions, respectively. Yet these two regions are the most populated and endowed with natural resources.

Graph 4-1: GDP by regions



Source: INE, 2015

The country's economic performance was remarkable between 1995 and 2013-2015. The Gross Domestic Product (GDP) growth rate was in the region of 7.4 in the period, which was informed mainly by a few large-scale capital investment projects, sound financial management, political stability and significant donor support. As with growth in some other developing countries in the SADC region (e.g. South Africa, Angola, etc.), the benefits of economic growth have not been enjoyed by all citizens and the link between economic growth and poverty reduction has been weak. Benefits from large scale capital investment projects tend to accrue to those who are

¹² 1st - Norway (0,849); 181st Mozambique (0,418); 188th Central African Republic (0,352).

¹³ 1st - Iceland (1,111); 78th Mozambique (2,013); 163th Syria (3,814).

¹⁴ 1st - Switzerland (5,81); 133rd Mozambique (3,13); 138th Yemen (2,74).

¹⁵ 1st - New Zealand, 138th Mozambique; 190th Somalia.

already economically better-off (i.e. mostly minority groups residing in urban areas), as opposed to much poorer people who form the bulk of the population and particularly those living in rural areas. Urban poverty has also been showing a growing trend in the last two decades.

Political tension during the period 2013-2016, the discovery of hidden debts (2015/2016) and the decline/fluctuations of the prices of the commodities that Mozambique was starting and/or promising to export (mainly coal and gas) in the same period, have been accompanied by deacceleration of economic growth, reduced injection of foreign capital, and aid from donors. This was accompanied by high inflation and elevated depreciation of the national currency. After tight monetary policy reforms to control currency depreciation and fiscal deterioration inflation has decreased from close to 27% in October 2016 to 18% in March 2018 (BM, 2018), but the financial situation remains difficult and marked by uncertainties. Micro Small and Medium Size Enterprises (MSMEs), which are the dominant business entities in the country are the most affected by this complex context as they struggle to have access to finance and other forms of facilitation.

The effects of climate change, which tend to affect poorest countries with low resilience and lesser adaptive capacity, have further exacerbated the national economic challenges.

4.1.1 Physical Environment

4.1.1.1. Geomorphology

As shown in [Error! Reference source not found.Figure 4-1](#), the geomorphology of Mozambique is in the form of a staircase that is divided as follows, where we have plains, plateaus and mountains.

The Mozambican relief is the result of the interaction of internal agents (volcanism, tectonism and earthquakes) responsible for the formation of mountains, plateaus and external agents responsible for erosion (rivers, winds, living beings, lakes, seas and oceans). The Mozambican relief has a staircase format that is when walking from the coast to the interior we have 3 steps in which the lowest corresponds to the plain on the coast. The intermediate are plateaus and the highest, the mountains.

The plateaus are in central and northern Mozambique and are divided into 2 parts:

- Average plateaus (200 - 500 m altitude);
- High plateaus (500 - 1000 m altitude).

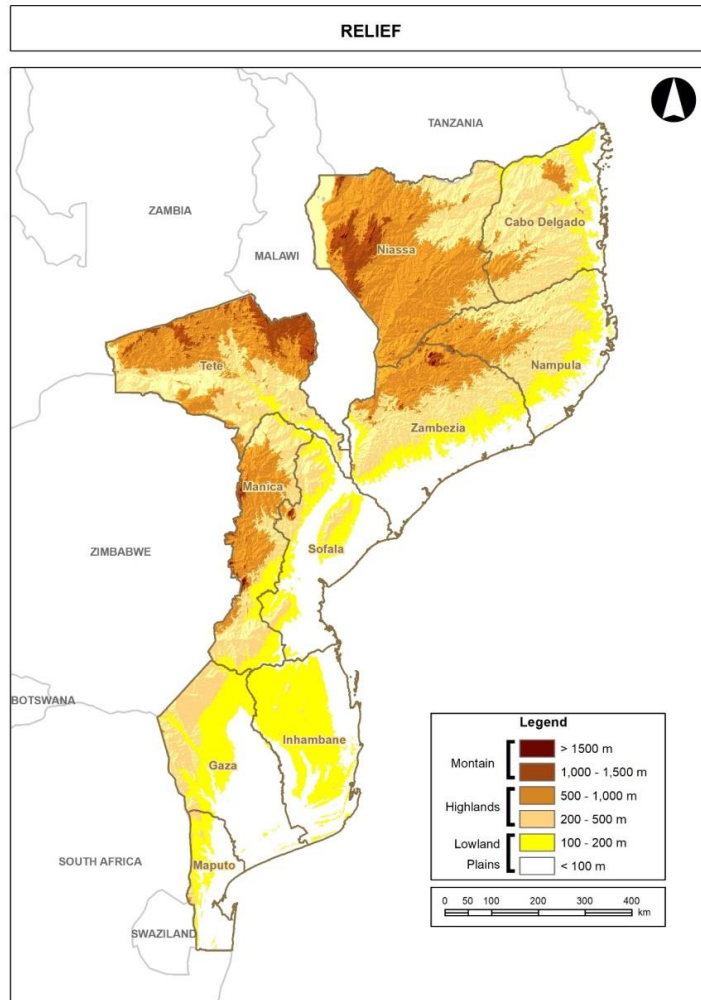
The mountainous region is in the central region of Mozambique, mainly in the provinces of Zambézia Tete and Manica.

- Chimanimani Chain - in the province of Manica. It is the highest point is Mount Binga with 2436 meters of altitude.;
- Plateau of Chire- Namúli - in the province of Zambézia and the highest point is the Namúli mountain with 2419 m and the Sierra Inago with 1807 m;

Maniamba-Amaramba Chain (Jéci Mountain Range) - Niassa province along Lake Niassa and the highest point is Jéci Mountain Range - 1836m.

The southern coastal areas have low water levels and extensive swamps, which make them prone to severe inundations in times of heavy rains.

Figure 4-1: Mozambique geomorphology



4.1.1.2. Soils

The constitution of the soil of Mozambique is variable as a result of the soils which are not homogeneous. According to its geographical and astronomical location, Mozambique has a wide variety of soils typical of tropical and subtropical regions. In general, in the mineralogical composition of Mozambican soils, ferruginous and aluminous materials predominate, being therefore considered pedalferic or ferralitic. These abundances of ferruginous and aluminous materials are the result of the resistance of these elements to the processes of disintegration of the mother rocks in climatic conditions of tropical regime. (Muchangos, 1999: 70).

The various classifications consider the mineralogical composition of the soils; color, origin, age, and recent morphological and biological processes. In the mineralogical composition of Mozambican soils ferruginous and aluminous matter predominates, being therefore considered pediphic or ferralitic. These abundances of ferruginous and aluminous materials are the result of the resistance of these elements to the processes of disintegration of the mother rocks in climatic conditions of tropical regime. Latosols are also designated by the frequency of their occurrence in the form of hardening known as laterite.

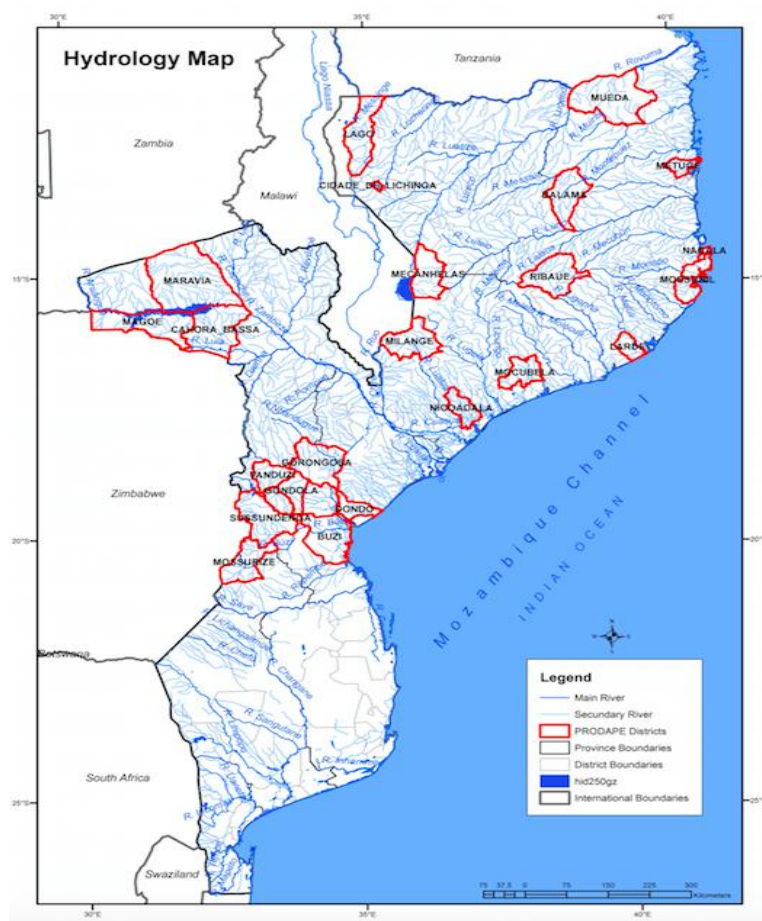
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4.1.1.3. Hydrology

The country is drained by several important rivers, nine of which are international¹⁶. The Zambezi is the largest and most important river, the fourth-longest in Africa, and the largest flowing into the Indian Ocean from Africa. Lake Niassa (also Malawi), which is part of the Zambezi River basin, is the country's major lake. Cahora Bassa dam, along the Zambezi River, is Africa's fourth-largest artificial lake. A small portion of Lake Chiuta is found in Mozambique. Zambezi river is subdivided into 27 sub basins, spread over five provinces (Manica, Sofala, Zambezia, Tete and Niassa), which include five of the PRODAPE targeted provinces (DNGRH, 2017). A large swathe of the Zambezi River Delta contains clearly visible evidence of centre-pivot irrigation meaning that there is already extensive irrigated agriculture taking place in the Delta. There is an agency responsible for the management of the Zambezi River Valley (ADVZ¹⁷) and a Special Land Use Plan (PEOT¹⁸) for the Valley was formulated in 2015. Since 2016 the Strategic Plan for the Utilization and Development of Zambezi River Basin has been under formulation.

Figure 4-3: Distribution of the 23 districts by hydrology



¹⁶ Maputo, Incomati, Umbeluzi, Limpopo, Save, Buzi, Pungwe, Zambezi, and Rovuma.

¹⁷ Agência do Desenvolvimento do Vale do Zambeze.

¹⁸ Plano Especial do Ordenamento Territorial do Vale do Zambeze.

The other important rivers in Mozambique are Limpopo, Incomati, Save, Púnguè, Buzi, Lúrio and Rovuma. Lúrio, that spreads over the provinces of Niassa, Cabo Delgado, Nampula and Zambezia is an important river in Mozambique with the advantage of being confined within the country's boundaries. The other four major rivers are shared with other neighbouring countries and this comes with specific requirements in the management of their water courses.

Figure 4-3 shows the distribution of the 23 PRODAPE districts by water resources. In the same way as soils, Chapter 5 makes a brief analysis of the implications of water resources on aquaculture production. Soils and water are two important natural components in this subsector.

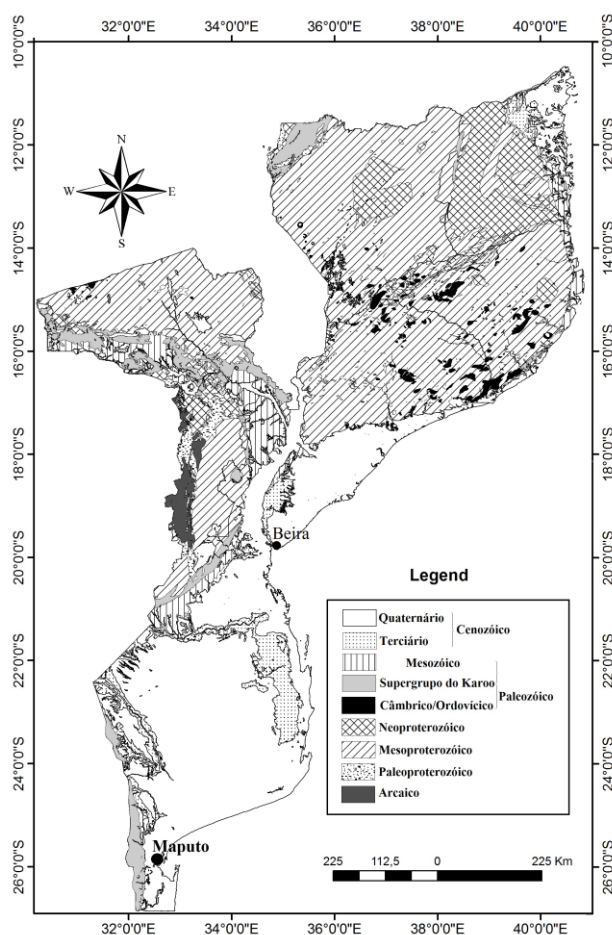
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4.1.1.4. Geology

Due to Mozambique's large extension, the geological differences are very great between the north, center and south of the Country. Thus, the north is fundamentally Proterozoic, and the South is entirely Phanerozoic, with the centre region sheltering archaic, Proterozoic lands and Phanerozoic (Figure 4-4).

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Figure 4-4: The great geological divisions of Mozambique



Scale 1: 1,000,000/Source: Vasconcelos, 2014

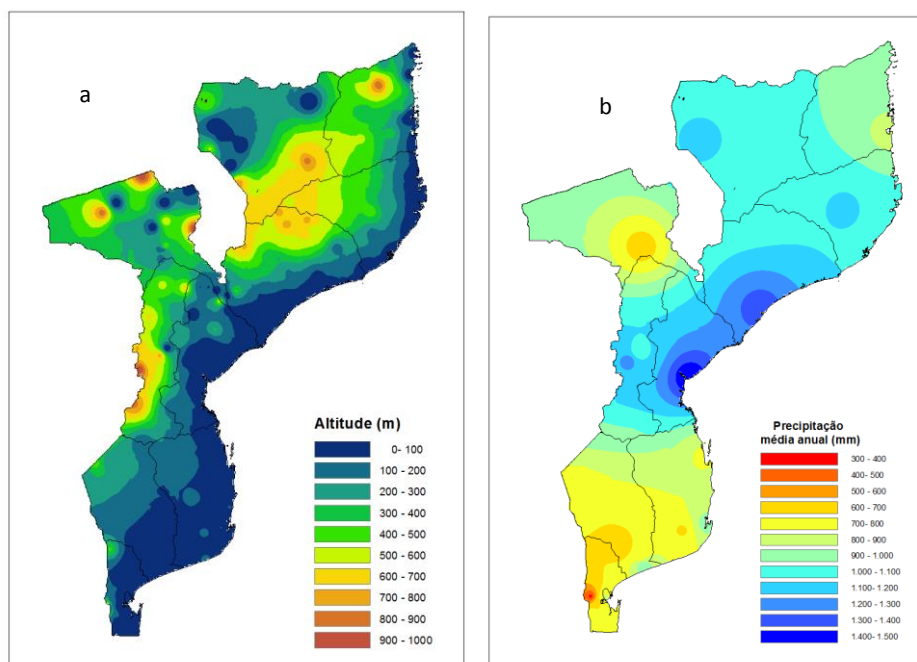
Precambrian terrains show a series of regional linear structures delimiting three tectonic blocks, a consequence of the collision between the various Gondwana blocks, each with its own characteristics (Vasconcelos & Jamal, 2010): Gondwana E, Gondwana W and Gondwana S. The blocks E and W are separated by an NS limit, and these are separated from the S block respectively by the Lutetium Belt (LTB - Tectonic Belt Belt) and the Sanângoè Shear Zone (SSZ). The Phanerozoic terrains are divided into Karoo Supergroup (SGK) and East African Rift System (SREA) (Vasconcelos & Jamal, 2010) (Fig. 3). The age of the SGK, divided into Lower (sedimentary) and Upper (sedimentary and igneous), varies from the Upper Carboniferous to the Lower Jurassic (GTK Consortium, 2006; Vasconcelos & Jamal, 2010) and is represented in deep intracratonic tectonic depressions resulting from rifts that were aborted during a dismembering phase in Gondwana. It follows the opening of the Indian Ocean as a result of continental drift and the dispersal of Gondwana, along with the development of the SREA (Vasconcelos & Jamal, 2010), which began in the Jurassic and continues to this day (GTK Consortium, 2006), resulting in the development of two huge sedimentary basins, the Mozambique Basin and the Rovuma Basin (L. Vasconcelos, 2010).

4.1.1.5. Climate

The climate, in general, is humid tropical with two distinct seasons: dry (or winter) and rainy (or summer). The average annual precipitation varies between 300 and 1500 mm (Figure 4-5Figure 4-5b) and occurs mainly during the summer, between October and April, with January being the rainy season (MANHIQUE, 2008). The temperatures present regional variations due to the interference of factors such as latitude, continentally and the relief itself. In general, temperature values tend to increase toward lower latitudes (HOGUANE, 2007).

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Figure 4-5: Altitude distribution in Mozambique



(a) and spatial distribution of annual mean precipitation, referring to the period 1980-2012 (b)/Source: Odete Amélia de Amílcar Macie, 2016

However, due to interference of the relief (Figure 4-5Figure 4-5a), there are lower temperatures in the higher regions and west of the country, which are located, from north to south, in the provinces of Niassa, Zambézia, Tete, Manica. In general, average annual temperatures are distributed as follows: from 18 to 20 °C in mountainous regions; from 22 to 24 °C in the central and northern planar regions and the centre (MICOA, 2005).

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Atmospheric circulation is characterized by areas of influence of low equatorial pressures with NE monsoon winds during the summer (SAETRE and SILVA, 1979). The south and central winds are predominantly SE trade, and in the north are influenced by a monsoon regime with NE winds during the summer and SW during the winter.

The rainy season lasts from October to May, with small quantities also possible outside this range. Most of the rains occur between December-January, with January being the wettest month in the entire country.

4.1.1.6. Climate Change Issues

A significant proportion of Mozambique territory is situated in favourable natural conditions for the occurrence of natural disasters, notably floods, droughts and cyclones. In recent times sea-level rise (SLR) and temperature increases are being added. Losses of lives, public and private assets which translate into GDP losses are a direct consequence of these disasters. These offset the country's efforts to eliminate poverty and promote development.

Vulnerability in general and particularly to flooding and SLR is related to heavy rainfall, hypsometry which explains that extensive plains are lower in relation to the rivers and sea levels, high flood flows from neighbouring countries, in shared river basins¹⁹, changes in vegetation cover and land use.

Mozambique is part of the group of countries that are implementing the Pilot Program for Climate Resilience (PPCR), which encompasses support for the institutional and policies' reform, for the funding of pilot projects (roads, agriculture, early warning systems, coastal cities and irrigation) and for knowledge management. Among other main funding agencies/initiatives comprise the World Bank²⁰, the Least Developed Countries Fund (LDCF), the PASA3, the African Development Bank, the JICA, the USAID and the Portuguese Carbon Fund.

The CRA for PRODAPE (and PROCAVA) presents a detailed mapping of the distribution of the 23 PRODAPE districts by the different climatic risks, namely cyclone, flood, and drought, including the different combinations of these risks. [Figure 4-6](#) and [Table 4-1](#) summarize the combination of the three variables and classification of each district by risk hazard and in combination, respectively.

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¹⁹ Mozambique shares nine important river basins with its neighbours, and it is situated downstream of all of them.

²⁰ The World Bank is also funding actions in water resources management, conservation areas, forests and energy.

Figure 4-6: Severity levels of combined drought, flood and cyclone hazards

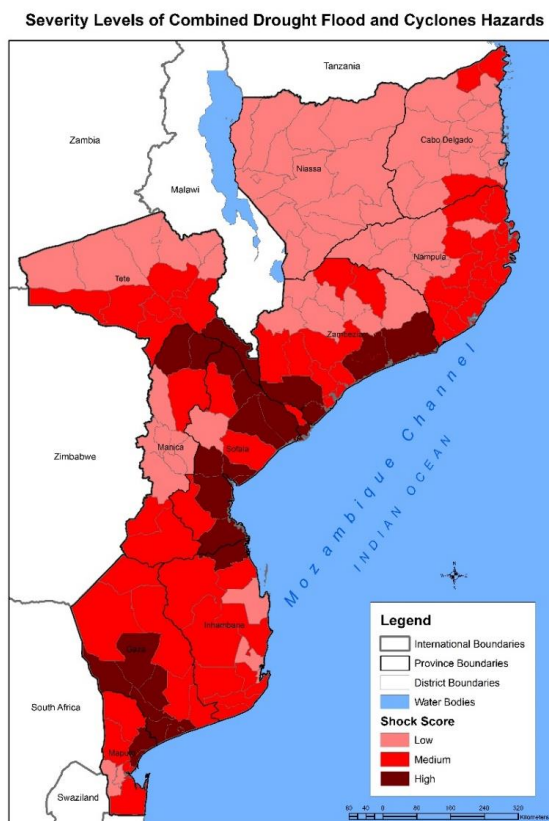


Table 4-1: Climatic risk analysis of the 23 PRODAPE districts

Nr	Province/District	Cyclone Risk	Flood Risk	Drought Risk	Drought + Flood Risks Combined	(Drought & Flood Risks) + Cyclones Combined
	Cabo Delgado					
1	Balama	Low	Low	Low	Low	Low
2	Mueda	Low	Medium	Low	Medium	Low
3	Metuge	Medium	Low	Low	Low	Low
	Niassa					
4	Lago	Low	Low	Low	Low	Low
5	Lichinga	Low	Low	Low	Low	Low
6	Mecanhelas	Low	Low	Low	Low	Low
	Nampula					
7	Ribaue	Medium	Low	Low	Low	Low
8	Mussoril	High	Low	Medium	Medium	Medium
9	Larde	High	Medium	Low	Medium	Medium
	Zambézia					
10	Milange	Low	Low	Medium	Medium	Low
11	Mocubela	High	Medium	Medium	Medium	High
12	Nicoadala	Medium	Low	Medium	Medium	Medium
	Sofala					
13	Dondo	Medium	High	Medium	High	High

14	Búzi	Medium	High	Medium	High	High
15	Gorongosa	Low	High	Medium	High	Low
16	Beira	Medium	High	Medium	High	High
	Tete					
17	Cahora Bassa	Low	Low	High	Medium	Medium
18	Magoé	Low	Low	High	Medium	Medium
19	Maravia	Low	Low	Medium	Medium	Low
	Manica					
20	Gondola	Low	Low	Medium	Medium	Low
21	Sussundenga	Low	Low	Medium	Medium	Low
22	Vanduzi	Low	Low	Medium	Medium	Low
23	Mussorize	Medium	Low	Medium	Medium	Medium

From [Figure 4-6](#) and [Table 4-1](#) it follows that the provinces of Sofala (districts of Dondo, Buzi and Beira) and Zambezia (district of Mocubela) present the districts with the highest combined risk, while Nampula (Mossuril and Larde), Zambezia (Nicoadala), Tete (Cahora Bassa and Magoé) as well as Manica (Mussorize), present the medium risk. The remaining districts present low risk, and these are concentrated in Cabo Delgado and Niassa (in which all the selected districts (from a total of six present low risk) and Manica (with only one district presenting medium risk, from a total of four). And except for Cahora Bassa, Magoé and Mussorize (medium risk) high and medium risk are also associated with being in the coastal region.

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Droughts and floods, combined with soils, water, hypsometry require the adoption of well-thought mitigation measures in aquaculture (and agriculture) production. In relation to aquaculture these will be discussed in the subsequent chapters, mainly in Chapters 5 and 7. The CRA report presents more details about the existing risks and recommended mitigation measures, which can be consulted separately.

4.1.2 Biological Environment

4.1.1.7. Vegetation and flora

There are still large gaps in the knowledge of plant species distribution of the flora in Mozambique. According to a preliminary checklist of vascular plants, the flora of Mozambique comprises 3,932 indigenous plant taxa and of these 177 are endemic (Da Silva et al. 2004). It has about 5,781 known plant species (MICOA, 2014) this number is a result of various expedition done recently (e.g. Timberlake et al. 2009; Timberlake et al. 2011; Burrows et al. 2018; Massingue, 2018).

Box 4-1: The importance of flora and forests

Forests form one of the most complex natural ecosystems with considerable influence on the quality of the environmental components such as air, water, soil, climate and different forms of life and biodiversity in general. It also has a strong weight on recreation, landscape scenery, noise and general wellbeing of humans and other species. The health of the environment in general has strong relations with forests in vast and complex ways.

Forests improve the environment in different forms such as: (i) relative humidity of air that is increased; (ii) increased fertility of surface soil by adding large quantities of organic matter in soil by which water and nutrient holding capacity of soil is increased; (iii) quality and diversity of life of wild and domestic animals, including humans.

The forest environment or site consists of the physical environment surrounding the aerial portions of the tree (climatic factors) and that surrounding the subterranean portion (edaphic factor) and the third one is the biotic factor. External influences, particularly fire, grazing and browsing animals and humans, significantly have an impact on the nature of sites and their capacity to support tree growth.

As the forest becomes established and develops, the site itself undergoes changes. Forest cover moderates the extreme daylight temperature regime of open sites resulting in more uniform conditions. Wind velocity is slowed in the vicinity of

tree crowns and becomes negligible within the forest.

Trees crowns intercept sunlight and alter the quantity and quality of radiation reaching forest floor compared with that reaching open sites. On the forest floor, accumulating layers of leaves, twigs and other litter attract a characteristic grouping of plants and animals that live on decaying organic matter and on each other.

There is increasingly more evidence to the effect that forests have the following influence on air temperature: (i) lowering the daily mean temperature in the hot season and raising it slightly in the cold season; (ii) lowering the daily maximum of air temperature and raising the daily minimum; (iii) diminishing the daily range of air temperature; and (iv) influencing precipitation

Forest air is cooler and moister, than the air in the open. Forest increases the precipitation of any area. As air cools while rising, precipitation increases with increase in elevation.

The beneficial influence of forest vegetation on soil is due to its beneficial effect and its power of increasing fertility of the land by adding nutrients. In general, the influence of forest vegetation on soil is related to the producing of a new substratum of soil and the changing of soil structure. Forest vegetation assists in the formation of soil by the accumulation of plant remains by stimulating weathering through the action of acids formed by vegetation, and by the resistance which forest vegetation offers to moving air and water.

Forest vegetation also plays an important role in water retention by reducing surface runoff, and thus increasing the amount of water that percolates into a soil and controlling erosion. Forest cover also increases seepage by increasing the volume of soil in mountainous regions over the solid rock foundations. The humus layers, characteristic of every well-managed forest, absorb from two to four times their weight of water. Forest soil, with its overlaying organic layers is in a real sense a vast sponge capable of absorbing much more water per unit area than soil in the open.

Plants also have a role to play in controlling air, water and noise pollution, cleaning the air, etc.

From the biotic point of view plants are undoubtedly the most important feature in the environment of terrestrial animals. All animals are dependent directly or indirectly upon plants for food. Forests also provide many animals with shelter from bad weather, protection from enemies, sites for shelter, and materials for nests.

MITADER (2016) – ESMF for MoZFIP²¹

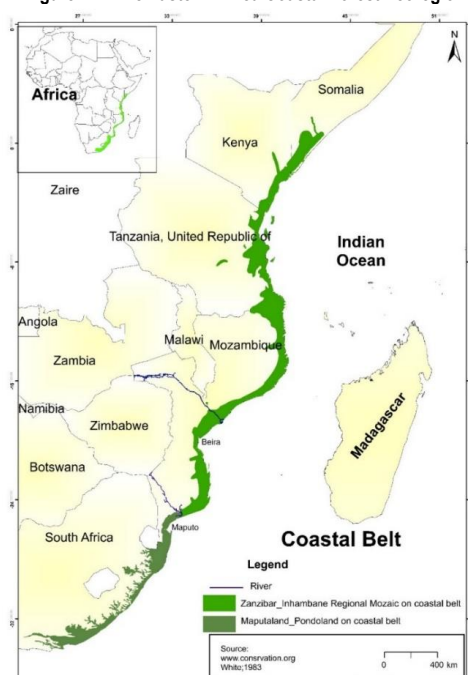
²¹ Environmental and Social Management Framework (ESMF) for (i) the Mozambique Forest Investment Project (MozFIP), (ii) the Dedicated Grant Mechanism to Local Communities (MozDGM) and (iii) REDD+ Initiatives

4.1.1.3.1. Ecoregions and Biogeography

Although some plant exploration was undertaken in Mozambique between 1940 and 1980, according to information from Herbarium LMA and LMU there is still lack in botanically information. Mozambique has long been recognized as a probable area of high biological diversity and interest” (Barbosa, 1967), (Huntley, 1978; Moll & White, 1978; and White, 1983), agree. “This recognition was primarily based on the known high species diversity and high number of narrow-range endemics in the flora of coastal south-eastern Tanzania”, a region that has no apparent geographical isolation from the adjacent Mozambique. Another reason is “because a significant number of Mozambique narrow-range endemics were confined to the northern coastal areas” (Timberlake et al. 2011). It is also recognized that the climate in some area is moister and more humid (Moll & White, 1978), and thus likely to be different ecologically that can be determinant for high level of diversity. Additional (Muller et al 2006 and Palgrave et al 2007) described vegetation of Gorogonsa and found this area as also possessing high level of diversity of plant species.

Such levels of endemism for example have led to the East African coastal areas being identified as a separate ecoregion by the World-Wide Fund for Nature (WWF)²² namely – the Eastern Africa Coastal Forest Ecoregion (Burgess *et al.* 2004a). This ecoregion is regarded as one of the globally most important ecoregions in the world, the Global 200, based on its irreplaceability or distinctiveness (including species richness, endemic species, unusual species or groups, unusual ecological or evolutionary phenomena) and the global rarity of habitats (Olsen & Dinerstein 2002). WWF now has a specific programme directed towards the conservation of East African coastal forests (WWF-EARPO 2006) that include the coastal zone of Mozambique. In addition, the Coastal Forests of Eastern Africa are considered by Conservation International (CI) to be a global biodiversity hotspot – an area of high species diversity and endemism that is under increased threat (Myers *et al.* 1999, Burgess et al. 2004).

Figure 4-7: The Eastern Africa Coastal Forest Ecoregion



²² The World Wildlife Fund (WWF) has defined global eco regions based on geographically distinct assemblages of species, natural communities and environmental conditions. Information on each eco region and its conservation status are provided to assist with the continued conservation of these areas.

During the civil war in Mozambique (1975-1994), botanical collecting came to a halt and has only taken place sporadically since then (Da Silva et al. 2004). Hitherto, most of the botanical inventories undertaken in Mozambique have been conducted basically in the south of the country mainly in Maputaland Centre of Endemism (Southern Mozambique expedition, 2001, Izidine & Bandeira 2002, Izidine, 2003, & Matimele, 2017; Massingue, 2018).

The importance of Mozambique in terms of biodiversity becomes clear when it is noted that the study area contains seven of the WWF's Global 200 ecoregions:

- Southern Inhambane-Zanzibar Coastal Forest;
- Eastern Miombo Woodlands and Savannas;
- Zambezian flooded grasslands;
- Zambezian and mopane woodland;
- Southern miombo woodlands;
- Lake and
- Eastern Zimbabwe montane forest-grassland mosaic

In general terms it should also be highlighted that Mozambique is one of the best endowed countries in Africa in the area of natural resources. According to an AFD study (AFD, 2009), 49% of the country's total wealth is natural capital, as opposed to the average of 24% in the other sub-Saharan African countries. Most of this wealth is concentrated in the northern region.

An overview of Mozambique vegetation shows that seventy-nine percent of its territory is covered by natural vegetation. Although several research projects have recently aimed at documenting Mozambique's diversity, the current conservation status of the country's flora remains unknown (Dudley and Stolton, 2012). Despite this, analyses of existing data show that the biodiversity in the country is high (USAID, 2008) and that globally, Mozambique boasts 7 ecological zones of international importance. These include:

- Agulhas Current;
- East African Coast;
- Lakes of the Rift Valley
- East African Mangroves
- Forests of the South Rift Valley
- East and Central Miombo Woodlands and
- The Savannas of the Zambezi Floodplains.

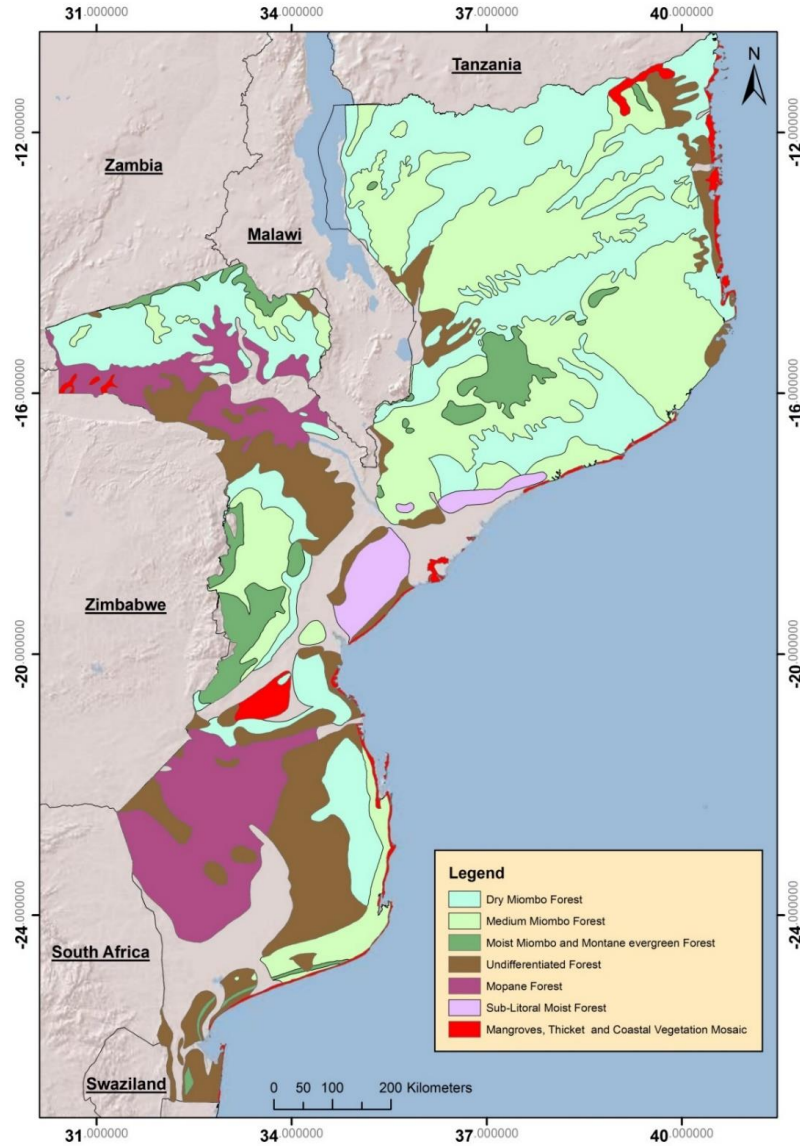
Other sites of high importance for biodiversity include Lake Niassa, Gorongosa Mountain, the Archipelago of Quirimbas, and the Chimanimani Massif (Dudley and Stolton, 2012; USAID, 2008).

On the other hand, as shown in Figure 4-8, the richness of the country in terms of biodiversity is due to the **high diversity of the existing ecosystems**. There are four main categories of natural ecosystems in Mozambique: (i) terrestrial, (ii) marine, (iii) coastal and (iv) lake. The country has five different biomes subdivided into 12 ecoregions, most of which are critically endangered. Floristically up to 4 Phyto-geographic regions of endemism are recognized namely: (i) Zambezian, (ii) Swahilian, (iii) Swahilian-Maputaland transitional zone and (iv) Maputaland-Tongoland (Ntumi et al, 2014). The project districts and operation areas are found on all of them.

The Swahilian/Maputaland Regional Transition Zone/The Zanzibar-Inhambane regional mosaic (sensu lato)

According Burgess et al. (2004) this region has about 259, 900 km². In Mozambique this region extends from the Rovuma River (border with Tanzania) to the Limpopo mouth (10° 28' 5.61" S e 40° 28' 8.36" E to 25° 12' 4.68" S e 33° 31' 21.3" E respectively) with about 147, 000 km². The climate is tropical, the rainfall is mostly between 800-1200 mm per year, and the elevation is about 200 masl (White, 1983).

Figure 4-8: Distribution of vegetation types in Mozambique



Box 4-2: Forests and Climate Change

After many years of focusing on the influence of forests on climate at the microclimate or local level in recent times there is increased attention at the potential, impact of forests on global conditions.

Forest have a positive or negative impact on climate change (CC) through their influence on the global carbon cycle. Forest are being recognized as playing important roles in global biochemical cycle. Major pools of carbon are the atmosphere, fossils fuels, oceans and terrestrial biota and soils. Forests are often called “carbon sinks” because of the role they play in capturing carbon from the atmosphere through plant photosynthesis, thus diminishing the concentration of carbon dioxide in the atmosphere. Through deforestation this environmental service is lost.

The world's forests contain more than 55% of the global carbon stored in vegetation and more than 45% of that in soil. Most of the carbon Pools in forest vegetation is in tropical forests (62%), whereas most of the carbon pool in forest soils is in boreal forests (54%).

Carbon sequestration in the forest is reversed by tree and vegetation cutting, burning and the degradation that leads to the death of trees and their decomposition, which lead to the release of the sequestered carbon into the atmosphere. Converting forests into agricultural land releases the carbon contained in the soil. Around 13 million hectares of forests are devastated each year in the world. The annual GHG emission caused by this deforestation and other types of land use changes represent between 10 to 18% of the worldwide greenhouse gas emissions, turning it into the second largest source, after the energy sector. This is a phenomenon that can no longer be ignored as it is known for being responsible for at least 20% of GHG forestry emissions, even though it is more difficult to quantify than the pure and simple loss of a forest. At the global level, the carbon stored in the forest biomass has decreased by around 0.5 Gt each year over the 2005–2010 period, essentially because of the deterioration of worldwide forest cover.

Currently Mozambique is preparing the first version of the forest reference level that will become the baseline to start measuring the real effects of emissions reduction in connection with deforestation and forest degradation. Preliminary estimates based on global data indicate that 12MtCO₂/year emissions from deforestation and forest degradation is the current situation (2010). If the current trend is maintained, it is estimated that the emissions from the deforestation and forest degradation could reach 39 MtCO₂/year by 2030.

REDD+²³ actions should prioritize two main components: (1) avoided deforestation, which includes (i) the reduction of deforestation and forest degradation through the intensification of agriculture and increasing the efficiency in the production and use of biomass energy; and (ii) improving the conservation of forest ecosystems, by increasing the efficiency of the management of the system of conservation areas; and (2) Enhancement of carbon sequestration capacity through reforestation and restoration of reduction of carbon emissions from trees and shrubs.

Forests, agriculture and energy sectors have a major immediate impact on the national baseline. The conservation of ecosystems can be achieved through the rehabilitation and reinforcement of the implementation of the management of the system of conservation areas and timber concessions. According to the National Reforestation Strategy (MINAG, 2009), increasing sequestration/removal of carbon at the national level could account for one million hectares, added to the gains from restoration and rehabilitation of degraded forests. As shown in the graph below preliminary estimates indicate a potential of emission reduction from 39 to 3 MtCO₂/year (in 2030) resulting from the reduction of deforestation and increase in carbon stocks, totalling around 170 MtCO₂ as avoided emissions and carbon sequestration during the reference period.

MITADER (2016) – ESMF for MoZFIP²⁴

Maputaland

Maputaland is in the south-east Mozambique (25° 12' 4.68" S and 33° 31' 21.3" E to 26° 51' 53.688" S and 32° 51' 24.017" E) from the Limpopo River Mouth at Xai-Xai, the capital of Gaza province (Van Wyk & Smith, 2001) to Ponta de Ouro (border with South Africa), it occupies about 30,200 km² (Burgess et al. 2004). Morphologically it has two major physio geographic units: the Lebombo Mountains in the west and a low topographic coastal

²³ REDD+ (Reduced Emissions from Deforestation and Forest Degradation) an aid mechanism for forested countries (like Mozambique) by which developed countries would finance the protection of the forests through financial incentives.

²⁴ (*idem*)

Figure 4-9: The flora Zambesiaca area



The **Zambezian Regional Centre of Endemism** extends from 3° S to 26° S and almost from the Atlantic Ocean to the Indian Ocean, occupying all Mozambique's hinterland provinces and part of the coastal area. The climate is tropical, continental, with one rainy season from November to April (500 and 1400 mm per year, generally decreasing from north to south). Mean air temperature is related to altitude and varies from 18° to 24° C. The Zambezian centre is the second largest phytochorion (Phytogeographical region) in Africa, probably having the richest and more diversified flora. There are at least 8,500 species, 54% of which endemic (e.g. of endemic genera, which are *Diplorhincus*, *Bolusantus* and *Cleistochlamis*) (White, 1983). Some of the vegetation types are dry, swampy, riparian and montane forests, woodlands, thickets and grasslands.

Afromontane centre of endemism is limited to highlands and mountains areas of Chimanimani (border region between Mozambique and Zimbabwe). Areas with similar feature can be found in Gorongosa, Mabu and Milange mountains where studies confirmed the presence of species that occur in Chimanimani Endemism centre

Vegetation Characterization

According to Wild and Barbosa (1967) Mozambique has 54 vegetation types, these in turn were grouped into nine different types of communities (Marzol, 2007; Sitoe et al 2014 - occasional publication) namely: 1. flooded areas, 2. mopane forest, 3. undifferentiated dry deciduous forests, 4. Miombo medium, 5. dry Miombo, 6. Forests sub-humid sub-coastal, 7. Mosaics of coastal vegetation, bushes and mangrove, 8 sub-arid zones and dry grasslands, 9. forests (semi-) evergreen mountain and moist mountain meadows and wet miombo.

Study area comprise twenty threes district as described below in terms of vegetation and flora/faunal. In terms of vegetation the project area is generally described as gentle undulating and remote, predominantly rural countryside with undercover of miombo forest and savannah mosaic vegetation arranged by drainage lines, topographical basins and anthropogenic interventions. The area is densely populated by subsistence farmers who clear and plant fields within the flood plains of various drainage lines and rivers transecting the area (e.g. most of field crops are found along rivers basin). The Miombo Woodland is the most extensive vegetation type, and it dominates in the northern and central parts of the country (Bandeira et al, 2007).

Miombo

A vast portion of southern, central and eastern Africa is covered by miombo woodlands. Millington *et al.* (1994). Miombo woodlands are the most extensive and common vegetation type in Mozambique (Campbell et al. 1996), it occur in the north of the Limpopo river to north of the country, and occupy approximately two-thirds of the natural forest area, it occur in most inland area, it can appear as forest or woodland, also associated to the other type of vegetation where drainage is poor, acacia savannas or grassland may become locally dominant (Werger, 1978). Other associated vegetation with miombo includes dry deciduous forest and thicket, as well as deciduous riparian vegetation (White, 1983).

The Miombo Woodland is the more extensive vegetation type, and it dominates in the north and central parts of the country. In the southern part it is found in parts of Gaza and Inhambane provinces. This vegetation type is characterized mainly by the presence of species such as *Brachystegia*, *Julbernardia* and *Pteleopsis*, many times mixed with *Pterocarpus*, *Vitex payos*, *V. doniana*, *Cussonia spicata* and others. Mopane Woodland is the second more extensive vegetation type, and it occurs in the southern (in between the Limpopo and Save rivers, covering most of Inhambane province) and northern (in the upper part of the Zambezi valley, covering all southern part of Tete province) parts of the country. Species that characteristically compose this vegetation type are *Colophospermum mopane*, *Adansonia digitata*, *Azelia quanzensis* and *Sterculia rogersii*. The Undifferentiated Woodland covers extensive parts of the south, centre and northern country. It is composed by a large variety of species, mainly *Acacia* spp. in the drier areas, but also *Azelia quanzensis*, *Sclerocarya birrea*, *Albizia versicolor*, *Terminalia sericea* and *Petophorum africanum*. In places of higher altitude, whether under drier or moist conditions, a specific vegetation type develops. Afromontane Elements are confined to the central (Manica province, in the border with Zimbabwe) and northern part (northeast Tete and west Zambezia, also in the limits with Malawi). They occur only at high altitudes, between 1500 and 2000 m, and common species are *Widdringtonia cupressoides*, *Podocarpus milanjanus*, *Khaya*, *Macaranga*, *Zanha golungensis* and others. The

main afromontane elements in Mozambique are Chimanimani Mts (around 1500 species, 100 known endemic occurring this Mozambique-Zimbabwe border afromontane, highest point is Binga Mt 2440), Namuli (2419 metres, around 330 species, 16 endemic species), Chiperoni (229 species, 3 new species), Mabu (1710 m, at least 250 species and one considered new) with one of the largest moist forest in southern Africa, Inagu Mt still little known but apparently with a new *Encephalartos* species. Prominent additional Mountains/inselbergs are those from Niassa (e.g. Lipilichi 1848m, Nacaonda 1738, Mecula 1441, Txa-txe 1324m, Jao/Yao 1336, Natukwe/Cuamba 1332 m), Nampula and Cabo Delgado provinces. The coastal areas are covered by different vegetation types that typically grow along the coast. All those constitute the Coastal Mosaics, which include sand forests, swamp forest, dune forests, woodlands, grasslands and mangroves. Along the valley of the Changane River (a tributary of the Limpopo) it is found a unique inland halophytic vegetation type. The highly saline soils, locally known as “tonga”, only allow halophytic succulent, creeping plants to grow, the only capable to cope with the arid conditions. Some of those are *Arthrocnemum* sp., *Chenolea* sp. and *Salicornia* sp. The last major vegetation type in the country occurs on the Malawi-Mozambique border, a Swamp Vegetation, associated to freshwater swamps.

Vegetation in the study area consists of a complex, floristically diverse mosaic of vegetation types and plant communities divided into eight (28) vegetation units namely 1, 2, 6, 9, 10, 13,14, 18, 21, 23, 24, 28, 29, 31, 33, 35, 36, 39,40, 44, 45, 50,51, 52, 54,56, and 64 in north and central zone of the project. For the south with class 59. Only the most common classes were described.

Aquatic Invasive Species in Mozambique

Biological invasions are recognized as a serious threat to global biodiversity and ecosystem function, inflicting great social and economic damage. These can have serious repercussions in aquaculture. The presence and often dominance of invasive species in aquatic habitats has caused comparatively greater ecological and economic consequences than those in terrestrial environments (Vilà et al. 2010). **Invasive aquatic plants** are introduced **plants** that have adapted to living in, on, or next to **water**, and that can grow either submerged or partially submerged in **water**. They invade rivers, dams, lakes and irrigation canals. They disrupt navigation, fishing and other recreational activities. Adversely affect waterflow, increase the loss of water from storage dams and can pose a serious threat to hydro-electric installations. Invasive aquatic plants may alter ecosystem structure, resulting in a significant negative impact on aquatic biodiversity and water quality (Zedler and Kercher 2004; Chamier et al. 2012; Brundu 2015), and thus are of great concern to both ecologists and environmental managers as well as aquaculture practitioners.

High densities of the plants degrade aquatic ecosystems and are a threat to biodiversity. Invasive aquatic plants can cause local losses of species diversity throughout the world and they can also contribute to water quality deterioration.

Invader aquatic plants species in Mozambique include: *Azolla filiculoides*, *Eichhornia crassipes*, *Pistia stratiotes*, *Nymphaea mexicana*, *Myriophyllum* spp., *Elodea* spp., *Ipomoea carnea*.

There are also opportunistic aquatic plants in Mozambique. These are mainly indigenous or cosmopolitan species that can flourish and become troublesome in disturbed aquatic habitats, these include: *Lemna* sp., *Ludwigia* sp., *Typha capensis*.

Figure 4-10: Lemna sp covering most of the water bodies



Among these species the most common are: *Eichornia crassipes*, and *Pistia stratiotes* (Figure 4-11). Although it is a known fact that these plants cause negative impact for aquacultures production in Mozambique studies are few to address how to manage them. The most common is physical management consisting mostly of removal of the species. This method is environmentally the best because it does not require the use of chemical products.

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Figure 4-11: *Pistia stratiotes* and *Eichornia crassipes*

Eichornia crassipes were the most common species found in aquaculture dams in Niassa and Manica provinces during the preparation of this ESMF, and in all of them the management consisted mostly in physical removal.

Protected/conservation areas

As shown in [Figure 4-12](#)~~Figure 4-10~~, currently, 22 national parks and forests/fauna reserves exist in Mozambique covering an area of 216, 278 km² representing about 25% of total area in the country.

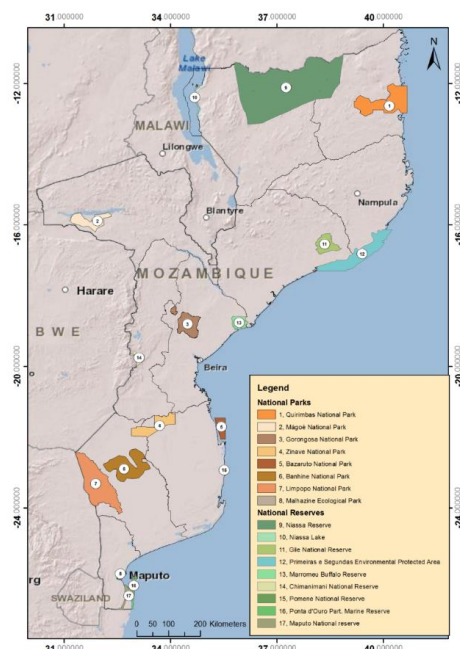
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All protected areas, including National Parks, Forest Reserves and Trans-frontier Conservation Areas, are under the responsibility of DINAF/MITADER. The Forest Reserves were created to safeguard timber reserves from advancing agriculture for future sustainable utilization. The possibility that these Reserves can make a significant contribution towards biodiversity conservation has been recognized and studies are being conducted to gain an understanding of the vegetation and ecosystem condition within these Reserves.

According to Muller *et al.* (2005), of the 13 existing forest reserves, five (Licuáti, Derre, Moribane, Mecuburi, and Matibane) are co-managed as commonage between the Forest Service and local communities. Only two of the forest reserves (Inhamitanga and Nhampacue) are not currently inhabited. All the forest reserves (including those under management and the ones uninhabited) show different degrees of human disturbance, particularly clearing for agriculture, human induced fire, collection of firewood and charcoal, and logging. Among the causes of degradation of the forest reserves are abandonment of the forest reserves by the Forest Services during the civil war, use of forest reserves as hideouts by communities and guerrilla fighters, promotion of agriculture within the communities living inside the forest reserves, illegal logging, and poaching among others.

The Niassa Game Reserve (NGR) lies approximately 180 km from the proposed mining area. The core area of the NGR is located between the Rovuma and Lugenda River and covers approximately 23 040km² with a surrounding buffer zone of hunting blocks that make up an additional 19 239km² (Branch *et al.*, 2005). The NGR is the largest conservation area in Mozambique.

Figure 4-12: Overview of conservation areas in Mozambique



There are a few intersections between the conservation areas (broadly defined) with PRODAPE districts mainly in the cases described in [Table 4-2](#) and illustrated in [Figure 4-12](#):

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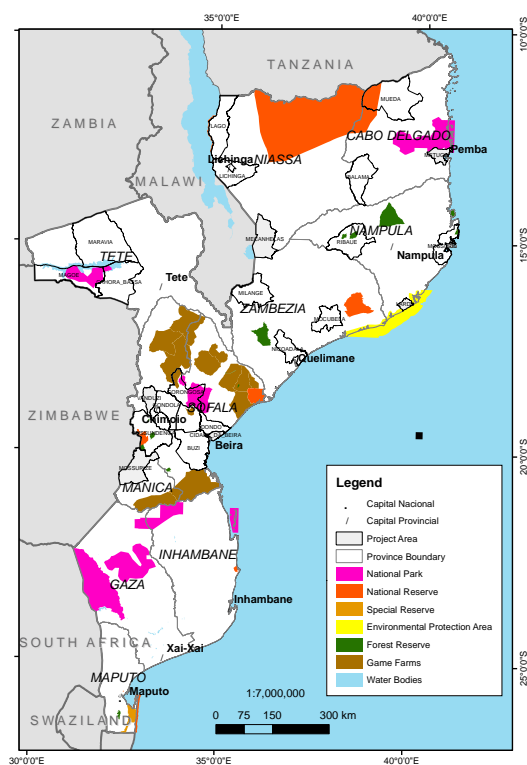
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Table 4-2: Intersections between PRODAPE districts and conservation areas

N.º	PRODAPE Province/District	Conservation Area
1	Cabo Delgado/Metuge	Quirimbas National Park
2	Cabo Delgado/Mueda	Niassa Reserve
3	Nampula/Ribaué	Forests Reserves
4	Tete/Cahora Bassa	Magoé National Park
5	Tete/Magoé	Magoé National Park
6	Sofala/Gorongosa	Gorongosa National Park
7	Manica/Sussundenga	Chimanimani National Reserve

These interferences will need to be carefully managed in the selection of specific subproject sites to avoid encroachment of project components into areas earmarked for non-interference, in line with the zoning of each conservation area²⁵.

Figure 4-13: PRODAPE districts and conservation areas



²⁵ In Mozambique some conservation areas have space for different land use practices that are specified in the zoning of such areas.

4.1.1.3.1.1. Main Floristic Traits in the Project Area

In terms of vegetation the twenty-three districts of the project area comprise areas that are predominantly rural countryside with undercover of miombo forest and savannah mosaic vegetation arranged by drainage lines, topographical basins and anthropogenic interventions. The districts can be subdivided as shown in [Table 4-3](#).

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Table 4-3: Distribution of vegetation types and status in districts of study area

Province	District	Dominant vegetation Types	Status Habitats
Niassa	1. Lago	<ul style="list-style-type: none"> Mixed Miombo woodland Miombo woodland 	Modified: Scattered settlements near by the main village.
	2. Lichinga	<ul style="list-style-type: none"> Mixed Miombo woodland Open miombo and mixed woodland Permanent wetland (small rivers) 	Modified: Settlements, rice paddies in floodplains
	3. Mecanheles	<ul style="list-style-type: none"> Mixed Miombo woodland Open miombo and mixed woodland Permanent wetland (small rivers) 	Modified: settlement and cultivation (machambas); Woodland with many cashews and mangos
Cabo-Delgado	4. Mueda	<ul style="list-style-type: none"> Open miombo and mixed woodland Degraded dry forest Groundwater forest Permanent wetland (small rivers) 	Modified: settlement & cultivation; rice paddies in floodplains
	5. Balama	<ul style="list-style-type: none"> Groundwater forest Mixed woodland Miombo woodland and some patches of miombo forest Permanent wetland (Montepuez river and other small rivers) 	<p>Modified with settlement & cultivation; some patches of riverine forest along of Montepuez river, but some areas are intensively cultivated.</p> <p>Natural: along some mountains although timber collection is present.</p>
	6. Metuge	<ul style="list-style-type: none"> Mangroves Coastal woodland 	Modified: with settlement & cultivation (machambas); Woodland with many cashews and mangos
Nampula	7. Ribaue	<ul style="list-style-type: none"> Mixed woodland Miombo woodland Open miombo and mixed woodland The Deciduous savanna or woodland Forest patches on the slopes and gullies of the inselbergs at medium altitudes 	Modified: with settlement & cultivation (machambas); Woodland with many cashews and mangos

Province	District	Dominant vegetation Types	Status Habitats
	8. Mossuril	<ul style="list-style-type: none"> Coastal dry forest Mixed woodland Miombo woodland Small patches of mangroves 	Modified: with settlement & cultivation (machambas); Woodland with many cashews and mangos
	9. Larde	<ul style="list-style-type: none"> Miombo woodland Coastal wooded (Palms) Permanent wetland (small rivers and lagoon along the coast) Small patches of mangroves along rio Larde Floodplain grasslands along estuarine fringes. 	Modified: with settlement & cultivation (machambas); rice paddies in floodplains; Woodland with many cashews and mangos
	10. Magoe	<ul style="list-style-type: none"> Mopane woodland 	Largely Natural: some timber collection. Modified: with settlement & cultivation (machambas)
	11. Cahora-Bassa	<ul style="list-style-type: none"> Undifferentiated vegetation Small patches of mopane woodland 	Largely Natural: some timber collection. Modified: with settlement & cultivation (machambas)
	12. Maravia	<ul style="list-style-type: none"> Permanent wetland (rivers) Undifferentiated vegetation Open miombo and mixed woodland 	Largely Natural: some timber collection. Modified: with settlement & cultivation (machambas)
Zambezia	13. Milange	<ul style="list-style-type: none"> Permanent wetland (small rivers) 	Largely Natural: some timber collection. Modified: with settlement & cultivation (machambas); disturbed by tea plantations
	14. Mocubela	<ul style="list-style-type: none"> Miombo forest Miombo woodland Open miombo and mixed woodland Permanent wetland (small rivers) 	Modified: with settlement & cultivation (machambas)
	15. Nicoadala	<ul style="list-style-type: none"> Open miombo and mixed woodland Permanent wetland (small rivers) 	Modified: with settlement & cultivation (machambas)
Manica	16. Mossurize	<ul style="list-style-type: none"> Forest patches on the slopes and gullies of the mountains at medium altitudes Open miombo and mixed woodland 	
	17. Gondola	<ul style="list-style-type: none"> Open miombo and mixed 	

Province	District	Dominant vegetation Types	Status Habitats
		<ul style="list-style-type: none"> woodland 	
	18. Vanduzi	<ul style="list-style-type: none"> Open miombo and mixed woodland 	
	19. Sussundenga	<ul style="list-style-type: none"> Forest patches are found on the slopes and gullies of the mountains at medium altitudes Open miombo and mixed woodland 	
Sofala	20. Gorongosa	<ul style="list-style-type: none"> Open and closed Acacia woodland Riverine woodland & thicket Floodplain grassland & <i>Acacia seyal</i> wooded grassland. Open miombo and mixed woodland and miombo forest Mixed formations of dense semi-deciduous tall forest, at low altitudes 	
	21. Buzi	<ul style="list-style-type: none"> Alluvial grassland & wooded grassland Floodplain grasslands along estuarine fringes (Pungue river). 	Modified: Settlements, rice paddies in floodplains
	22. Dondo	<ul style="list-style-type: none"> Alluvial grassland & wooded grassland (Acacia & palms) Floodplain grasslands along estuarine fringes (Pungue river). 	Modified: Settlements, rice paddies in floodplains
	23. Cidade da Beira	<ul style="list-style-type: none"> Alluvial grassland & wooded grassland (Acacia & palms) Floodplain grasslands along estuarine fringes (Pungue river). 	Modified: Settlements, rice paddies in floodplains

4.1.1.8. Fauna and Aquatic Fauna

The Mozambican territory, due to its geographical location, including extensive areas that include mountains, plateaus, coastal zones and plains and climates ranging from humid tropical, tropical modified by altitude and tropical semiarid, is very diverse in terms of habitats and species. Areas of high biodiversity and endemic species are only partially included in the conservation area system (ACs), except for areas of marine and coastal diversity that are least included in conservation areas.

The information about the current state of biodiversity is scarce in Mozambique, due to factors such as lack of capacity in human resources (e.g. taxonomists, herpetology experts, etc.) and weak financial capacity, a fact which makes that priorities are given only to conservation areas and areas of recognized biodiversity. Although with poor documentation, it can be said that biodiversity is high in the hinterland, where human population density is low.

In Mozambique there is a great diversity of fauna species whose geographic distribution depends on various factors such as the latitudinal, altitudinal, climatic, biological, and the currently degree of human intervention. In the aquatic and marine environment, the distribution of the fauna depends on its requirements of salinity, temperature, depth, clarity and dynamics of the waters. However, by introducing exotic species and improvement of existing, humans are altering the fauna distribution patterns in Mozambique (Muchangos, 1999).

The vast extension of Mozambique (North to South) determines the existence of many different habitats, fact that translates into a great diversity of fauna, from big mammals to microscopic organisms (micro-invertebrates). Even though fauna is little documented and/or there are no formal publications in Mozambique, reliable sources indicate that this vast territory has a potential occurrence of about 69 species of amphibians (Amphibiaweb, 2012), 215 species of the reptile class and 730 species of birds. It is likely a rough estimate by default, considering the deficient species documentation of research, especially in remote areas of Mozambique, to a greater emphasis on the north of the country. For example, the "National Report on the Implementation of the Biological Diversity Convention in Mozambique" (MICOA, 2009) mentions only 167 species of reptiles and indicates that the number of amphibian species is unknown.

Due to technical quality needed for the study of microscopic fauna mainly associated to water resources and the fish fauna data which document these groups are deficient. Thus, the exact number of species is still unclear, but according to NSS (2012) cited by ERM & IMPACTO (2014) in subtropical estuaries, there is potential occurrence of 200 species of macro-invertebrates in the various substrates.

Along the coastal districts, there are more than 20 estuarine wetlands (estuaries), which are fed by multi-dimensional river basins, represented by the large Rovuma estuary, as well as the Palma estuary, which have the largest river basins in the region. The smaller estuaries are created by the action of the tides on the beaches and by the subsequent growth of mangroves. The entry of nutrients and external debris supports the processes of nutrient cycling within ecosystems.

In vertebrates, about Herpetofauna group especially, there are species that occur in the northern districts of Mozambique that are not yet present in the IUCN list, e.g. the South African python (*Python natalensis*). However, the South African python was included in the South African Red Book (Branch, 1988) as a vulnerable species and the Regulamento da Lei de Florestas e Fauna Bravia de Moçambique (Decreto n.º 12/2002) underlines the "Python or Giboia" as protected.

In the group of amphibians, four important species of wetlands and brackish estuaries can be observed in Cabo Delgado. These are *Hyperolius parkeri*, *Edulis pyxicephalus*, *Afraxalus crotalus* and *Mertensophryne lindneri* (Lindner frog). They are species of conservation interest. According to Channing (2001) the Lindner frog species was recorded only three times, being restricted to a small region near the border between Mozambique/Malawi, with possible occurrences in southern Tanzania. This species, such as other wetland frogs, is a very important conservation species (though only listed as of least concern) (IUCN, 2012), and with the breeding biology of the unknown species, it is here considered to be a species of unique habitats.

In general, wetland systems specifically freshwater are the amphibious community motors, since they ensure active reproduction conditions.

Other important area for biodiversity conservation is in the North of Mozambique, especially in the coastal zone, "Mtwara-Quirimbas Complex". Is an area of importance for global biodiversity due to the following characteristics: extensive rich areas in diversity of coral reefs (more than 48 genus), an important area for feeding and nesting

sea turtles (green turtle, olive turtle, etc.) and migratory birds, unique Rovuma dunes system, important area for whale reproduction, a species protected by CITES I and CMS I (Sitoe et al, 2015).

In the districts of the interior of northern Mozambique, it is strategically located the Lago District, a name that possibly comes from a watershed of Mozambique (Lago Niassa), the third largest in Africa. It is home of about 1,000 species of fish. Among the various species Salmon and Tilapia are protected, as the local communities see them as their main source of food and income and agreed to the closure of all fishing activities especially during the spawning of lake salmon and other species.

The central region of Mozambique is characterized by various faunal biodiversity complexes from reserves, parks, wetlands and/or flood plains such as the Zambezi Delta and Rift Valley - Marroneu Complex, which are cumulatively important areas of biodiversity (Ramsar site and important area for birds, protected area, mangroves and important area for marine and coastal biodiversity). There is also the *Banco de Sofala* that is associated to the Zambezi Delta, the main fishing area of the country, with more than 80% of the national fishing fleet, more than 25% of the population of artisanal fishers and with a high-income contribution through the export of shrimp.

In Sofala province, specifically in the Pungue and Buzi channels (one of the main wetlands) the most outstanding species of fauna is the clams, for their commercial value. According to a study by Bata (2006), the most important species, *Meritrix meritrix*, occurs along the sandbanks of the Pungue in front of the Beira Port. In this channel, there is potential occurrence of several species of shrimps, such as the *P. monodon*. At the level of the Pungue River estuary and its surroundings there is no other place where it is concentrated (Consultec, 2007). But there are also the following species *Fenneropenaeus indicus* and *Metapenaeus monoceros* that constitute about 99% in number of prawns in the Pungue estuary. These species usually have a marine adult stage and a juvenile estuarine or coastal stage.

In these channels there are also several species of fish (small pelagics of the family Engraulidae also catfish and croaker); echinoderms; crustaceans (mainly white shrimp, brown, tiger prawns gigante- *P. monodon*, the mangrove crab and prawns fine; bivalves (clams). The Buzi district is potential occurrence of at least the following species: *Amphilius laticaudatus*, *Amphilius uranoscopus*, *Barbus haasianus*, *Barbus kerstenii*, *Barbus radiatus*, *Brycinus lateralis*, *clarias Gariepinus*, *Malapterurus shirensis*, *Micralestes acutidens*, *Opsaridium zambezense*, *Oreochromis mossambicus*, *Parakneria Mossambica*, *Tilapia rendalli*, with least concern for all except *Oreochromis mossambicus* that is nearly endangered (Biodinâmica, 2016).

Large mammals are not common in the hinterland due to extensive hunting. The numerous swamps that surround towns, mangroves and the areas influenced by the seas provide a suitable habitat for a huge diversity of birds, including wading birds and the terns. The most common species are *Euplectes orix* (red bishop), the *Egretta garzeta* (little egret) and *Chilodonas hybrida* (Whiskered tern).

In terms of Herpetofauna in Buzi district region there are a few formal studies of amphibian species and local reptiles, but according to MICOA (1998) in Mozambique 39 species of amphibians have been identified, none of which is threatened by extinction. With this, it is presumed that there exist in this district several species of amphibians, mainly related to the wetlands. A study by the Biodinâmica (2016) recorded the occurrence of at least four reptile species common in Buzi district, namely: *cycloderma frenatum*, *Pelusios Castanoides*, *Pelusios subniger*, *Thelotornis capensis*, and none is classified in worrying conservation categories (CR - Critically Endangered, EN- Endangered, VU- Vulnerable) of the IUCN Red List, the CITES appendices and Mozambican Law (Republic of Mozambique 2002), yet species *Cycloderma frenatum* is nearly threatened.

The Lake Urema, which is situated in the Gorongosa district, is characterized by a diversity of ichthyofauna. Representative families are Mormyridae, Cyprinidae and Cichlidae including the following species: *Mormyrus longirostris* and *Petrocephalus Acatostoma*, *Labeo altivelis* and *Barbus macensis*, *Oreochromis mossambicus*, *Schilbe intermedius*, *Synodontis Zambeziensis* (Machipane, 2010). These species they have also been recorded in medium and lower Zambezi, rivers and Pungué Búzi (Timberlake, 1998).

It is also important to point out that, in the center of Mozambique, especially Manica and Sofala provinces where are located the 15 hunting areas "Coutadas" that the country offers. In Manica there is the Coutada 04 (in Machaze district), Coutada 07 (Tambara), Warren 09 and 13 (Macossa). And in Sofala Province with the Coutada 05 (Machanga district) near the Buzi, Coutada 06 (Maringué), Coutada 08 (Inhamatanda) located between Gorongosa district and Dondo, Coutada 08, 10, 11, 12 (Marromeu; Cheringoma district), Coutada 14 (Marromeu) and Coutada 15 (Macossa). According to the current conservation law nº16/2014 in Mozambique, the Coutadas are protected areas of sustainable use, public domain State, bounded, intended for hunting activities and the protection of species and ecosystems, in which the right to hunt is only recognized by the concession agreement entered between the State and the operator. There are areas where the use of forest resources and wildlife for local communities is not lost though, if it is in a sustainable way and for subsistence purposes.

The southern region of Mozambique is characterized by different zoo-geographical zones, one of the most important being the Limpopo Valley. The Limpopo Valley is in the province of Gaza and borders the northern district of Chokwe, separating it from the districts of Massingir, Mabalane and Guijá, to the south the district of Bilene. The river characterized by waters that tend to be highly saline due to (a) the river draining an arid catchment area; (b) the inflow of saline water drained from the various irrigation systems existing along its margins, which increases the conductivity and concentration of salts in the downstream direction; and (c) the river's gradient is low in the dry period, with penetration of seawater (salty) inland, up to 80 km from the coast.

Several sources in Mozambique underline a potential occurrence for 43 species of amphibians distributed in the province of Gaza, probably the most common being *Bufo garmani*, *Hyperolius tuberilinguis*, *Hyperolius marmoratus* and *Xenopus laevis*.

The group of reptiles in Gaza is distributed around 39 species, 10 of which are the most common, to be highlighted: *Crocodylus niloticus* (Nilo crocodile), *Acanthocercus atricollis* (Agama of trees), *Psammophis mossambicus* (Snake-grass), *Dendroaspis angusticeps* (Green Mamba), *Nucras sp.*, *Panaspis Wahlbergii*, *Mabuya varius*, *Mabuya depressa*, *Varanus niloticus* (Nilo Varano), *Bitis arietans* (Common Viper), *Geochelone Pardalis*. Most of these species are of least concern for conservation (LC), except for *Psammophis mossambicus* and *Mabuya depressa* with poor data. However, in the Limpopo river basin in specific there is a potential occurrence of two reptiles almost in endemism, such as: *Nucras caesicaudata* (blue squirrel lizard) and *Monopeltis decosteri*.

A study carried out at the Mapai Dam (in Gaza) for the ARA-Sul (2018) showed a potential occurrence of at least 21 fish species, and the Tilápia de Moçambique (*Oreochromis mossambicus*) is classified as Near Threatened by hybridization with Nilo Tilapia (*Oreochromis niloticus*) that has been introduced and that it propagates more quickly filling all ecological niches. In addition, in the Limpopo basin there is a potential occurrence of *Clarias gariepinus* (catfish), and catfish are not endemic and are not endangered. In the group of Macro-invertebrates were registered four main taxons, Molluscs, Anelids, Insects and Arachnids are represented by 11 Classes. In zooplankton, 12 taxa were recorded, most belonging to Cladocera and Rotifera. Other less abundant taxa include the Diptera, Odonatas, Tintimidias and Copepods. It should be noted that the same study points to a low diversity and abundance of Zooplankton in the Limpopo River, reflecting the level of pressure on the river, which influences a low pH, the water transparency and dissolved oxygen, and the dominance of Cladocera and Rotifera is indicative of physico-chemical conditions that are not of the best as well as of reduced pressure of predation. Focusing four important freshwater bodies the list below presents a general view of freshwater fish species predominant in Mozambique.

List 4-1: Common freshwater fish species

<u>Fish</u>	<u>Massingir Lake</u>	<u>Chicamba Real Lake</u>	<u>Cahora Bassa Lake</u>	<u>Niassa Lake</u>
<u><i>Anquilla mossambica</i></u>	<u>x</u>			
<u><i>Anquilla marmorata</i></u>		<u>x</u>		
<u><i>Brycinus imberi</i></u>	<u>x</u>			

<u>Fish</u>	<u>Massingir Lake</u>	<u>Chicamba Real Lake</u>	<u>Cahora Bassa Lake</u>	<u>Niassa Lake</u>
<u>Clarias gariepinus</u>	<u>x</u>	<u>x</u>	<u>x</u>	
<u>Clarias ngamensis</u>	<u>x</u>			
<u>Tilapia rendalli</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
<u>Synodontis zambezensis</u>	<u>x</u>		<u>x</u>	
<u>Schilbe intermedius</u>	<u>x</u>		<u>x</u>	
<u>Oreochromis spp</u>	<u>x</u>	<u>x</u>	<u>x</u>	<u>x</u>
<u>Labeo congoro</u>	<u>x</u>		<u>x</u>	
<u>Labeo ruddi</u>	<u>x</u>			
<u>Labeo altivelis</u>	<u>x</u>			
<u>Labeo cylindricus</u>		<u>x</u>		
<u>Labeo mesops</u>		<u>x</u>		
<u>Labeo molybdinus</u>	<u>x</u>	<u>x</u>		
<u>Cyprinus carpio</u>	<u>x</u>	<u>x</u>		
<u>Distichodus mossambicus</u>	<u>x</u>			
<u>Glossogobius shirensis</u>	<u>x</u>			
<u>Hydrocynus vittatus</u>			<u>x</u>	
<u>Barbus trimaculatus</u>		<u>x</u>		
<u>Barbus radiates</u>		<u>x</u>		
<u>Barbus lineomaculatus</u>		<u>x</u>		
<u>Micropterus salmoides</u>		<u>x</u>		
<u>Brycinus imberi</u>			<u>x</u>	
<u>Brycinus lateralis</u>			<u>x</u>	
<u>Mormyrus longirostris</u>			<u>x</u>	
<u>Mormyrops anguilloides</u>			<u>x</u>	
<u>Cyphomyrus discorhynchus</u>			<u>x</u>	
<u>Distichodus shenga</u>			<u>x</u>	
<u>Limnothrissa miodon</u>	<u>x</u>		<u>x</u>	
<u>Sargochromis spp</u>			<u>x</u>	
<u>Serranochromis condrictonii</u>			<u>x</u>	
<u>Pseudocrenilabrus philander</u>			<u>x</u>	
<u>Pharyngochromis acuticeps</u>			<u>x</u>	
<u>Opsaridium microcephalus</u>				<u>x</u>
<u>Varicorhinus nyassensis</u>				<u>x</u>
<u>Bagrus meridionalis</u>				<u>x</u>
<u>Bathyclarias sp</u>				<u>x</u>
<u>Haplochromis spp</u>				<u>x</u>
<u>Lethrinops sp.</u>				<u>x</u>
<u>Pseudotropheus sp.</u>				<u>x</u>
<u>Labidochromis sp</u>				<u>x</u>
<u>Labeotropheus sp.</u>				<u>x</u>
<u>Serranochromis thumbergi</u>				<u>x</u>

Source: MICOA, 2009²⁶

Determination of Conservation Status

The increased demand for goods and services of natural resources including plant products has resulted in increased pressure on them. This pressure manifests itself in degradation and loss of biodiversity including changing the composition of the vegetation and its conditions (Dugan, 1993).

With agriculture being the main activity of the population in Mozambique this results in increased pressure for plants for construction materials, firewood, grazing, etc., leading to degradation and loss of biodiversity of natural habitats.

²⁶ The National Report on Implementation of the Convention on Biological Diversity in Mozambique

Wetland ecosystem

Wetlands in Africa are an important source of water and nutrients necessary for biological productivity and often sheer survival of people. Sustainable management of wetlands is therefore critical to the long-term health, safety and welfare of many African communities. Despite their importance, wetlands are being modified or reclaimed, often driven by economic and financial motives. Wetlands, however, contain numerous goods and services that have an economic value not only to local populations but also to people living outside the periphery of the wetland.

Wetlands are found throughout the African continent. In Mozambique Zambezia province has a renowned Ramsar area, i.e. the Zambezi Delta/Marromeu in the confluence zone between the Shire River and the Zambezi River. It supports 119 species of waterfowl and partially aquatic, including species of global interest, large breeding colonies of various species, and numerous migrants *Palaeartic* and intra-African (Benedict, 2000). Species in the Red List include world *carunculatus* *Grus* and *Rynchops flavirostris* (Bento, 2000; IUCN 2002). Thousands of pairs of white pelicans in the delta, and large breeding colonies of storks and herons, including *Anastomus lamelligerus*, *Threskiornis aethiopicus*, *Ardea cinerea*, *Squacco Heron*, *Platalea alba* and *Egretta* spp. The populations of waterfowl probably declined in the last 30 years because of the loss of natural flood cycle due to Kariba and Cahora Bassa dams. Floods that affected the extensive mosaic of habitats in the delta now rarely occur and thus the quality and quantity of waterfowl habitat decreased (Bento, 2000). The Zambezi Delta is a Wet Land of International Importance under the Ramsar Convention ratified by the Government of Mozambique. It is not directly in the project area. The other important Ramsar site in Mozambique and in the project area is the Lake Niassa, in Niassa province.

By force of **Ramsar Convention on Wetlands of International Importance**, ratified by Mozambique through the Resolution No. 45/2003 of 5 November, the governments commit themselves to sustainably use such areas by promoting territorial planning, policy development and publication of legislation, management actions and education of their people, as well as the proper and effective management of such areas in an integrated approach *vis a vis* international cooperation particularly regarding transboundary wetlands, the shared wetland systems, common species and development projects that may affect wetlands.

Threats trends to vegetation and red data list

Habitat conversion resulting from vegetation clearing and the practice of traditional and itinerant agriculture practice (slush and burn /encroachment, etc.) has been a major driver for deforestation and forest degradation. These factors are usually of high magnitude and the damage to the vegetation tends to be irreversible. Uncontrolled fires, specially its several recurrences as well as increased human settlements are also an important driver of deforestation and forest degradation. The table below summarizes plant diversity, its threats and trends.

List 4-2: Vegetation threats and trends

Group	N.º of species	Areas of floristic endemism	N.º of species in the red data list	Main threats	Trends
Flora	5500 (4800 of higher plants)	<ul style="list-style-type: none"> - Maputaland CE - Chimanimani CE - Coastal Forests of northern Mozambique - Inselbergs (e.g. Namuli, Chiperoni, Mabu, Mecula, Garuso). - More yet to be documented 	300 (122 threatened)	clearing of vegetation, slush & burn agriculture, human settlements, uncontrolled fires	Reduction of primary vegetation e.g. Maputaland endemic <i>Raphia australis</i> (Bobole) Increase of secondary or transformed vegetation

Source: MICOA (2009)²⁷

At present 300 species of plants are listed in Mozambique Red List ([List 4-3](#)). One out of these is extinct in the wild (*Sueda* sp.), 6 are critically endangered (*Encephalartos lebomboensis*, *E. munchii*, *E. ngoyanus*, *E. pterogonus*, *E. senticosus*, *E. umbeluziensis*) and 6 are endangered (*Crassula maputensis*, *Icuria dunensis*, *Cyphostema barbosae*, *Encephalartos aplanatus*, *E. chimanimaniensis*, *Sarcocornia mossambicensis*). The others are vulnerable, at low risk or with deficient data (Izidine & Bandeira, 2002).

55% of the Red List Species are confirmed endemics, and 22% are confirmed near endemic (Izidine & Bandeira, 2002). Confirmed and suspected endemic and near endemic totalize 85% of the Red List Species.

List 4-3: Number of taxa in each Red List category in Mozambique. (Source: Izidine & Bandeira, 2002²⁸)

Red List Status	Number of taxa
Extinct (EX)	1
Critically endangered (CR)	6
Endangered (EN)	6
Vulnerable (VU)	109
Lower risk near threatened (LR-nt)	16
Lower risk least concern (LR-lc)	23
Data deficient (DD)	139
Total	300

Threats trends to fauna and red data list

The list of fauna under threat is more difficult to compile due, mainly, to insufficient faunal data in general and scarcity of data covering the different taxonomies. The few existing data can be summarized as follows:

List 4-4: Mammals under threat

Common name	Scientific name
White rhino	<i>Cerato therium simum</i>
Mzanze	<i>Damaliscus lunatus</i>
Sitatunga	<i>Tragelaphus spekei</i>
Black rhino	<i>Diceros bicornis</i>
Giraffe	<i>Giraffa camelopardalis</i>
Matagaíça	<i>Hippotragus equinum</i>
Mountain Chango	<i>Redunca fulvorufula</i>
Cheetah	<i>Acinomyx jutabus</i>

Bird species under serious threat²⁹, i.e. endangered and critically endangered comprises Long billed apalis (*Apalis moreaui subsp. sousae*) and Thyolo alethe (*Alethe choloensis*)

Marine Red List Species: under this category protected marine species include sea turtles, dugongs, whales and dolphins. All marine mammals in Mozambique are species of special concern. Dugongs are seriously

²⁷ *Idem* (MICOA, 2009)

²⁸ From MICOA 2009.

²⁹ The fuller list comprises other categories of birds under threat such as vulnerable, near threatened and least concern

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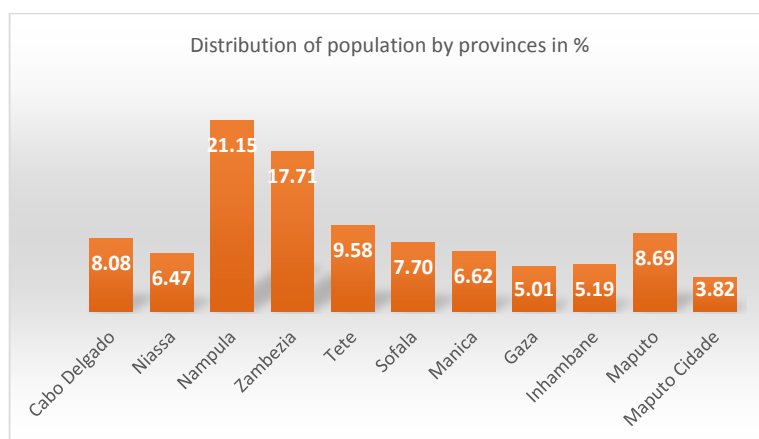
endangered, with the population in Bazaruto Archipelago being probably the most viable population in eastern Africa region (MICOA, 2006).

4.1.3 Social environment: Population and the Economy

As shown below (Graph 4-2) out of the country's eleven provinces the last population census (INE, August 2017) indicates that Mozambique is inhabited by 28,861,863 people. Nampula (6,102,867) and Zambezia (5,110,787) provinces represent close to 39% of the total, while the seven provinces defining the project area combined represent 77% of the total population. Close to 51% of the country's population are women.

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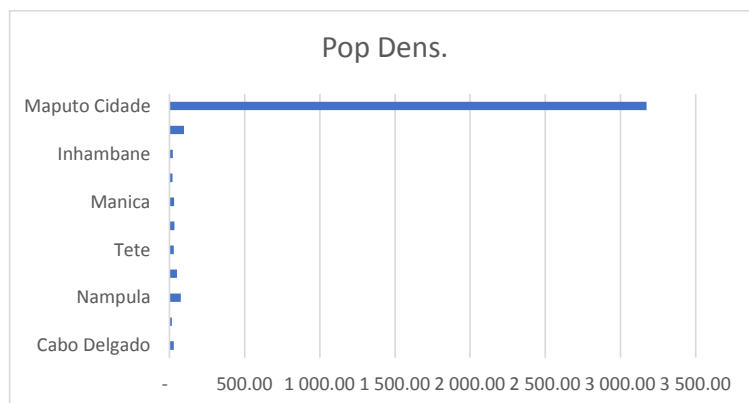
Graph 4-2: Distribution of the country's population by provinces



Source: INE, 2018

The country's population density stands at 35 with Maputo City (3,173.4) and Maputo Province (96.3), being the most densely populated provinces, as shown in the Graph below.

Graph 4-3: Population densities by province



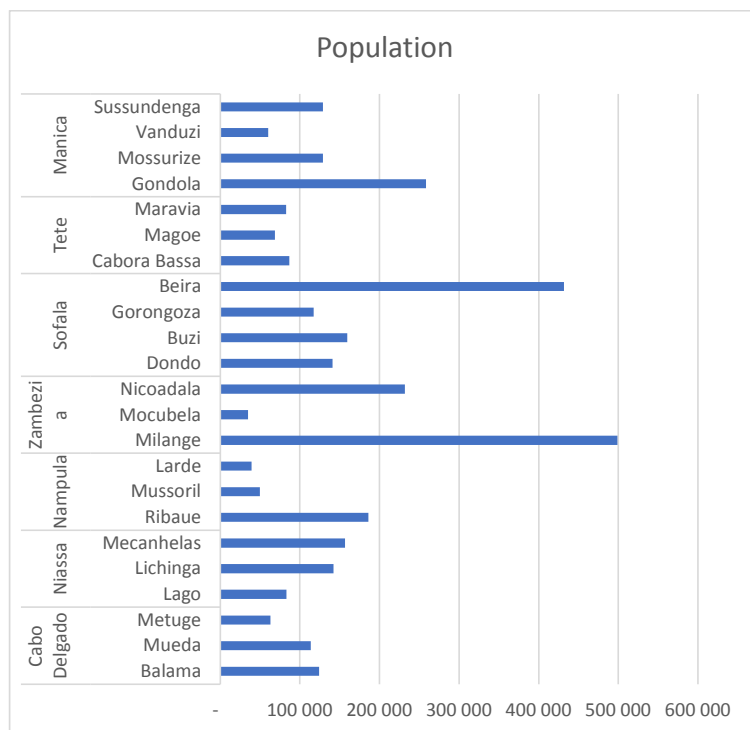
Nampula (74.7) and Zambezia (48.6) come in the third and fourth position, respectively, while Niassa (14.4) is the least densely populated province.

Although some scholars argue that there is little correlation between population density and economic development, it is a fact that certain benefits can be obtained from the former, including some with interest for PRODAPE, namely:

- Economies of scale in infrastructure. E.g. a larger population density will help reduce the average costs of a transport network (roads, railways, etc.) and increase access to other goods and services (e.g. access to markets, services (electricity, water supply, cold rooms, etc.).
- Urban/concentrated areas tend to be more energy efficient than the rural areas, which have a higher per-capita energy composition. While in remote areas, people will have to cover long distances to get to the shops. In heavily populated urban areas, shops and facilities are likely to be within walking distance.
- Greater intellectual capital. As population increases the greater the scope of a society to produce entrepreneurs and innovators, who come up with improved technology and business which helps to improve living standards as their innovations spread quickly and easily in areas of concentration of people.

The 23 PRODAPE targeted districts represent close to 12% of the country's population and are distributed as indicated in the Graph below.

Graph 4-4: Distribution of the population by the 23 PRODAPE districts



The districts of Milange, Beira and Gondola represent 35% of the population of the twenty-three districts. Larde and Mocubela are among the least expressive. These have been recently established when in 2015 several districts were split to create new districts from previous administrative posts integrated in other districts.

People tend to concentrate along the main rivers, water courses and bodies and along the main development corridors made of roads, railways and other infrastructures (e.g. electricity, telecommunications, water supply and sanitation, etc.).

A vicious cycle made of natural conditions, lack of capital, inadequate financial services, ancient production technologies and poor services responsible for development and dissemination of such technologies, poor marketing systems and other factors that define the environment in which local economic activities are carried out, explain the prevalence of the subsistence economy. The economy is based on direct and integrated exploitation of natural resources, with very little transformation. Plant and animal production, forests and fisheries are integrated in a single economic system of multiple relationships. These are combined to guarantee the survival of the individuals, the families and the communities.

Some of the aspects that define the practice of agriculture (and fisheries) in Mozambique and the project the areas, which are typical of the so-called "family sector"/subsistence economy are:

- Cultivation of very limited areas: slightly close to 2 ha and below 7 ha is the common size of most of the farms³⁰.

³⁰ The informal character of agriculture and animal production, which are dominant economic activities, explains the present land use and land tenure patterns. Ancestral laws establish the distribution and use of land by existing families. Lineage plays a crucial role in the process. Each family and groups of families do their best to secure enough land and to have direct access to areas for housing, fauna, forests, pastures, fertile grounds and water.

- Use of farming technologies that are rudimentary: cultivation is primarily undertaken using hoes and virtually no external inputs, such as improved seed, fertilizers and chemicals are used³¹.
- Over the years the family sector farmers have developed livelihood strategies oriented towards minimizing risk through crop diversification, which takes place in a variety of ways including:
 - Growing several crops and the dominance of intercropping;
 - Preferring to grow two or more consecutive crops rather than one of a longer cycle, even if the potential total yield is higher for the latter, to obtain advantage of moisture availability during the short rainy season; and
 - Growing crops in as many diverse environments (topography/relief/soil) as possible, e.g., in sandy flat areas, in medium textured alluvial deposits of slopes (transition zones), in the fine textured dark coloured soils of the river beds (*dambos*) and in open valleys and alluvial soils.

This results in a combination of plots on different soil types and in different crop preferences, each with different fallow and cropping patterns.

Diversification is also extended to embracing a multitude of activities across sectors, including fisheries, in, what is seen by many, as being in detriment of specialization that would lead to elevated production and productivity.

At the household level artisanal fisheries is the second most important economic activity practiced in the rivers, lakes and the long Indian Coast and the main source of animal protein in Mozambique.

The dominance of agriculture and fisheries as the main subsistence activities goes hand in hand with other activities including the emerging commercial sector of agriculture made of small and medium size farmers, which although still in small numbers, are becoming increasingly important in Mozambique. Artisanal mining is also another important economic activity as is formal and informal employment in local cities and towns in the public and private sector and local services (banks, telecommunications, water supply and sanitation, etc.).

Both formal and informal Micro, Small and Medium Size Enterprises (MSMEs) represent about 98.6% of all business units, employing 43% of the workers and accounting for 76% of the total sales. Trade and service sectors form the bulk of business units, with commerce and retail businesses accounting for close to 60%, restaurants and accommodation 20% and manufacturing less than 10%. Most of these MSMEs tend to grow informally and as a reaction to immediate market deficiencies.

In what is relevant for the project, studies show that despite the MSMEs' importance in national economic development and poverty alleviation they lack growth perspectives, due in part to the entrepreneurs' and workers' poor education and training skills, cumbersome regulations, high cost of credit and poorly developed basic socioeconomic infrastructure³². Local entrepreneurs tend to diversify into many relatively small and uncompetitive businesses rather than growing promising small businesses into large ones that could reach out to more people and offer more income generation opportunities (job creation, gender mainstreaming, etc.).

The "Strategy for the Development of Small and Medium Size Enterprises in Mozambique" approved by the government in 2007 highlights the central role of MSMEs as drivers of employment, competitiveness, diversification and innovation, including mobilization of social resources. The strategy relies on three major pillars:

- Improve the business environment for SMEs
- Strengthen SMEs' technological and management capacities (capacity building)
- Give strategic support (e.g. to exporters and high-tech firms, etc.)

³¹ Due to the monopolistic structure of the market for these products, they are rather very expensive in Mozambique.

³² M. Krause and F. Kaufman, "Industrial Policy in Mozambique", 2011

Priority is also given to the reduction of transaction costs for SMEs.

4.1.1.3. Fisheries and Aquaculture

As stated in the Fisheries Master Plan (2010-19) it is estimated that the fisheries sector contributes 2% to GDP³³. Fishery production, including sea and inland fishing as well as aquaculture production, amounts to more than 151 thousand tons per year of fish, with an economic contribution of around USD 452 million and an average of USD 70 Million of exports per year. Despite the moderate direct contribution of the sector to the GDP, it has a considerable weight in food security and particularly access to animal protein (i.e. 50% of animal protein consumed in the country) by a significant proportion of the country's population in rural and urban areas, balance of payment, public revenues, employment and gender equity. Around 850,000 households, or about 20% of the population, rely on fisheries for part of their income and a larger proportion relies on fishing for subsistence and food security.

The small-scale and artisanal fisheries in Mozambique play a significant role in the national economy. The sector accounts for about 90% of the total marine catches. The artisanal fisheries consist of individuals or small groups of fishermen with very weak economic power. They make use of non-motorized fishing vessels/boats of 3-8 m in length. They use beach seine, gillnet and long line to catch fish. The sector also consists of fish collectors and divers. It is estimated that the number of fishing boats and canoes is approximately of 15,000, of which 3% are equipped with engines, using beach seine and gillnet fishing gears.

Exports have been decreasing significantly in terms of volume and of value. Small-scale fishing is of great importance in the country's food security, not only in the coastal districts, where two-thirds of the population are located, but also in the inland regions, to where, along with freshwater fish, captured sea fish is sent after processing in the form of dry or smoked fish, with or without salt.

Freshwater aquaculture is dominated by the farming of native ciclids and tilapia but otherwise the popular species farmed in Mozambique include *Oreochromis niloticus*, African catfish, freshwater shrimp and carp. In 2018 artisanal fisheries contributed more than \$6.2 million from 3,490 tons of fish.

4.1.1.3.2. Background and Current Status of Aquaculture in Mozambique and in the Project Area

The freshwater aquaculture in Mozambique is referred to as having started in the 1950s. Since 1992, there has been a progression in the cultivation of marine organisms (FAO, 2006d). The first commercial aquaculture production initiatives in Mozambique were established in the late 1990s, in the provinces of Cabo Delgado, Zambézia and Sofala, aimed at the cultivation of marine species, namely shrimp and algae, and commercial fish farming emerged in the 2000s in the provinces of Manica and Tete with the cultivation of tilapia and later commercial initiatives to grow marine fish in Cabo Delgado and Zambézia (IDEPA, 2018).

Despite a certain presence of commercial operators of different sizes, currently, aquaculture in Mozambique is mostly practiced by artisanal fish farmers for subsistence purposes, domestic consumption and limited surplus for domestic marketing. Aquaculture's annual production in 2017 stood at 1,835 tons, growing 36% when compared to 2016 production (IDEPA, 2018). In this regard it is showing considerable growth in this period.

³³ The figure is estimated to currently (2017) stand at 4%.

Table 4-4: Mozambique Aquaculture Production (Ton) (Source: IDEPA, 2018, adapted from MIMAIP)

Province	Aquaculture Production by Province		
	2016	2017	Variation (%)
Niassa	153	202	24
Cabo Delgado	33	61	46
Nampula	69	72	4
Zambezia	101	123	18
Tete	37	212	83
Manica	208	191	-9
Sofala	33	69	52
Inhambane	453	668	32
Gaza	64	178	64
Maputo	28	59	53
Total	1179	1835	36

The provinces of Inhambane (36%), Tete (12%), Niassa (11%) and Manica (10%) account for about 69% of aquaculture production in Mozambique.

The development of aquaculture in Mozambique has been slow over the years. This is attributed to a number of constraints related to the lack of quality fingerlings/larvae, feed unavailability, access to financing, financial institutions' inability, lack of diversity of cultivated species, weak intersectoral coordination, lack of small and medium-sized enterprises, among others (IDEPA, 2018).

The country has made continuous efforts to develop aquaculture and promote industrial or commercial aquaculture, having approved in 2007 the Aquaculture Development Strategy in Mozambique, with a time horizon of 10 (ten) years. Although it was still focused on artisanal aquaculture, this strategy allowed the country to take the first steps, from a strategic perspective, to studies preparation, legislation and regulations approval, and boost the aquaculture sector.

Aquaculture Potential

The potential for aquaculture in Mozambique is estimated at 258 000 ha for fish farming, with potential to produce 3.870 million tonnes of tilapia and 30 000 ha for mariculture (underestimated), with 45 million tonnes of shrimp (IDEPA, 2018). The species currently produced under freshwater aquaculture are mainly Tilapias, carps and catfish.

Table 4-5: Species with Potential for Cultivation in Mozambique

Species		Use	Growing environment
Freshwater Species	Tilapia	Human consumption	Cages Earthen ponds
	Carp	Human consumption	Cages Earthen ponds
	Catfish	Human consumption	Earthen ponds
	Spirulina	Human Nutritional Supplement Fish Feeding	PVC tanks Earthen ponds
Brackish water species	Shrimp	Human consumption	Earthen ponds
	Crab	Human consumption	Cages Earthen ponds
	Mangrove oyster	Human consumption	Longline
	Artemia	Fish and shrimp feed	Earthen ponds
Marine Species	Mussel	Human consumption	Longline
	Rock oyster	Human consumption	Longline
	Croakers	Human consumption	Cages
	Mullet	Human consumption	Cages
	Snapper	Human consumption	Cages
	Grouper	Human consumption	Cages
	Surface tuna	Human consumption	Cages
	Ornamental fish	Aesthetic value	Aquariums
	Macroalgae	Human consumption Pharmaceutical products	Cultivated in the space between tides
	Microalgae	Fish Feeding	Earthen ponds PVC tanks

The estimated aquaculture potential can be underestimated, since in its determination it was considered essentially the potential of coastal aquaculture in earthen ponds, and with emphasis on culture of freshwater species, ignoring the potential of mariculture and farming in the sea. Nevertheless, Mozambique exploits only about 1,000 tonnes (1,835 tonnes in 2017), equivalent to 10% of the total capacity underestimated. Moreover,

aquaculture activity in the country is far from being economically viable, with the main constraint being the lack of qualified technicians in the area and the lack of technology for cultivation and feed production (IDEPA, 2018).

Currently, the adherence of the communities to aquaculture practices increased the demand of quality fingerlings. In order to respond to the fingerling's deficit, the Aquaculture Research Centre - CEPAQ was created, with a maximum production capacity of 30 million Tilapia fingerlings per year. There are approximately 120,307 hectares suitable for aquaculture, of which 77,592 hectares for earthen ponds, 32,124 hectares for cage cultivation and 10,591 hectares for seaweed cultivation. With regard to aquaculture in inland waters, it is estimated that there are around 258,000 hectares of suitable land, of which only 0.08% are exploited for ponds and cages.

Feed Factories

The country has a low production of feed and has depended on the importation of feed and is currently importing about 120 tons of feed per year. On the other hand, a new tariff was approved in which the import of raw materials for feed production is exempt from customs duties to encourage domestic production.

Regarding feed production, there is some experimental production at Inhambane province, in the district of Inharrime, where 14.5 tons were produced in 2016, representing about 0.4% of the need. Other initiatives are through alternative feed formulated based on local ingredients promoted by IDEPA within the communities, in coordination with the DPMAIP and SDAE.

Mozambique presents good opportunities to develop both freshwater and marine aquaculture. The lack of feed factories has been one of the major constraints faced by the producers, thus making the activity expensive and consequently retracting the practice due to the cost/benefit factor.

Table 4-6 presents a summary of the weaknesses and threats that limit the development of aquaculture and the strengths and opportunities that the country has that can contribute to the development of aquaculture and increase the contribution levels of the sector in GDP, employment, social development, export revenues, tax, guarantee food and nutritional security of Mozambicans. The summary is complemented by the CRA/ESMF Team findings in the field, as presented in Chapter 5.

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Table 4-6: SWOT analysis of freshwater aquaculture and mariculture in Mozambique

Freshwater aquaculture
Strengths
<ul style="list-style-type: none"> Good water quality and quantity, pollution free and land availability Political stability Legislation, regulation and sector plans improved High biodiversity New aquaculture institution created Existence of teaching and research institutions for aquaculture area; Establishment of a unit that will provide matrices and genetic improvement of aquaculture species (CEPAQ). Government priority Satisfactory interest from local communities and farmers Willingness by government to develop
Weaknesses
<ul style="list-style-type: none"> Lack of infrastructure and logistic aspects Absence of hatchery facilities Insufficiency and poor quality of nutritional inputs (fingerlings and feed); Lack of trained personnel and extension services Commercial aquaculture sector underdeveloped; Poor coordination among the relevant institutions Lack of investment

<ul style="list-style-type: none"> Few incentives ▪ High tax rates High level of losses and poor-quality certification Low skills Expensive feed cost (lack of local feed factory) Absence of market strategy ▪ Reduced numbers of aquaculture technicians and extension workers; ▪ Legal and regulatory framework that does not respond in full the challenges;
Opportunities
<ul style="list-style-type: none"> ▪ Build capacity and train for involved stakeholders (on the way) Build infrastructure Harmonize aquaculture projects and integrate environmental management ▪ Review tax regimes and land acquisition rates Develop applied research on high valued species and technologies Implement best management practices and avoid losses ▪ Improve local fish market Development of demonstration sites and improved extension networks Job creation Better coordination between NGOs and GOs institutions Construct a feed plant by using local feed ingredients
Threats
<ul style="list-style-type: none"> ▪ Lack of funds Theft and vandalism Susceptibility to natural disasters (cyclones, floods, erosion and droughts) Lack of capacity for disease management Poor environmental management Bureaucracy . ▪ Environmental pollution; ▪ Shrinkage of investments due to the global financial crisis. ▪ Conflict with other sectors regarding land and water use.

(Adapted from Ribeiro, 2007; Hanoomanjee et al., 2009; Omar, 2009; IDEPA, 2018)

4.1.1.4. Gender and Poverty Issues

Gender issues are often highlighted in policy documents that have been prepared and circulated in the country since independence, in 1975. However, it is noted that the corresponding concrete policy measures to establish gender equity are still rare.

Formally the legislation in force in the country promotes equality of rights between men and women, which extends to property rights, legal recognition, marriage and access to economic activities and opportunities. However, in practice discriminatory social standards based on gender identity still prevail and further work still needs to be done to reduce gender disparities, especially regarding women's and youth economic empowerment and access to the labour market.

In general women's and youth unemployment is higher³⁴ than that of men and women generally work the most in informal and/or precarious sectors of the economy and society. On the other hand, households headed by single women, have lower incomes than those headed by men. Gender-based violence and abuse of women and girls is also acknowledged to significant at household and community level, with the law enforcement agencies and other agencies (education, information, awareness raising etc.) dedicated to managing this phenomenon still finding it hard to effectively curb it.

More promising developments are occurring in education and governance as the country is close to achieving gender parity in primary education and women's representation in Parliament has been growing.

³⁴ Youth unemployment rate stands at 42% of men and women aged 15 to 24 years old without a paid employment or self-employment in 2017 (UNDP, 2018). And although the labour force participation rate of women aged 15 years or older in Mozambique is significantly high (75%), it is lower compared to their male counterparts with 87%.

Women are directly engaged in agricultural and fisheries production and many other related small businesses that can prosper with the implementation of PRODAPE. Women and men are also in different positions in relation to management of natural resources. The common view is that in the fisheries sector women usually limit their activities in the collection of invertebrates (e.g. clams) at the intertidal areas. In aquaculture, there is not yet a clear distinction of activities undertaken between women and men, although preliminary indications are that if left unattended the tendency will be that of having more men active in the subsector than women, mainly because parts of the activity are labour intensive and the activity has the potential of being a more lucrative and monetarized undertaking than many other traditional and subsistence activities. Men tend to focus on this kind of activities and relegate the most household subsistence activities to women.

The important aspects to consider with respect to the gender and youth issues are to ensure that the project design and implementation recognize that men and women and the youth have different needs and capabilities including access to the proceeds and that they can be affected differently by aquaculture projects. Through own internal policies and/or operational procedures there will be the need to establish a minimum quota of direct participation of women and the youth in project implementation activities.

Young people and particularly young men tend to be absent in traditional rural production activities such as agriculture and fisheries/aquaculture. This robs these sectors of the strong potential represented by this segment of the society, which is increasingly made of people with better educational and technical background including financial capital as better explained in the chapter dealing with the preliminary assessment of the socioeconomic conditions (Chapter 5).

5. Significant Environmental and Social Impacts

5.1. Preliminary Socioeconomic Assessment of the Project Area

5.1.1. General Characteristics of the Households and their Surrounding Environment

An initial assessment of the socio-economic environment and potential impacts and perceptions of the project was undertaken at the preliminary stage related to the formulation of the ESMF and CRA for PRODAPE (and PROCABA³⁵).

The exercise was based on two main types of methodologies, that is, qualitative and quantitative, to gather and process the various types of information. It was a mix of evaluation methodologies. The qualitative methodologies were based on (i) continuous literature review including the consultation of maps and other forms of information; (ii) conducting interviews, focus group discussions with relevant people; and (iii) direct observations in the field. Focus groups interviews and discussions were conducted particularly with (a) local authorities; (b) aquaculture technicians; and (c) representatives of aquaculture associations and other aquaculture practitioners.

The quantitative methodologies, which on the one hand express the attempt of gathering more objective data on the socioeconomic environment, consisted mainly in the administration of a questionnaire ([Error! Reference source not found, Annex 6](#)) to the households (HH) that live in different points of the country, including in the seven provinces targeted by PRODAPE and a few PRODAPE specific districts and locations. Preference was given to HH living in peri urban and rural areas, who are potential agents in the aquaculture value chain to be activated under PRODAPE, i.e. as producers, consumers, traders, etc. The information was triangulated with other secondary data, including that from the 2014-15 poverty assessment (IOF) and other sources.

As shown in [Table 5-1](#) the exercise ended up focusing on 1209 randomly selected HH distributed by twenty-seven (27) districts, including some urban districts, mainly in Maputo City, which fall outside PRODAPE target districts. Several constraints dictated that the exercise had to be conducted in and around cities and small towns. In those peri-urban and rural areas, surrounding these urban units, were given preference.

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Table 5-1: Distribution of the interviewees by district

N.º	District	n	%
1	BALAMA	15	1.2
2	BEIRA	50	4.1
3	CHANGARA	75	6.2
4	CHIMOIO	45	3.7
5	CHOKWE	49	4.1
6	GONDOLA	50	4.1
7	INHAMBANE	30	2.5
8	INHARRIME	45	3.7
9	KAMAXAKENI	6	0.5
10	KAMPFUMU	47	3.9
11	KAMUBUKWANA	47	3.9
12	LAGO	50	4.1

³⁵ The agricultural project also funded by IFAD

N.º	District	n	%
13	LICHINGA	30	2.5
14	MACIA	30	2.5
15	MATOLA	100	8.3
16	MONAPO	30	2.5
17	MUEDA	50	4.1
18	MUSSURIL	49	4.1
19	NAMPULA	50	4.1
20	NHAMATANDA	30	2.5
21	NICOADALA	30	2.5
22	PEMBA	80	6.6
23	QUELIMANE	45	3.7
24	RIBAUE	51	4.2
25	SUSSUNDENGA	30	2.5
26	VILA DE MILANGE	50	4.1
27	XAI-XAI	45	3.7
	Total	1209	100.0

5.1.1.3. Demography, education and access to basic services and infrastructure

The 1,209 HH represent 7,444 people distributed in categories as shown in [Table 5-2](#). This corresponds to 6.1 persons per HH. The national average number of persons per HH established by the latest household survey (INE, 2015³⁶) stands at 5, with most households consisting of 3-4 and 5-6 members. Data from IOF 2014/15 estimate the total number of households countrywide to stand at 5,058,763. Of these, 69.4% live in the rural area and the remaining in the urban area.

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Table 5-2: Distribution of persons by HH

Persons per HH (by categories)	n	%
1-5	679	57.5
6-10	421	35.7
11+	80	6.8
Total	1180	100.0
No information	29	
Total	1209	100.0

³⁶ [Mozambique's Fourth Poverty Assessment](#) (since 1997 INE conducts every 10 years a General Population and Housing Census (RGPH – in Portuguese), which covers all the inhabitants of the country. Every five years the INE also Poverty Assessments (IOF – also in Portuguese), which are based on a statistically constructed sample (10,844 and 11,628 households in 2008/9 and 2014/15, respectively). The two exercises (RGPH and IOF) are performed based on more objectively validated systems and instruments and produce highly reliable results.

Field Code Changed

The surveyed households also represent 3,771 (51%) men and 3,6733 (49%) women. At the national level 51% of the population is made by women. Women tend to be more concentrated in rural areas. In and around cities and towns, as was the case with the surveyed population, it is normal to find more men than women. These are areas that offer more formal and informal income generating opportunities outside the traditional economy. They are also more monetarized, which make them more attractive to men as it will be seen in the gender analysis.

Correspondingly, the surveyed HH are headed by men in close to 51% of the cases, with the women headed households standing at 49%. Usually women headed households are also the most vulnerable as are those headed by children/young people, the elderly and differently abled persons. Those also tend to be more concentrated in typical rural areas.

Table 5-3: Sex of the Head of the HH

Sex of the head of the HH	n	%
Not indicated (it is an institution)	3	0.2
Men	613	50.7
Women	593	49.0
Total	1209	100.0

Within the structure of a population by sex the index of masculinity defines the quantity x of men that exists for every 100 women, being that the index of femininity is its inverse. In either case, the further away the index is from 100, the greater the inequality between the sexes. Although it is generally noted that in rural areas, the masculinity indices tend to be relatively lower. More balanced societies (in the areas of labour power, better distribution of labour by sex, family stability, etc.) tend to have values closer to 100. At the national level in 2007 and 2013, the masculinity index stood at 92.8% and 93.2%, respectively, or approximately 93%, in the two horizons, despite a slight increase.

An important and determinant factor in the distribution of socio-economic resources within households is the distribution of their active and non-active age members. The higher the percentage of non-active members, the higher the dependency ratio. In the country, on average, there are 2.4 people under the age of 15 per household, 2.4 people between the ages of 15-64 and only 0.2 persons aged 65 and over. INE (2016) data indicates the following distribution of the population by age categories:

- 0-14 years: 44.92% (men 5,856,623/women 5,791,519)
- 15-24 years: 21.51% (men 2,741,474/women 2,835,474)
- 25-54 years: 27.24% (men 3,301,883/women 3,762,626)
- 55-64 years: 3.42% (men 425,312/women 462,125)
- 65 years and over: 2.9% (men 345,408/women 407,706)

An analysis of the distribution of the population by age group, shows that the sum of individuals of non-active age (under 15 and 65 and over) is largely superior to the age group considered active, which is evidenced by the high rate of dependence estimated at about 108%, meaning that in every 100 people of working age there are approximately 108 people of non-active age. On the other hand, in the urban environment, there is an average of about 84 persons of non-active age in every 100 persons of active age

Mozambique's population continues to be dominated by young people despite the incessant increase of those above 65. In the same way as the masculinity and femininity indexes the age of a population is a determinant factor in socioeconomic development including that of specific projects such as PRODAPE.

The highest level of education attained by the heads of the HHs is illustrated in [Table 5-4](#). While the percentage of those who are illiterate remains high (14%) there is a significant proportion of those who have attained significant levels of education including tertiary education (16%) while the mode is made by those who have completed medium level (29%). This seems to be normal both the city/town centres and in the periphery, where the survey focused on, in the current times, which results from the efforts that have been undertaken to provide greater degrees of education since the mid-1970s, after national independence and particularly in the last 20 years with the expansion of secondary and higher education, combining public and private initiatives. Higher levels of education can be a positive factor in the promotion of all kinds of business and initiatives, including fisheries and aquaculture, for reasons that are obvious.

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Table 5-4: Highest education level attained by the Head of the HH

Highest level of education attained by the Head of the HH	n	%
Cannot read and write	163	13.9
Primary education	213	18.2
Secondary education	266	22.7
Medium level education	338	28.9
Tertiary education	190	16.2
Total	1170	100.0
Missing information	39	
Total	1209	100.0

At the national level IOF data indicated that the percentage of illiterate people went from 49.9% in 2008/9 to 44.9% in 2014/15. This reduction is recorded for both sexes and in all age groups except for the 15 to 19 age group, for which the reduction has been significantly higher. The data also show significant differences in the illiteracy rate between men and women. In 2014/15, women have an illiterate rate of 57.8% against 30% of men. Rural areas also have a higher percentage of illiterate people 57% than the urban areas (23%). PRODAPE's most remote areas can be expected to face the challenges marked by this phenomenon and disparities.

Access to Transport

The conditions of the residence areas of most of the respondents can be evaluated from the state of the roads leading to the places where they live, as shown in [Table 5-5](#).

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Table 5-5: Conditions of the road leading to the HH

Road conditions	n	%
Tarred (even if with potholes)	257	21.3
Sealed	94	7.8
Gravel	718	59.4
Rudimentary	132	10.9
Other	8	0.7
Total	1209	100.0

More than 70% of all respondents can access their homes/residences only by using poor roads/streets, which is partially revealing of their social status or that of the study area or the country in general.

Road and transport infrastructure remain as a serious development problem in Mozambique and this can be expected to have implications on the development of aquaculture as it has been having on agriculture in general. A brief characterization of the regional profile highlights the following:

Southern Region: of the three regions in which Mozambique is usually subdivided into, the southern region is the only one that at present has all district capitals linked to the national (Maputo City) and provincial (Matola City) capitals by tarred roads. The recent opening of the bridge over Maputo Bay and of the road linking Maputo City and Matola/Boane to Salamanga and Ponta do Ouro, eliminated the only connection that was done using a dirty road until the final part of 2018. Most businesses in this region are concentrated in Maputo and Matola.

Central Region: this region has historically played an important role in trade and other socioeconomic activities in Mozambique. Beira, the heart of the region, which is also an area of capital importance, retains the status of the second city of Mozambique³⁷ and an economic centre of regional importance. Its port plays an integral role linking central Mozambique to Zimbabwe. The commercial importance of Beira has been emphasised in regional planning by the establishment of the Beira Spatial Development Initiative. It is easily and closely linked to Dondo (about 30 km through EN6), which is another area of interest for aquaculture. Other important production centres in Sofala province have no meaningful infrastructure, including roads. Beira City is not linked to the National Highway North-South (EN1). The road passes through Inhope approximately halfway between Chimoio and Beira. The road from Beira to Mutare and through to Harare is now in considerably good condition after being upgraded to highway standard as part of the Beira SDI program. There have been significant road developments in Manica province, which can be expected to be helpful for PRODAPE. The link roads to Gorongosa are currently under rehabilitation. Regional trade is also important in the provincial capitals of Manica, Tete and Zambezia. All provincial capitals are accessed by air while road access to Chimoio and Tete is relatively good. Road access to Quelimane is still difficult and the crossing of the Zambezi River in Caia and Tete has been consolidated after the opening of an additional bridge in Tete and in Caia. These developments facilitate the central region trade and to the South-North link in general.

Except for Quelimane and Nicoadala and Quelimane=Milange, which are served by a good tarred road, important production areas in this province have poor infrastructure. The railway in this province is only 145 km long (Mocuba-Quelimane) and needs rehabilitation.

Northern Region: The North of the Country is generally poor in terms of infrastructure. Niassa is the least developed province of Mozambique in this regard. In this region infrastructure is mainly concentrated in and around Nampula, Nacala and Pemba. The Nacala Corridor SDI is at the forefront of development in the region. It links Nacala and Nampula to Lake Niassa and into Malawi through air, road and sea infrastructure. The emphasis placed on the area at government level has already resulted in an increased availability of infrastructure. Nacala and Pemba have witnessed the fastest growth.

Nampula is the third largest Mozambican city and is provided with a few important business facilities. Nacala is a small port town with considerable trade facilities while Pemba, in addition to having a port has the most developed tourism infrastructure in the region. The port of Nacala is a deep natural port allowing unrestricted access to any type of vessel. The airports in Nampula, Nacala and Pemba are registered as international.

Niassa also has a very limited supply of basic infrastructure and outside the city centres of Lichinga, Cuamba and recently Lago, access to the various points of the province is precarious. Infrastructure is in poor condition

³⁷ Although indications are that this might need an update as Nampula now seems to be the development hub outside Maputo and Matola cities.

across the North but is at its worst in Niassa. The road between Cuamba and Lichinga is now under rehabilitation.

Table 5-6, below, gives an indication of the road conditions from the provincial capitals to PRODAPE districts:

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Table 5-6: Overview of road conditions by district within PRODAPE area

N.º	Province/District	Road condition from the provincial capital do the district
	Cabo Delgado	
1	Balama	Is done through the N1, which is in good condition between Pemba and Montepuez but bad between Montepuez and Balama. Works started but interrupted
2	Mueda	Reasonable but in need of rehabilitation
3	Metuge	Good and Bad. The final stretch from the N1 to Metuge is gravel and in poor condition
	Niassa	
4	Lago	Very good (recently opened)
5	Lichinga	Very good
6	Mecanheles	40 km recently opened in very good condition and remaining very bad and during the rainy season is hardly passable
	Nampula	
7	Ribaue	Very good (recently rehabilitated as part of the Nacala Corridor)
8	Mussoril	Bad/gravel
9	Larde	Very bad
	Zambezia	
10	Milange	Very good
11	Mocubela	265 km total, of which 228 are very good and 37 km bad (gravel)
12	Nicoadala	Very good
	Sofala	
13	Dondo	Very good
14	Buzi	Bad (gravel)
15	Gorongoza	Good (under rehabilitation)
16	Beira	Very good
	Tete	
17	Cabora Bassa	Good
18	Magoé	Bad
19	Maravia	Bad
	Manica	
20	Gondola	Very good (recently rehabilitated)
21	Sussundenga	Very good
22	Vanduzi	Very good
23	Mossurize	Good

However, the links between the district capitals and the administrative posts and localities, which concentrate most of the production centres, are generally precarious. Among other ongoing interventions mention should be made of the fact that a project to develop and tar close to 4,000 km of rural roads in the two provinces and ten districts of Nampula (Erati, Mamba, Monapo, Mossuril (PRODAPE district) and Mongicual) and Zambezia (Lugela, Morrumbala, Maganja da Costa, Pebane and Chinde), was launched in December 2018 and is

expected to be completed by 2024 (Savana, December 28, 2018). The project is jointly funded by the GoM and the World Bank and it can be expected to be beneficial to PRODAPE.

Settlement Patterns

The precarious conditions of the local roads are also reflected in the way housing and settlements are structured, as shown in [Table 5-7](#)~~Table 5-7~~, below.

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Table 5-7: Housing pattern

Housing pattern	n	%
Houses close to each other	345	28.5
Slightly dispersed houses	743	61.5
Significantly dispersed houses	117	9.7
Farming areas	4	0.3
Total	1209	100.0

More than 70% of the respondents live in settlements marked by houses "spaced apart" or even "separated from one another", which is also partially associated with the models of peri-urban and even rural areas in the country.

As for the type of dominant material in the construction of the houses/homes of the respondents it is possible to note the prominence that the "Blocks or bricks" occupy ([Table 5-8](#)~~Table 5-8~~).

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Table 5-8: Construction material (walls)

Construction material (walls)	n	%
Blocks/bricks	836	69.1
Sand/soil plaster	228	18.9
Wood and corrugated iron	31	2.6
Reed (not plastered)	88	7.2
Other	26	2.2
Total	1209	100.0

Empirical evidence has highlighted the fact that in the last two decades, in many areas of Mozambique, and especially on the outskirts of cities and towns as well as rural areas, there has been a substantial replacement of precarious walls (wood, blocks and sand/soil-plaster based bricks). This is seen simultaneously as an indicator of increased purchasing power, but also of increased willingness and ability to live in improved homes where the example of neighbours tends to be contagious and to determine attitudes and behaviours. This is relevant for any development initiative including in aquaculture where the mobilization of savings and peer education will be fundamental in the adoption of unfamiliar activities and practices.

Regarding the roofing of the houses the survey shows, [Table 5-9](#) and [Figure 5-1](#), below, that the predominance goes to the "zinc/corrugated iron" (69%) and, in the same way as the wall material described above, practically the use of plant material is extinct and/or being increasingly replaced by other more conventional materials, mainly zinc/corrugated iron. From a certain perspective, zinc/corrugated iron roofing can also be taken to confirm the low to medium income class of the respondents and people in peri urban and rural areas across the country.

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Table 5-9: Construction materials (roofing)

Roofing material	n	%
Tile	119	9.8
Zinc/corrugated iron	839	69.4
Thatch grass	82	6.8
Fiber	75	6.2
Mortar	81	6.7
Other	13	1.1
Total	1209	100.0

Figure 5-1: A view of the house roofing in Pemba Metuge (C Delgado)



Most (about 76%) of the surveyed HHs own the houses they live in ([Table 5-10](#)). The rental is only associated with 16% of the HH.

Table 5-10: Housing tenure system

Ownership of the house in which the HH lives	n	%
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Ownership of the house in which the HH lives	n	%
Owned by the HH	963	79.7
Rented by the HH	188	15.6
Lent (not paid)	21	1.7
Other	37	3.1
Total	1209	100.0

Apart from this being the typical pattern of Mozambique, the above is also, in part, revealing of the social condition of the respondents. In low-income communities, families tend to own the infrastructure they live in, regardless of the state and/or cost of the latter. Association with unstable incomes and other factors tend to discourage home rental.

Most of the households (65%) have been living in the area in which they were interviewed for at least five (5) years or more, including close to 19% that have been in the same place for twenty years or more. This confirms the sedentary nature of the households in that they do not move frequently from one area of resident to the other. This is an important characteristic in the development and assimilation of economic activities, as could be the case of aquaculture, as it makes it possible for lessons to be learned a replicated over time.

Access to Services

Energy

Close to 84% of the surveyed HH indicated having access to electricity. It is reported that after close to two decades of dedicated expansion of access to electricity the main power supplier in Mozambique (EDM) currently serves more than 1.5 million customers/power connections³⁸ (EDM, 2018). However, it is also noticed that expansion to new consumers has slowed down significantly. The pace of electrification has reduced to 40,000 new connections in 2016 compared to 120,000 new connections annually in previous years and Mozambique's electrification rate presents vast disparities between urban and rural areas (54% in urban and 6% in rural).

Table 5-11: Access to electricity (from the national grid)

Access to electricity	n	%
Yes	1010	83.5
No	199	16.5
Total	1209	100.0

The 6% coverage or close to that is likely to be the norm in most remote rural areas. The rate of 83.5%, uncovered by the HH survey, is significantly above the national average and applies only to selected areas of the cities and towns included in the survey.

Electricity by EDM and/or FUNAE or other sources will be of capital importance in the attainment of PRODAPE objectives.

³⁸ Which represent close to 7,500,000 people or 26% of the population.

It is estimated that reaching universal electrification by 2030 (as envisaged under the SDG – Goal 7 (i.e., Accessible and Clean Energy)) will require US\$6.5 billion of investments across the sector value chain. Electricity connections need to grow up from 165,000 a year in 2018 to 350,000 in 2020 to 590,000 in average between 2025 and 2030. Increasing the number of consumers from about 1,550,000 today to about 7,800,000 by 2030 challenges not only distribution and commercial practices but also transmission and generation. It will require a complete internal restructuring of EDM's management, operations, logistics, technical staff, and systems. It also represents as financial challenge for Mozambique (WB, 2018³⁹). In several specific areas PRODAPE will need to align its development objectives with those of electrification.

The project's expressed intention of promoting the use of green technologies (i.e. solar pumps, solar panels etc.) whenever possible, is commendable. Adequate mainstreaming with other similar and relevant initiatives should be actively pursued.

Water

As shown below, close to 58% of the HH indicated having access to piped water. Despite the regional differences, IOF 2014-15 results indicate that progress has been made in covering water supply throughout the country according to province and area of residence (urban and rural).

Table 5-12: Access to piped water

Access to piped water	n	%
Yes	695	57.5
No	514	42.5
Total	1209	100.0

At the national level and in urban areas, the predominant source of water is piped water (63%) while in rural areas unprotected wells are dominant, and serve about 35% of the total households, in contrast to the 47% recorded in the IOF 2008-09.

Analysis by province shows that most households in four provinces, namely Maputo City with 95.5%, Maputo province with 76.5%, Gaza with 32.6% and Sofala with 28.8% the main source is piped water. This is followed by three provinces - Tete, Manica and Inhambane whose households mostly consume water from wells or boreholes with hand pumps. Households in other provinces consume mostly unprotected well water that is considered an unsafe source of water.

Water for aquaculture and that for different domestic uses (drinking, cooking, washing, etc.) including for plant and animal production can at times enter into conflict. Depending on specific conditions in the ground PRODAPE will be required to exercise adequate planning and harmonization of interests.

5.1.1.4. Employment, economic activities and income

The employment situation confirms the relatively precarious situation in which the heads of the HHs and the HH per se find themselves in. Only about 63% of the heads of HH reported having formal employment and/or a stable source of income that could be from formal employment and/or regular remuneration (e.g. pension fund). The remainder heads of HH are distributed by a multitude of informal and self or family employment activities that include fixed and mobile selling of a multitude of products, seasonal employment, odd jobs (electricians, mechanics, plumbers, etc.) and renting of property including land. However, at the HH level in general close to 69% of the people in working age reported not having formal/regular employment/income. The members are

³⁹ Mozambique Lighting and Grid Access Project (Moz-LIGA)

distributed by many income activities in which informal activities and the practice of subsistence activities shows predominance.

Table 5-1344: Formal and regular income by the heads of the HH

Formal and regular income by the Head of the HH	n	%
Yes	761	62.9
No	448	37.1
Total	1209	100.0

Table 5-14Table 5-15 shows that those earning less than MZM 1,800.00 form the mode (close to 29%), followed by those earning more than MZM 14,000.00 (27%).

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Table 5-1445: Income categories

Income categories	n	%
None with permanent job/income and less than 1.800 Mt	345	28.5
1.800 to 3.600 Mt	68	5.6
3.601 to 7.200 Mt	82	6.8
7.201 to 14.400 Mt	162	13.4
More than 14.400 Mt	227	18.8
More than 14.400 Mts	325	26.9
Total	1209	100.0

An attempt of tracking those who declared they did not depend on fixed jobs/income resulted in the identification of the economic activities and income averages presented in Table 5-15Table 5-16, below. Most of these are women and young people, who, due to their circumstances, are more inclined to embark on self-employment activities. It is a potential that with the necessary efforts could be diverted to aquaculture.

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Table 5-1546: Other economic activities and average monthly incomes

Economic activities	n	Average monthly income (in MZM)
Mobile trade	77	4,299.74
Trade from an informal kiosk/stall	181	6,883.62
Shop owners	30	14,169.17
Seasonal jobs	65	2,153.46
Informal trans frontier trade	18	5,091.67
House/room rental	53	9,027.36
Odd jobs (electricity, plumbing, etc.)	72	5,987.78
Workshops/depots (mechanical, carpentry, iron smith)	69	14,905.29
Sale of agricultural products (fruit/vegetables)	151	5,713.18
Sale of animals	50	2,811.40
Other	82	22,328.01

For both heads and other members of the HH in general fisheries and largely aquaculture and/or trading in products related with these activities rate significantly low among the interviewed communities and respective HH. Only three of the respondents (0.02%) indicated being involved in some form of fisheries activities. While this might be attributed to the nature and characteristics of the selected survey sample, this seems to not be surprising in a country in which official statistics indicate that only about 20% of the country's population is directly involved in fisheries. A closer look also indicated that it is only specific communities and groups that tend to concentrate people active in this area of the economy and traditionally those who developed it in a way that had a meaning in their economy were concentrated along the coast and/or close to significant freshwater bodies. Currently those active in aquaculture are even more difficult to identify as this activity is just starting to be practised in a way that can be more systematic and involving more people. Quality interviews with those involved in aquaculture indicated that in most cases this activity is recent and although seen as promising people are not yet in position of determining the extent to which it contributes in the formation of their income. Hopefully initiatives under PRODAPE will assist in the consolidation of the existing activities and contribute to strengthening the position of aquaculture in local economies.

However, although not necessarily from aquaculture, in a few cities and towns, mainly those in the hinterland and close to water bodies (rivers and lakes (natural and artificial)) trading in freshwater fish is a visible phenomenon. Due to inadequate cold conditions by the operators and consumers fish is mostly sold dried, smoked and/or salted. Restaurants in cities such as Chimoio, Tete and Lichinga offer freshwater fish, mainly tilapia, in their menus and the demand seems to be high.

Figure 5-2: Selling of Sharptooth Catfish and Tilapia in Nampula



Source: PRODAPE CRA and ESMF formulation team (December 2018)

On the other hand, together with the selling of manufactured products (food, beverages, clothes and other assorted goods), mainly imported, there is significant visibility of different forms of trade and business in plant and animal (livestock) products originating from local producers (maize, beans, groundnuts, chicken, goats, etc.). Close to 24% of all the responses were from people who openly manifested being associated with activities in these areas.

Of interest in this document is the fact that among those who professed being self-employed and/or in family related businesses the reported monthly incomes range from a minimum of 2,153.46 MZM (occasional/seasonal workers) to a maximum of 22,328.01 MZM. The average monthly income of FAs in this category is 8,488.24 MZM, significantly above the minimum salary in the agriculture, hunting, forestry sector where it stands at 4,142.00 MZM, as from April 2018⁴⁰.

In-depth studies will be required (e.g. a more detailed socioeconomic baseline survey), as these are not linear processes, but these could be the people with a strong potential to embark on aquaculture businesses, by bringing both their experience of running their own businesses and part of the required capital.

Ownership of Goods and Assets

Regarding the pattern of ownership of a selected variety of goods and services, [Error! Reference source not found. Table 5-13](#), below, presents the summary of the main characteristics of the studied HH.

Table 5-13: Access to/possession of goods and services

Possessed goods/services	% of HH that responded affirmatively	Maximum number of items by HH
Electric/gas stove	38.5	4
Electric iron	57.1	3
Radio	49.8	3
TV	75.5	4
Video	41.5	4
Satellite TV	46.0	2
Mobile phone	88.3	18
Bicycle	24.5	9
Motorbike	22.9	4
Car	22.0	6

Except for bicycles, motorcycles and cars, other goods and services are owned by close to 50% of the HHs, with the possession of mobile telephones (88.3%) and televisions (75.5%) showing considerable high values. There are many interpretations that can be drawn from this picture, but what matters for the study is that the studied HHs offer promising opportunities to the aquaculture market, both in terms of producers and consumers as they show fair ability to pool resources together for the acquisition of a variety of goods, including some of high value, without necessarily being essential. All goes to show that there must be idle money even if distributed unevenly among the studied communities. Combined with the right attitude that money can be invested in agriculture and fisheries.

5.2. PRODAPE Planned Developments and Potential Impacts

As stated under subchapter 2.1.2.1. PRODAPE, from the physical point of view, will facilitate and finance the development of:

- hatcheries in selected locations (the focus will be on establishing one main hatchery in each target province);
- fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs;
- earthen ponds among rural smallholders of a standard size of 500 m²;

⁴⁰ Salary structure approved on April 24, 2018, during the 13th ordinary session of the Cabinet.

- cage farming in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds;
- organization of smallholder operators into aquaparks and clusters to develop their activities in and around these production units
- facilitation for the development of infrastructures and services to facilitate market linkages for fish products (inputs and outputs).

It is expected that these developments will create the necessary environment for the aquaculture subsector to thrive and fulfil the various roles of increasing food security, incomes to local people and contribute to national development. However, if the necessary measures are not systematically put in place the project has the potential of creating and/or aggravating environmental and social problems including those related with the effects of climate change. In the selected districts the ESMF Team managed to observe developments that are already being implemented, which are associated with different kinds of issues and impacts as documented and discussed in the paragraphs that follow.

Figure 5-3: Aquapark in Metuge/Cabo Delgado province



Source: PRODAPE CRA and ESMF formulation team (December 2018)

With or without valid arguments, aquaculture has been accused of being the cause of many environmental, social, economic, including aesthetic problems.

Figure 5-4: Fish feed production unit (under construction)/Manica province



Source: PRODAPE CRA and ESMF formulation team (December 2018)

It is a matter of fact that ecosystems are not always as fragile as at times they look like, instead, they have remarkable capacity of resiliency, and if basic processes are not irretrievably upset, ecosystems will continue to recycle and distribute energy. However, irreversible damages have been already caused due to inadequate management of the activity. The main negative impacts attributed to the activity are discussed in this chapter.

All efforts must be made to ensure that PRODAPE does not exacerbate existing and/or perceived problems. A consistent adoption of both the GoM and IFAD environmental and social management systems, including climate change has the potential of mitigating any adverse impacts and optimize the positive impacts, especially because PRODAPE will focus on small to medium scale interventions.

5.3. Environmental and Social Concerns in the Project Area

As part of the formulation of the project's CRA and ESMF a rapid assessment of the conditions on the ground and of potential impacts of the project was conducted by both teams, i.e. CRA and ESMF. [Table 5-17](#) presents a summary of the main findings. These are limited to what the CRA/ESMF Team was able to witness directly and/or have access to information and are used here as examples of issues that might require more detailed and comprehensive investigation. In CRA/ESMF Team point of view Sofala province provided what the team considers to be the more comprehensive account of the existing achievements, opportunities, challenges and risks.

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Figure 5-5: Fish Tanks in Murore, Manica province



Source: PRODAPE CRA and ESMF formulation team (December 2018)

Table 5-17: Summary of the main findings from field visits

N.º	Provinces	Main development/directions	Matters Arising											
1	Manica	<p>Aquaculture is mostly developed in ponds, estimated to be more than 1000. Three of the four target districts of PRODAPE (i.e. except Vanduzi) have been benefiting from PROAQUA support. From June 2013 to September 2018, 1,242 fish ponds were constructed under PROAQUA, of which 805 ponds were built inside the three PRODAPE target districts, i.e. Gondola, Sussundenga and Mossurize (DPMAIPM, 2018). 289 fish tanks were rehabilitated, of which 135 in the same three PRODAPE's target districts.</p> <p>IDAPE's production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>N/A</td><td>N/A</td><td>N/A</td></tr> </table> <p>At some point there were cages in Chicamba Dam. But these have been discontinued. The company behind the operations (Messica Pesca) stopped its operations due to lack of water at the dam as consequence of recent rehabilitation of the power plant at Chicamba dam and internal problems. This company is being currently restructured.</p> <p>There are no formal/commercial fish feed producers now in the Province. Fish farmers use a variety of food sources to get by (e.g. chicken broilers feed (A1, A2), vegetable leftovers and own low-cost formulations provided by DPMAIP-Manica. Fish farmers were also trained in the preparation of formulations and small feed production equipment were purchased under PROAQUA. However, the Province has strong potential to produce and commercialize ingredients locally.</p> <p>Currently, there are no fingerlings producers in the Province. Fingerlings have been purchased from Vilanculos to supply farmers under PROAQUA (June 2013 to September 2018). The oldest fingerlings production unit (Messica Pesca) is being rehabilitated and it is expected to meet the entire province demand. The breeding stock is being collected from Chicamba Lake. ISPM41 has</p>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	N/A	N/A	N/A	<p>There is the need to:</p> <ol style="list-style-type: none"> 1. Operationalize fingerlings production in the province; 2. Produce fish feed locally. Quality feed is important because local available resources are not balanced (vegetable leftovers) which prolong the time for fish to reach mature stage; 3. The value chain needs strong commercial operators to incentive small fish farmers to produce. No fish storage/cold rooms, processing at a commercial scale are in place; 4. Fish selling in large scale is only done during festive days (just seasonal) 5. Potential for conflict resulting from different water uses although at this stage except in what refers gold panning in Manica in specific points the conflicts are not yet high in many places as all the activities are of small/medium size. As the economy grows and diversifies the use of water by the various users will require dedicated monitoring and control to maintain quantity and quality standards. <p>Other issues include:</p> <ul style="list-style-type: none"> ▪ eutrophication in some water ponds, mainly due to extensive use of locally produced food leftovers to feed fish and poor pond water management ▪ in the combination of agriculture with aquaculture at the SDAE level and on the ground and due to a combination of factors, agriculture ends up overshadowing aquaculture. The latter has less extension workers with specific subject matter knowledge to deliver to the farmers – this is a common
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	N/A	N/A	N/A											

⁴¹ Local technical tertiary education institute.

N.º	Provinces	Main development/directions	Matters Arising											
		<p>5 fish tanks in their aquaculture unit and use them to produce some fingerlings to supply local farmers. However, their ability and focus to perform this service needs to be upgraded.</p> <p>Three sites were visited in Manica, namely at Murore Irrigation Scheme in Sussundenga; Munhaza in Sussudenga (where an Aquapark with 40 tanks is being developed) and Messica Pesca (in Manica District for fingerling production⁴²)</p> <p>The dominant approach for small scale producers has been that of linking aquaculture to agriculture, mainly irrigated agriculture. The province possesses favourable hypsometry and water resources to conduct the activity. Water can in general be managed by gravity, which, combined with reasonable availability, among other aspects, reduces costs.</p>	<p>problem across the country. It is a fact though that even in agriculture the ratio extension workers/farmers still leaves a lot to be desired⁴³. This is further compounded by the fact that there is not consistent research/technological innovation to back up existing extension workers</p>											
2	Tete	<p>The province has considerable background in fisheries and aquaculture, mainly in and around Cahora Bassa⁴⁴. Commercial producers have been dominant.</p> <p>Under the new context (mainly initiated under PROAQUA) aquaculture is being developed in most of the Province (9 out of 13 districts), including in the three target districts of PRODAPE (Cahora Bassa, Mágoé and Maravia) except Mágoé, despite its potential.</p> <p>Currently there are 318 (68%) fish ponds in operation out of 468. 98% of operational tanks are associated with small scale aquaculture farmers. However, there is huge contribution of three commercial fish farmers who have 88 cages all located in Cahora Bassa District. There is no data of aquaculture development in Mágoé District. Only 19 out of 29 earthen ponds in Maravia District are in operation. Due to several constraints, including technical and financial, no small farmers have cages, despite their high productivity.</p> <p>IDAPE's production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td></td><td></td><td></td><td></td></tr> </table>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018					<p>Issues in need of attention seem to be:</p> <ol style="list-style-type: none"> 1. Due to the various structural constraints that PRODAPE is designed to assist resolving, lower production compared existing potential. Very few small farmers and cooperatives around the Cahora Bassa Lake doing aquaculture. 2. Local communities rely on fishing in Cahora Bassa Lake instead of fish farming. This can also be related to relative high cost of cages. 3. Fish feed production is not established. This probably will end soon because fish production units are being projected to operate in the short/medium-term. This can incentive small fish farmers to invest in aquaculture.
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											

⁴² Expected to produce 1 million fingerlings per month and be able to supply entire Manica Province and beyond.

⁴³ The country did not have more than 3,000 extension workers by 2007, to assist more than 2 million small scale farmers (Gemo; H. (2005) Mozambique's Experience in Building a National Extension System.

⁴⁴ It is estimated that out of the 2-4% Mozambique's GDP represented by fisheries close to 0.5% have been associated with Kapenta, from Cahora Bassa, whose main market has been neighbouring Zimbabwe.

N.º	Provinces	Main development/directions				Matters Arising
		Freshwater fish	212.3	288	301.3	
		<p>Currently there are no fish feed producers in Tete Province. Feed is being imported from Zimbabwe, South Africa and Mauritius. Mozambesi (in Cahora Bassa district) is planning to establish a fish feed production to reduce production costs. Bronic (also in Cahora Bassa district) recently purchased a complete fish feed production unit. The company is stocking ingredients from Angónia (maize and soya); kapenta fish rejection as well as moringa leaves that will be used in the formulation.</p> <p>All commercial fish farms have their own fingerlings production, but these are not yet enough to supply the emerging small-scale farmers. Actual capacity of Mozambesi is 450.000 fingerlings per month. Bronic is producing their fingerlings from cages to populate other cages</p>				
3	Nampula	<p>Nampula has also been an important player in fisheries. Significant aquaculture initiatives only took place under PROAQUA and these are still at their initial stage. Small-scale and family farmers are still to see and show results.</p> <p>In Nampula PRODAPE pre-selected districts are Ribaué, Mossoril and Larde. In these districts and mainly in Ribaué there are a few small and medium size private aquaculture initiatives with potential to turn into bigger businesses. Malema and Lalaua have been mentioned as having other similar initiatives.</p> <p>The province and PRODAPE targeted districts have considerable abundance of freshwater. In addition to rivers and lakes there are many water springs and adequate physiography to install and operate water ponds by gravity. The rainfall pattern has been regular.</p> <p>While in Ribaué it can be said (without offering concise numbers) that there are promising small/medium-scale private initiatives in fish farming, the situation in Larde does not offer clear direction. With poor roads the district remains relatively isolated from the rest of the province, including Nampula, from where most of the assistance comes.</p> <p>In Mossoril there are already 27 fish earthen ponds - 13 in one community and 14 that are associated with the agrarian technical school of Nacuça. The development of these initiatives was preceded by contact with the district government, community consultation, and securing of DUATs on behalf of the associations (the technical school took its own initiative). Aquaculture is combined with irrigated agriculture. There are associations that seem to believe that aquaculture</p>				<p>Main constraints and issues to consider are:</p> <ul style="list-style-type: none"> ▪ Discontinuity of initiatives that interferes negatively with the consolidation of a coherent system of supply and demand; ▪ The promotion side (DPMAIP, technicians, research, extension workers) must be able to offer regular assistance to the various stakeholders to consolidate promising initiatives; ▪ Aquaculture remains relatively isolated from other development subsystems, e.g. financial systems; ▪ Existing agrarian training institutions interested in embracing aquaculture should be given dedicated support to consolidate their initiatives.

N.º	Provinces	Main development/directions	Matters Arising											
		<p>has potential to offer better financial returns than agriculture. But this has still to be tested.</p> <p>IDAPE's production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>72.3</td><td>122</td><td>81.6</td></tr> </table> <p>Fish feed is procured outside the province and combined with local components made of agricultural leftovers. There is also potential for fish feed production in Ribaué and Nampula city (by a private company already doing animal feed), and sporadic actions have been going on. These are not yet consolidated, mainly due to prevailing inconsistencies in the demand and buying power of the exiting aquaculture operators. Ribaué also has an Agrarian services centre including an agrarian training institution, which is taking initial steps to embrace aquaculture in its training. With some additional support the centre can produce fish feed for the entire province and beyond. The same goes for the agrarian technical school of Nacucha (Mossuril).</p> <p>Fingerlings are imported mainly from Inhambane and plans to produce them locally (mainly in Ribaué, where there are private operators) are being considered. Ribaué Agrarian services centre and the agrarian training institution as well as the agrarian technical school of Nacucha (Mossuril) are strong candidates. PRODAPE is likely to be used to advance existing plans.</p>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	72.3	122	81.6	
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	72.3	122	81.6											
4	Cabo Delgado	<p>In its capacity as a coastal province Cabo Delgado has strong tradition in fisheries. Aquaculture seems to be a new activity. There are already some producers (individually or collectively) who can upgrade and move to aquaculture in a more professional and exclusive way. The efforts must be associated with building strong links between Savings and Credit Systems.</p> <p>There is great interest in the subsector. Demand for final product exists. In the inland waters there is more interest.</p> <p>The next goal would be for the family sector to cover the aquaculture cycle while covering other areas of its economy (crop and animal production). For many of them, there is no space to dedicate to aquaculture alone because the results take a long time to come about and this is</p>	<p>Main constraints and issues to consider are:</p> <ul style="list-style-type: none"> Infrastructure and services: roads are a problem. The other problem is the cold systems. Remote areas have no electricity. This makes solar energy a possible alternative. There should be better coordination between agriculture, public works (roads and water) and fisheries as well as with EDM/FUNAE; A regular supply/demand of fish feed and fingerlings needs to be developed, which could, to a great extent be met using provincial capacity. Here is where PRODAPE is required to play its promotion role; 											

N.º	Provinces	Main development/directions	Matters Arising											
		<p>seen as interfering negatively with their subsistence strategies.</p> <p>Under PRODAPE selected districts are Balama (freshwater combining earth ponds and cages), Metuge (salt water (ponds)) and Mueda (freshwater (ponds)). In Balama there is already some cage production using existing dams and new small dams are being set up. In Metuge an Aquapark is still being built. It will have 60 ponds (approximately 3 ha pond area) of which 40 are nearly completed under PROAQUA. In Mueda activity remains incipient. Several developments in CD such as graphite mining in Balama, tourism across the province, gas industry in the northeast and other offer a potential market for aquaculture products and could be an opportune way of meeting the expected demand to stem from these developments.</p> <p>IDAPE's production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>60.60</td><td>62</td><td>55.57</td></tr> </table> <p>There is a certain balance between men and women in aquaculture. There are more women in the mussel business than men. Women go more to the fields and men to the tanks. The latter is a more demanding job.</p> <p>There are no fish feed producers yet in CD. The province relies on imports and local formulations. However, the province has excess production of certain agricultural products (beans, corn, fishmeal, etc.) that could be used to produce feed. It must be made of material that floats and has vitamins. Machines for local production are being distributed among local farmers.</p> <p>The fingerlings come from Vilanculos, which raises the costs when they get to C Delgado</p>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	60.60	62	55.57	<ul style="list-style-type: none"> A system of inter-institutional functional links should be set up from top to bottom and vice versa, in areas where there will be sub-projects. Especially at the starting stage where there is a need to build encouraging examples of success. Certain places should be selected to build success stories as a result of perfect synchronization of initiatives and components; Intensify nutritional education and training. Production and dissemination of education and training materials. A lot is being done, but not adequately disseminated; Collaboration with the water management sector should be around identification of the most indicated water bodies, water quantity and quality issues ... aquaculture and water resources databases still do not work well ... Extensionists and aquaculture producers do not have water monitoring kits (quantity/quality). They resort to naked eye. They should have basic technical resources; Collaboration with INAM has been limited to general indications. Not so many specific issues are being dealt with.
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	60.60	62	55.57											
5	Sofala	<p>Sofala is also a fisheries powerhouse in Mozambique. The authorities acknowledge that Aquaculture is a new subject in the province and in the country and that it is marked by serious investments limitations. They also note that climate change has been affecting the native fish catching sector, which provides scope to produce captive fish. Notwithstanding the constraints Aquaculture initiatives involving different classes of operators have been underway for quite</p>	<p>Main constraints and issues to consider are:</p> <ul style="list-style-type: none"> PROPESCA tried to address the various challenges faced by the subsector, which are the same as those identified under PRODAPE, but it only touched the surface. There is a need to consolidate what was 											

N.º	Provinces	Main development/directions	Matters Arising
		<p>some time. Examples include but are not limited to:</p> <ul style="list-style-type: none"> in Gorongosa as part of PROAQUA the construction of 60 fish ponds to form an Aquapark has been underway. This will be handed over to a local association to manage; Dondo has some experience through a former national liberation fighter who is leading the production of fish in tanks. The fish is sold locally; there is also a great potential for fish production in the Mandruze Valley in Dondo District where 17 floating cages have been installed in 2016. Additional 35 cages are planned in Mandruze from a total of 50 to be installed until 2019, to form a cage aquapark; there is a plan of the sector to install cages, about 20, in the Buzi district, which offers some potential; the Agrarian school of Estaquinha (Buzi river tributary), in the district of Buzi, 10 cages are in operation, and additional 20 will be installed; in the district of Buzi, there is also an association of fish producers, which has 10 cages; in Beira there is currently a producer with more than 15 tanks. In the city of Beira also there is Aquaculture and Agriculture Company (MAA), which is dedicated exclusively to the production of fingerlings, with installed capacity for more than 2.7 million fingerlings per year. It also produces fish feed, although its focus has been on animal feed (chicken, pigs, etc.); MozTile company also in Beira is dedicated to fish feed and fingerlings. It also offers the possibility of training young people interested in aquaculture; DPMAIP is also planning to acquire a machine that will support the Aquapark installed in the district of Gorongosa, which will also benefit the neighbouring producers; <p>There is a credit line for aquaculture through the Fisheries Fund and GAPI. But the challenges of improving the value chain remain. SWIOFISH also provided some credit assistance with focus on different levels of producers. The underlining concept is for producers to take ownership of their projects.</p>	<p>initiated. Some issues to consider include:</p> <ul style="list-style-type: none"> there is a need to identify potential stakeholders, with demonstration tanks, associated with clear indication of the costs involved; DPMAIP believes that projects should ensure the establishment of the value chain in aquaculture, that is, producers of quality fingerlings (rapid growth) should be empowered, ensure quality feed production, producer empowerment, and commercialization; Commercialization is still incipient, since it is believed that the production of fish is basically for domestic consumption; Demand exists, the sector should focus on increasing production to meet local and regional needs; There is lack of technologies to foster the added value component, partly derived from weak financial capacity to invest in infrastructure. <p>There is a need to transform aquaculture into a business. Aquaculture should be promoted to add value to the fish and become a market-oriented activity. There should be increased coordination in the planning of aquaculture activities at all levels (district, provincial and producers) to ensure the reserve of appropriate aquaculture spaces, as well as greater ownership of districts and operators in the interventions of the sector.</p> <p>Fish farming in cages seems to be the most adequate in Sofala, due to droughts that have been affecting some districts. In Nhamatanda, for example, due to frequent droughts, production in tanks is impractical. Cages become the only option.</p> <p>Regarding PRODAPE management and issues per se:</p>

N.º	Provinces	Main development/directions	Matters Arising											
		<p>IDAPE's production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>68.65</td><td>96.50</td><td>180</td></tr> </table>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	68.65	96.50	180	<ul style="list-style-type: none"> There needs to be a focal point of the Project at the province level and that management is not only limited to the central level. This focal point should also be stimulated through a salary supplement. This was common under IDPP and INAQUA and should be maintained; DPMAIP has great limitations on extension workers working in aquaculture. There are only 10 extension workers active in Machanga (4); and Muanza (2). There is a need to recruit more technicians to respond exclusively to the area of aquaculture, because at the district level there is no representation of the fishing sector, which is attached to the SDAE. However, SDAE extension agents tend in most cases to produce traditional food in detriment of aquaculture; Training should be promoted through scholarships and short-term courses to technicians or trainers to develop specialists in aquaculture; There is a need to develop capacity for monitoring water quality in fish ponds and to analyse fish quality through the establishment of small laboratory units in the districts; There is also strong limitation in terms of transport resources in the province to assist the activities of the subsector; The issue of obtaining environmental licenses for aquaculture projects remains a challenge. The general belief is that. The license is required for large projects (e.g. legal persons) but not for small-scale operations; There should be focus on environmental fish farming. At present more than 80% of the fish production is artisanal and tends to be affected by climatic changes; In the matter of the management of effluents resulting from fish tanks, mainly in the projects of the family sector, the establishment of gardens to use the waters of the effluents should be promoted; PRODAPE interventions must ensure the existence of funds to attend to the environmental and social impact
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	68.65	96.50	180											

N.º	Provinces	Main development/directions	Matters Arising											
			studies and environmental licensing.											
6	Niassa	<p>Lake Niassa has been the centre of traditional fish production in Niassa province. Efforts that have been undertaken to introduce aquaculture have resulted in about 681 fish ponds and 19 cages in this province. Fish ponds occupy close to 28 hectares and most of them are in Sanga and Lichinga Districts. In the last trimester (July-September 2018) the infrastructure in place was responsible for 187 tons of fish.</p> <p>IDAPE's production data:</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>202.3</td><td>206.3</td><td>257.1</td></tr> </table> <p>Among the PRODAPE target districts, Lichinga is important in Niassa Province. It also has potential to establish cages because part of it (the western portion) is surrounded by Niassa Lake. Lago is the most important district because of the potential of Niassa Lake. However, only 19 cages have been installed there, so far, and there is also the intention of establishing fingerlings production centre there because of higher temperature than Lichinga, where the fingerlings production facility is currently installed. Mecanhelas is less expressive in aquaculture, with only 8 fish ponds in the entire district. This district will need more attention including dedicated technical training as very few farmers are engaged in this activity by now.</p> <p>Although earthen ponds are promising in the selected districts, cage fish farming has huge potential in the province's aquaculture. Both Lichinga and Lago have Niassa Lake and Mecanhelas also has important permanent lakes like Chirua, Chiúta and Amaramba. The strategy, according to DPMAIP-Niassa, should also be that of establishing a central fingerlings production unit in Lago to feed production in Lichinga and elsewhere.</p> <p><i>Fish Feed Production:</i> currently there are no fish feed producers in Niassa Province. Feed is being purchased from Nampula and/or produced locally at the farm level. One unit is to be established in Lichinga by one farmer. He is in the process of obtaining a processing unit from</p>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	202.3	206.3	257.1	<p>In addition to the other common problems faced by the subsector nationwide, main constraints in aquaculture production in Niassa are:</p> <ul style="list-style-type: none"> ▪ Even though it uses using intensive production methods the existing fingerlings production unit is not efficient enough to ensure continuous fingerlings throughout the year. The main reason being the long period of low temperatures in Lichinga. The owner is planning to relocate the fingerlings production to Niassa Lake where temperature is higher and transform the unit that currently serves a limited number of farmers including his own production into a distribution unit. ▪ There are no private operators investing on fishing distribution, processing and value adding. ▪ There is no fish feed production unit now; ▪ CRA and ESMF Team visited a farm (Eduardo Mulembwe Farm, in Lichinga), composed by 5 large earthen ponds, which is facing some challenges of lack of water to maintain the production due to prolonged drought. A small weir is being planned. The farm has a borehole and enough space to expand the production. The involvement of the water regional authority in the process was not all too clear.
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	202.3	206.3	257.1											

N.º	Provinces	Main development/directions	Matters Arising											
		<p>Tanzania. Ingredients are easily available in Lichinga in its capacity as a central city, which concentrates agricultural production from other districts.</p> <p><i>Cages and Earthen Ponds Contractors:</i> there are small local contractors capable of opening earthen ponds. There are 19 cages in Niassa Lake built locally. It can be said that there is local knowledge at DPMAIP-Niassa on how to build these units. However, there are no specialized company building cages.</p> <p><i>Fingerlings Production:</i> there is only one fingerlings production unit in Lichinga. It is one operator that is being supported by DPMAIP-Niassa. The system includes ponds where the breeding stock stays. Eggs are collected and hatched in improvised incubators. Hatched fingerlings are then used to populate the ponds and those of other fish farmers.</p> <p><i>Research:</i> research on aquaculture in Niassa is very incipient. There are some experiments being implemented by Pedagogical University at the existing fingerlings production facility in Lichinga. The focus is on fish feed formulations and general fish farming.</p>												
7	Zambezia	<p>In the same way as Sofala and most of the coastal provinces, Zambezia has been an important player in fish production in Mozambique.</p> <p>Concerted efforts in the last five years have resulted in 1,834 earth ponds in Zambezia Province. The top three are Namarroi (394), Gurué (241) and Milange (177). Other PRODAPE target districts, Nicoalada (124 ponds) and Mocubela (33 ponds) are less expressive. Both Milange and Nicoalada have accessible roads, while Mocubela is quite a challenge and might require concerted support from the sub-component market linkages of PRODAPE.</p> <p>IDAPEs production data</p> <table border="1"> <tr> <th rowspan="2">Description</th><th colspan="3">Aquaculture Production (ton)</th></tr> <tr> <th>2017</th><th>Planned 2018</th><th>Achieved 2018</th></tr> <tr> <td>Freshwater fish</td><td>128</td><td>222</td><td>204.5</td></tr> </table> <p>Due to its location, Nicoalada has two different areas, where aquaparks can be built for fresh water and brackish water. Milange has one established aquapark with more than 40 earthen</p>	Description	Aquaculture Production (ton)			2017	Planned 2018	Achieved 2018	Freshwater fish	128	222	204.5	<p>Local authorities (DPMAIP included) believe that the main constrains for aquaculture development in Zambezia Province is about to be solved as the fingerlings' unit is completed and operational in full capacity. The operator needs additional financial support to finalize the construction works needed; investing by himself it will take longer. The feed processing unit is brand new and need to start operating. An extra storage compartment will be needed in future to store ingredients and produced fish feed. In near future the main challenge will be to increase fish farm units (tanks and cages) and processing. However, in the same way as in other provinces concerted efforts are necessary to ensure that the developments work in a more synchronized way and to build a selected number of success stories that can inspire and mobilize synergies across the board.</p>
Description	Aquaculture Production (ton)													
	2017	Planned 2018	Achieved 2018											
Freshwater fish	128	222	204.5											

N.º	Provinces	Main development/directions	Matters Arising
		<p>ponds. In Mocubela there is a chance to also include other types of fish farming than freshwater since its coastal area and has potential for saltwater. And in fact, if concerted measures are not put in place, chances are that people will also embark on saltwater production, which could go against PRODAPE approach. An overview of the main developments in this province highlights the following:</p> <p><i>Fish Feed Production:</i> DPMAIP-Zambezia applied for funds from Agencia do Zambeze (ADVZ) to establish a fish feed factory located in Nicosadala. The factory is now complete, and the operator was selected already to start operations soon. The capacity is about 150 kg per hour (note: the guide was not sure about this figure). In general ingredients are easily available in the province. High altitude districts of Zambezia (Gurue, Alto Molocue, Milange) produce large amount of soya. And maize is widely available in these districts and others, such that there are anecdotal stories about maize being exported to the neighbouring countries (such as Malawi) due to local poor marketing.</p> <p><i>Cages and Earthen Ponds Contractors:</i> there are local contractors that can build earthen ponds. Mobilization for Mocubela will be relatively difficult because of actual road condition that is gravel/earth roads, sometimes difficult to cross specially during rainy season.</p> <p><i>Fingerlings Production:</i> the fingerlings production unit was built in Licuari area in Nicosadala District. However, the Contractor didn't finalize the works and a private operator was selected to finalize them. Its actual capacity is of 63,000 per month, expecting to increase to 100,000 by this year. The facility includes incubator room, 11 fish ponds. At present breeding is being made naturally. The operator does sexual inversion on site. The facility has potential for more production. Some efforts have been made to support the operator via BNI, but at the end the bank rejected to finance the conclusion of the works proposed by the operator.</p> <p><i>Research:</i> there is virtually no research activity by local universities on aquaculture, even though the province hosts the School of Marine and Coastal Sciences (Escola de Ciências Marinhas e Costeiras (ECMC)), in Quelimane. This is a tertiary institution associated with the oldest and biggest tertiary institution in Mozambique, i.e. Eduardo Mondlane University.</p>	

As can be understood from previous descriptions aquaculture in the way PRODAPE intends to develop it is considerably new in Mozambique. There are not many previous experiences that can be used to enlighten how things should be done to guarantee success. There will be a strong element of “learning by doing” as successes and failures happen on the ground. Strong elements of action research are recommended to be part of the project design. Among other aspects this encompasses the establishment of solid baseline conditions to be used in project monitoring and lessons learned.

However, irrespectively of the adoption of such an approach, the preliminary assessment made at the field level highlights a few issues that need dedicated attention in PRODAPE's final design, subproject planning, implementation and monitoring in order to adhere to sound environmental and social management principles. Some of the issues include, but are not limited to:

- **Siting of subprojects (aquaculture ponds and cages):** by design PRODAPE will limit production activities to freshwater aquaculture. However, since the project is likely to inherit interventions initiated under PROPESCA and PROAQUA and other development initiatives there is the likelihood that pressure will be made for the project to extend its scope to interventions that are in saltwater areas. One such a case is represented by the ponds in Metuge/Cabo Delgado Province, but there could be other cases, e.g. the potential for Mocubela and Nicoadala districts in Zambezia and other coastal districts, e.g. Larde and Mossuril (Nampula), Beira and Buzi (Sofala), to embark in similar direction. There is a need to decide on this and communicate it to relevant entities to act upon;
- **Clearance of vegetation with special conservation status:** if the necessary efforts are not made there is the risk that the opening of aquaculture ponds will be done at the detriment of conservation of plant species with special conservation status, e.g. mangrove, in the case of these being developed in saltwater areas⁴⁵. Including interference with wetlands. Again, the interventions in Metuge and Nicoadala are examples of this phenomenon. In Metuge, instead of encouraging and/or embarking on a mangrove restauration process the promoters decided to use mangrove cleared areas to install aquaculture ponds (40 at present (December 2018), which are likely to expand to 60 upon completion and establishment of the planned Aquapark on the site). In addition to this being a non-recommendable practice this carries the risk of causing additional and/or consolidation of the destruction of the mangrove as more activities in and around the Aquapark develop;
- **Land insecurity:** it was also observed in the field that in some cases the aquaculture ponds are installed in areas where there is not enough clarity about land use rights. For subprojects to be run smoothly over time they must be installed in areas clearly earmarked for aquaculture developments. Land use rights (DUATs) must be obtained by the developers and preferably by the associations that will manage subprojects and/or be passed on to them. What at some stage might start with considerable agreements among different parties, including among state agents, may degenerate into conflicts with the potential of halting projects and translating into losses of assets and opportunities. The ongoing development of the Aquapark in Metuge is yet another example of this risky development;
- **Formal environmental and water licensing of subprojects:** it was observed that the subprojects are developed in relative isolation from other public entities responsible for the licensing of activities. Important sectors such as environment and water are not actively involved (except for the installation and operation of cages in existing dams/reservoirs) in the design and licensing of the use of land, water and other general environmental aspects. This seems to apply to most subprojects. The underlying assumption seems to be that small-scale developments in the hands of informal operators do not require certain licenses (e.g. environmental licenses). It should be noted that even for Category C subprojects it will be fundamental under PRODAPE to apply and obtain (land), environmental and water licenses. These can be obtained collectively where groups of producers and/or their associations work together;
- **Staying within Category B or below and cumulative impacts:** to keep subprojects under Category B or C, and avoid them falling under Category A, attention will need to be paid to the potential of clustering developments in one single development area of influence or ecosystem. Mozambique's DM 54/2015

⁴⁵ It should be noted though that the PDR specifies PRODAPE will be confined to freshwater aquaculture and no activities in mangrove areas.

states that Aquaculture Projects will fall under Category A, when (i) **interventions produce more than 100 ton/annually**. From the production point of view and based on the data being articulated countrywide, under normal circumstances, it can be estimated that a fish pond that will produce a maximum of 1,200 kg of fish every six months (i.e. one pond (500 m²) can generate a maximum of 3,000 fish from equal number of fingerlings considering zero mortality, which are multiplied by 400 gr, corresponding to the maximum/average weight of the fish after maturity). With all aspects performing optimally (which is not usually the case), this means that a subproject would need to stick to **41.6 ponds** in a given area, producing two times per year, to generate up to 100 ton of fish. More than that carries the risk of going beyond Category B and C and of falling under Category A. Under such assumptions the initiatives pursuing more than 40 fish ponds should be avoided and these are starting to be significant as can be seen from the field findings (Metuge is planning to set up 60 in one small area). However, in general the existing initiatives are relatively small and confined to sizes that place them under Categories B and/or C and this should be positively encouraged and clarified;

- **Design standards for and construction of infrastructures:** although the general orientation of sticking to certain measurements (e.g. up to 500 m² for aquaculture ponds) is being adhered to, it is noticed that the design of aquaculture infrastructures (e.g. feed manufacturing units, cold rooms, ponds and cages themselves, etc.) does not follow any clearly defined standards. In general, no concrete and/or formally written designs and plans are prepared and executed accordingly. This goes hand in hand with the fact that currently there are no significant contractors/consultants with specialized experience in this area except for some emerging operators (e.g. Mozambesi in Tete, Muanza in Sofala (where 10 tanks of 500-700 m² were opened using diverse conventional machinery⁴⁶), Zambezia, where aquaculture production has been ongoing for a number of years), who have some background and technical and material resources. Even acknowledging that it is likely to take a while for the subsector to develop its own set of such standards and implementing agents/contractors it is recommended that under the project actions be taken to ensure minimum quality standards across the board (i.e. design, construction, operation);
- **Adequate combination of environmental impact assessments and formulation of environmental and social management plans and subproject auditing:** all goes to show that in addition to starting new subprojects PRODAPE will inherit a significant part of developments initiated by other projects (e.g. PROPESCA and PROAQUA), which will be in different stages of development and completion. Most of these past subprojects if not all did not undergo any systematic environmental and social impact assessment and might have been developed in contravention of fundamental requirements in this sphere (e.g. site selection, site construction establishment, compensation for land and/or asset acquisition, prevention of the spread of STD including HI/AIDS, malaria and other preventable diseases; offering employment opportunities for local people including women and the youth⁴⁷, etc.). Yet all developments (old and new) should adopt a sound environmental and social process that is consistent with both the GoM and IFAD policies. All previous developments, irrespectively of their location, size, stage of development, will be subject to an environmental and social audit. The audits will be systematic and independent examination processes to ascertain the extent to which GoM and IFAD policies⁴⁸ have been followed and where relevant recommend remedial actions, which will then be put in place;
- **Sustainability of operations:** sustainability can be defined as being the extent to which positive effects of project can be expected to continue after termination of external assistance. For an intervention to be sustainable several requirements must be met. Among other aspects these include a systematic involvement of the project beneficiaries in all phases and activities of project design and implementation. The project must consider the preferences of the beneficiaries as well as their institutional and human capabilities to initiate and sustain interventions. It was observed in the field that

⁴⁶ Although in general the use of machinery should be avoided/minimized under PRODAPE in favour of manual/labour intensive works.

⁴⁷ Site visits suggest that this seems to have been the case in many places.

⁴⁸ As stated in Annex 11. Guidelines for the environmental and social audit (IFAD/SECAP, 2017) "The aim of the audit is to identify significant environmental and social issues in the existing project or activities, and assess their current status, specifically in terms of meeting the requirements of the Social, Environmental and Climate Assessment Procedures (SECAP)".

some of the interventions have not been consistent in adhering to this fundamental principle. Cases have been observed where a strong “top-down approach” has been adopted. These carry the risk of alienating local people and their authorities and potential of collapse. Metuge is again one such a case. The issue of sustainability is also associated with the need to build capacity among operators to competently manage environmental and social implications of the interventions. The Chapter dealing with capacity building and institutional strengthening elaborates more on this, but some problems are starting to come to the surface such as eutrophication due to the concentration of organic matter in water bodies, particularly fish ponds. With small scale projects there is, frequently, the assumption that focus should be on production neglecting the environmental (and social) impacts, which in isolation and when associated with other interventions in the same area of influence or ecosystem can be significant. Regular training and capacity building will be required to create awareness and capabilities to intervene in a constructive manner.

5.4. Potential adverse environmental and social impacts

Aquaculture projects in general are associated with a multitude of positive impacts as seen above and below. However, if the necessary measures are not adopted, they also have the potential of triggering several adverse impacts. Overall and in line with the initial stage at which Mozambique is in aquaculture development coupled with the limited size of the operations the extent of the impact remains insignificant when compared to the countries with high aquaculture production. As indicated in Chapter 4 in general Mozambique is still a pristine country, with a significant part of its natural resources still untouched, although the traditional practices in agriculture and fisheries, if left unattended and coupled with the population growth can translate into a fast alteration of the prevailing conditions. Possible implications include:

5.4.1. Impacts on Aquaculture in Water Quality

All types of aquaculture practices interact with the environment as they require water and land (Burford et al., 2003). The most important concern in aquaculture is associated with water quality management as poor water quality may interfere on the growth of the organism (Casé et al., 2008). According to Casé et al. (2008), some organisms such as zooplankton and phytoplankton are very sensitive to changes in water quality and can therefore be used as good indicators of environmental conditions and of health ponds. Water discharged from shrimp ponds usually contain high concentrations of suspended solids and nutrients which can have a negative impact when discharged, causing algal blooms, changes in benthic communities and creating anoxic conditions (Burford et al., 2003; Biao et al., 2004).

There are water quality standards that need to be considered and monitored in aquaculture. In marine aquaculture practices the most important water parameters that need to be monitored are: alkalinity and hardness, ammonia, dissolved oxygen, nitrogen and phosphorus, pH, salinity, temperature, and turbidity (Larsson, 1994). The basis for water quality standards depends on the carrying capacity of the environment.

Table 5-18 provides relevant water quality criteria to freshwater aquaculture and mariculture. Biological indicators such as meiofauna are also important tools in environmental monitoring (Mazzola et al., 2000). Waste products are also a concern in aquaculture as the organic matter increases biological oxygen demand (BOD) in the environment and the inorganic nutrients, nitrogen and phosphorus, increase the primary production (mainly growth of microalgae) (Mazzola et al., 2000).

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Table 5-18: Summary of water quality standards/criteria relevant to freshwater aquaculture and mariculture

Parameter	Unit	Freshwater Aquaculture	Mariculture
pH	mg/L	5.0 -9.0	6.0 – 9.0
DO	mg/L	3.0 -7.0	3.0 – 7.0
NH ₄	mg/L	<1.0	<1.0
NH ₃	mg/L	<0.03	0.01 – 0.05
NO ₃	mg/L	10-50	<100
NO ₂	mg/L	0.06 -0.4	0.05 – 0.1
P	mg/L	0.05 -0.2	0.015

Parameter	Unit	Freshwater Aquaculture	Mariculture
PO ₄	mg/L	0.05-0.1	<0.05
TSS	mg/L	25-40	10 - 30
TDS	mg/L	500-1200	1200
Faecal coliform	Count/100ml	Not desired	Not desired

Larsson, 1994

The groundwater abstraction in coastal areas can result in intrusion of the saline wedge when the abstraction is greater than the recharge of aquifers. The over-exploitation of aquifers may increase the levels of groundwater salinity, affecting adjacent land and waterways (Primavera, 2006; Sousa et al., 2006). It is likely that the significance of this impact can be high given the possibility of ultimate degradation of water quality and the negative consequences resulting there from. "In Thailand, for example, the government banned the practice of inland fish farming in 1998 because of salinization (Primavera, 2006). The water exchange rates may also cause fluctuations in the salinity levels (usually an increase causing hyper salinity); however, this can be used as an advantage in case of mullet *Mugil cephalus* culture to control the excessive growth of the algae *Ulva lactuca* and the gut weed *Enteromorpha intestinalis* (Primavera, 2006).

5.4.2. Destruction of Natural Ecosystems, Mangrove Forests

The mangrove forests are important ecosystems considered as the main source of organic matter to the coastal zone; they are also nursery areas for many aquatic species ecologically and/or economically important, as well as refuge or nesting areas for bird, reptiles, crustaceans, and other taxonomic groups. Mangroves are additionally accumulation sites for sediments, contaminants, nitrogen, carbon and offer protection against coastal erosion. According to environmentalists, mangroves support diverse local fisheries and provide critical nursery habitat and marine productivity which support wider commercial fisheries. These forests also provide valuable ecosystem services that benefit coastal communities, including coastal land stabilization and storm protection.

Mangrove forests have proven to be of great use in Africa as support elements to address climate variations by providing the first barrier of protection to hinterland elements in the event of extreme events such as rising sea level, winds, cyclones and even tsunamis (tidal waves caused by earthquakes in seas and oceans).

Mangroves have been object of devastation and degradation in line with what has been described in the previous chapters. The cover of mangrove forest has decreased worldwide from 19.8 million hectares in 1980 to less than 15 million in 2000. The annual deforestation rate was 1.7% from 1980 to 1990 and 1.0% from 1990 to 2000 [17], and the problem continues up today. Some authors have documented that aquaculture has been responsible for the deforestation of millions of hectares of mangrove forest in Thailand, Indonesia, Ecuador, Madagascar, and other countries. Mozambique has still to determine a concise baseline of its forests' resources, including mangroves and the extent of the current and ongoing destructions by sources of activities, as documented during the formulation of the REDD+ for Mozambique in 2016. However, there are enough reasons to believe that currently because aquaculture in Mozambique is not well developed the levels of mangrove destructions because of this activity remain low even though, historically, shrimp farms have been established in mangrove ecosystems and this contributes to the reduction of the mangrove forest. This happened with the establishment of Sol & Mar Aquaculture farm in Beira City (Nhangau area).

5.4.3. Ecological Impacts on Natural Ecosystems Because of the Introduction of Exotic Species

The negative impacts of the "biological contamination" due to the introduction of exotic aqua-cultural species on the native populations have been well documented. The main reported problems are the displacement of native species, competition for space and food, and pathogens spread. There is also the possibility of hybridization through interbreeding between genetically divergent individuals of different but closely related species. To mention an example, recent reports have revealed a parasite transmission of sea lice from captive to wild salmon. The authors of such study have hypothesized that if outbreaks continue, then local extinction is certain, and a 99% collapse in pink salmon abundance is expected in four salmon generations.

The introduction of exotic species is already evident in Mozambique, especially in the Zambezi River System, where most of the catches in the Cahora Bassa reservoir correspond to the species *Oreochromis niloticus*, which was introduced from aquaculture systems upstream the Zambezi River. The species was imported into Zambia in 1982 for aquaculture purposes and appeared in the Kafue River in the mid-1990s after escaping from nearby fish farms. Subsequent aquaculture introductions occurred in Lake Kariba. It is now widely distributed and common in most sub-catchments of the Zambezi, Runde-Save, Buzi, and Limpopo river systems (Zengeya *et al.*; 2015). *O. niloticus* is now established and spreading, posing a threat to the other indigenous tilapia species such as *O. mossambicus*, which is also listed as Near-Threatened (NT) on the IUCN Red List of threatened species. *Oreochromis niloticus* is already established in the lower catchment of the Limpopo River basin where indigenous congeners are at an extinction risk through hybridization and competition exclusion (Zengeya *et al.*; 2015).

Lake Chicamba in Mozambique is a large (116 km²) impoundment in the headwaters of the Buzi River system, which was invaded by *Oreochromis niloticus* in 1996 from a small (<0.3 km²) upstream reservoir. Experimental and artisanal catch data showed no *O. niloticus* until January 1996; after this *O. niloticus* was recorded in up to 83% of experimental seine net catches, 33% of experimental gill net catches, 43% of boat angling and 23% of shore angling catches, and in 48% of artisanal gill net catches. The rapid invasion of this lake illustrates the significant invasion threat that small point-sources of this species pose to southern African freshwater systems (Weyl, 2007).

It is recommended that this species should not be used for aquaculture or fisheries enhancement in catchments that have not been invaded, and that the eradication of potential point sources of *O. niloticus* in non-invaded catchment systems should be considered (Weyl, 2007).

Over the years, mostly because of aquaculture practices and the aquarium trade, humans have introduced crayfish species in areas beyond their native ranges. Many of these species survived and now thrive in areas where they were not supposed to exist. Freshwater crayfish invasions have occurred all around the world. Freshwater crayfish are famous for being high-impact invaders: they alter the structure and functioning of the ecosystems they invade. The crayfish is now present and is spreading throughout Mozambique and Zimbabwe.

In recent times Tilapia lake virus (TiLV) has been identified as an emerging infectious in diseased tilapia on three continents (Asia, America and Africa). So far, the link between TiLV and disease outbreaks have been well documented in a limited number of countries (e.g. Israel and Thailand) in other countries further investigations are being undertaken to determine the significance of TiLV. Existing studies show that populations infected with TiLV show variable levels of morbidity and mortality, which while not being of no concern to human health, the consequences of infection with TiLV in tilapia populations may potentially result in socio economic losses and impacts on food security (file:///C:/Users/r.abila/Downloads/1499930739_tilapia-lake-virus-working-paper-2017.pdf)

5.4.4. Ecological Impacts Caused by Inadequate Medication Practices

Farmers usually expose their cultured organisms to medication regimes, for different purposes such as avoiding disease outbreaks and improving growth performance. However, monitoring studies have detected low or high levels of a wide range of pharmaceuticals, including hormones, steroids, antibiotics, and parasiticides, in soils, surface waters, and groundwaters. These chemicals have caused imbalances in the different ecosystems. In particular, the use of hormones in aquaculture and its environmental implications have been scarcely studied.

Although evidence is still scarce, the risk exists and should be mapped. Reference has been made of a company in Inhambane Province using hormones for sex reversion. The cages are located near a water body that is used by the community. There is a risk of runoff of water containing hormones being transported to the water bodies, affecting the aquatic biota (masculinization).

5.4.5. Changes on Landscape and Hydrological Patterns

The agricultural and aqua-cultural activities have contributed to the degradation of ecosystems including important modification on landscape. The construction of shrimp farms in the river beds has modified the hydrological patterns in many regions of the world with the consequent impacts on the regional ecosystems and the local weather. It is a fact that currently there is not enough evidence for weather but there are visible cases for landscape, in many places where earthen ponds have been established.

5.4.6. Trapping and Killing of Eggs, Larvae, Juveniles, and Adults of Diverse Organisms

It has been estimated that, for each millions of shrimp *post-larvae* farmed, four to seven millions of other organisms are killed by trapping in the nets of farms inlet. Migration of fish can also be negatively affected by aquaculture developments in many ways.

5.4.7. Social Impacts

It is not possible to discuss aquaculture without reference to social impacts, as the main objective of aquaculture is to increase food production, job creation and improve the economy and livelihood of local communities (FAO, 2006a). At the same time, it is difficult to deal with social aspects as they cannot be generalized because the tradition and cultures vary from region to region (FAO, 2006a). However, some common points can be found and are highlighted here.

Aquaculture is known as a source of conflicts between the multiple usages at the coast such as artisanal fisheries, recreation and tourism; new sites are needed to increase aquaculture production (FAO, 2006a; Primavera, 2006). Generally, there is a tendency to convert a multiple- use coastline to a single-use resource, leading to conflicts among the social groups (FAO, 2006a; Primavera, 2006).

There is an issue of unequal benefits from aquaculture between the involved or affected people. Conflict arises as a result of land degradation and the cost to mitigate the damaged sites or to restore the ecosystem (FAO, 2006a).

Aquaculture activities can severely affect water quality and habitat degradation, goods and services such as wild catches. Consequently, social conflicts may start (FAO, 2006a). In India, for example, women were forced to walk longer distances to collect drinking water due to salinization of nearby waters due to aquaculture pollution (Bunting, 2006). According to Bunting (2006) skin diseases in humans, associated with poor water quality in shrimp farming, have been a concern. Another concern is the sedimentation that causes siltation of irrigation canals. Furthermore, competition for water resources in some cases lead to violence between different groups of water users.

Figure 5-6: A fish pond with signs of eutrophication/Manica province



Source: PRODAPE CRA and ESMF formulation team (December 2018)

Aquaculture also affects the lives of individuals who are not directly engaged in the industry. The best identified social impacts of aquaculture are the effect of pollution and the disturbance of ecosystem that provides goods and services to local communities (FAO, 2009a). Cage culture is usually related to the decline of aesthetics and of returns from recreational fisheries. The declining of recreational fisheries and loss of habitat can bring severe implications for rural economies that receive income from visiting anglers and tourists. They can also block navigation paths and induce competition for use of water space. Some governments have introduced pollution fees, environmental taxes and tradable permits; however, these regulations are constraints to entrepreneurs as they can be interpreted in different ways (FAO, 2009a).

5.5. Potential positive impacts

The promotion of aquaculture will have several positive impacts, such as:

- Reduce the pressure on traditional ways of catching fish from the ocean and other freshwater bodies, which have been considerably depleted;
- Increase the access to fish and animal protein to communities living in hinterland areas. Traditionally it is only coastal communities that enjoyed such benefit;
- Increase and expand food security to more households and communities across the country;
- Contribute to the diversification of the national and community income and economies and expand business opportunities in and around the various segments of the fisheries value chain (e.g. supply of inputs, transport, conservation, processing, marketing, etc.);
- Job creation and income generation;
- Stimulate the improvement of production technologies in and around the various segments of the fisheries value chain;
- Contribute to the GDP and to improve the balance of payment.
- Aquaculture can also be integrated with crop and livestock systems, thereby increase overall farm productivity and reduce wastes through intake of farm manure and livestock wastes. PRODAPE will put effort to develop integrated fish-livestock-crop system.

5.6. Impacts related with climate change

Climate change is a relatively new concern that may threaten the sustainability of aquaculture development. The changes are due to gradual global warming and associated physical changes that can lead to extreme weather events (FAO, 2009a). For the year 2016, the drought affected an area of 16,320 m², corresponding to 544 tanks distributed in the following provinces: Maputo (92), Gaza (78), Manica (56), Tete (218), Zambézia) and Cabo Delgado (25), with a loss of about 285.6 tonnes of fish estimated.

It is difficult to predict the magnitude of future impacts of climate change on aquaculture dependent communities as the magnitude of the impacts depend on the vulnerability of each community, its exposure to the impacts, as well as its adaptive capacity (De Silva and Soto, 2009; FAO, 2009a). To minimize negative impacts, a better understanding and promotion of adaptive strategies by both public and private sectors will be required; also, so are the mainstreaming of cross-sectoral responses into governance frameworks (FAO, 2009a). Recognition of climate-related vectors and processes and their interactions and the availability of information for decision-making may be needed (FAO, 2009a). According to FAO (2009), cooperation and coordination between government and all relevant stakeholders will be required for policy-making and action planning in response to climate change. The FAO (2009) suggests a review on existing aquaculture management plans, to ensure that the plans will cover potential climate change impacts, mitigation and adaptation responses. A stand-alone Climate Risk Assessment for PRODAPE is underway. The results will inform all the actors on the appropriate measures to be taken to improve adaptation and response.

One of the biggest challenges facing the future world aquaculture industry is the access to proteins, minerals and omega 3 fatty acids. More than 85% of the world's fish stocks are already fully exploited, hence increasing the use of wild caught fish as ingredients in the aquaculture fish feed is no longer possible. Climate change could also reduce the agricultural production of soy, corn and other ingredients that today's fish feeds rely upon, hence the industry must search for new and sustainable resources to produce cultured fish, such as algae, in the future.

The industry needs innovative solutions to solve this urgent challenge (<https://climefish.eu/climate-change-and-impacts-on-aquaculture/>).

The potential trends of climate change on aquatic organisms and in turn in fisheries and aquaculture are less well documented. An increase in the incidence of disease outbreaks in corals and marine mammals together with the incidence of new diseases has been reported. It was suggested that both the climate and human activities may have accelerated the global transport of species, bringing together pathogens and previously unexposed populations (Mohanty et al., 2010). Climate change could affect productivity of aquaculture systems and increase the vulnerability of cultured fish to diseases. All aquatic ecosystems, including freshwater lakes and rivers, coastal estuarine habitats and marine waters, are influenced by climate change. Relatively small temperature changes alter fish metabolism and physiology, with consequences for growth, fecundity, feeding behaviour, distribution, migration and abundance. The general effects of increased temperature on parasites include, rapid growth and maturation, earlier onset of spring maturation, increased parasite mortality, increased number of generations per year, increased rates of parasitism and disease, earlier and prolonged transmission, the possibility of continuous, year-round transmission (Mohanty et al., 2010). The effects of climate change and as better discussed in the CRA for this project and PROCABA are reflected on change in rainfall patterns, drought and floods, cyclones and typhoons, eutrophication etc., which have shown to translate into devastating effect to the natural and socioeconomic fabric of Mozambique and the Southern African Region.

There are gaps in knowledge in relation to the response and adaptation of both marine and freshwater resources and ecosystems to climate changes, meaning that planning for the unexpected needs to become a priority (FAO, 2009a). Aquaculture activities should respond to these changes by relocating farms or alternately farming more tolerant and resistant species to climate changes (De Silva and Soto, 2009). In the development of adaptive measures, the interactions between temperature and salinity must be considered as it may vary between farmed organism (De Silva and Soto, 2009). Furthermore, examples of past management practices such as conservation of key ecosystems, strategies for flood, droughts and coastal management (Magrin et al., 2007) in response to climate variability and extreme events must provide valuable lessons as how to deal with unpredicted impacts of climate change (FAO, 2009a). A Geographical Information System (GIS) based assessments of aquaculture related vulnerability to climate change should also be conducted (NEPAD, 2005).

5.7. Aquaculture Potential in the PRODAPE Target Districts

Aquaculture potential in the 23 PRODAPE districts was determined using a combination of three variables, namely vulnerability to natural disasters (cyclones, floods and droughts), characteristics of soil types and water availability. The latter was considered the most important because its availability determines the development of this activity. For this reason, all districts that showed water scarcity had at least the same water availability score. Water availability was determined by the presence or absence of rivers, lakes, springs ([Figure 5-7](#)), low lying zones and depth to the groundwater. The agricultural potential of the region was used also as an indicator of water availability.

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Soil types were obtained from the soil map ([Figure 5-7](#)) classified according to the FAO criteria from which the soil properties such as clay content and permeability were extracted. These properties determine the soil's ability to retain water when earthen ponds are opened. A site may be considered suitable for earthen ponds if the soil will ensure:

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- Good water retention such as clay or sandy clay soils;
- Good pond fertility such as clay loam or silty clay loams

Vulnerability to accidents was determined by combining the incidence of floods, cyclones and floods ([Figure 4-6](#)).

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The aquaculture potential including that for cage aquaculture is presented in [Table 5-19](#).

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Figure 5-7: Hydrology and soil map of the PRODAPE target districts

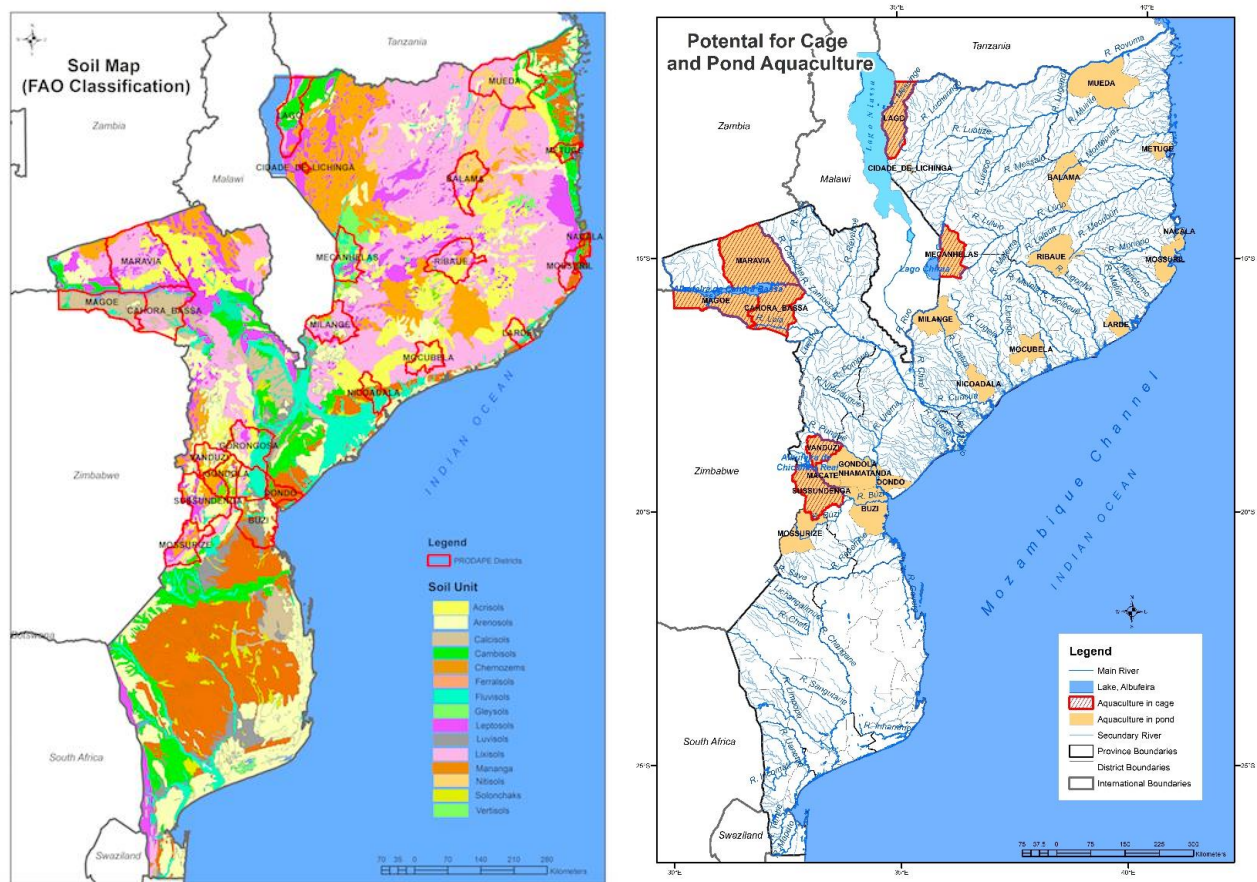


Table 5-19: Aquaculture potential in the 23 PRODAPE districts

Nr	District	(Drought & Flood Risks) + Cyclones Combined	Soils Characteristics	Water Availability	Aquaculture Potential
Cabo Delgado					
1	Balama	Low cyclone risk Low flood risk Low drought risk	Three predominant soil types (lixisols, Chernozems and acrisols) with physical characteristics that favour low permeability	High (Chipembe Dam and Montepuez River)	HIGH
2	Mueda	Low cyclone risk Medium flood risk Low drought risk	Two predominant soil types (lixisols and chernozems). They have high clay content favouring low permeability.	High (low lying areas)	HIGH
3	Metuge	Medium cyclone risk Low flood risk Low drought risk	Good. Cambisols developed in medium and fine-textured materials. Low permeability.	Medium (low lying area and high-water table due to the proximity to the sea)	HIGH
Niassa					
4	Lago	Low cyclone risk Low flood risk Low drought risk	Not relevant (High potential for cage farming)	High (Lake Niassa)	HIGH
5	Lichinga	Low cyclone risk Low flood risk Low drought risk	Sandy clay loam with low permeability	High (Lake Niassa)	HIGH
6	Mecanheas	Low cyclone risk Low flood risk Low drought risk	No predominant soil. Not relevant due to the high potential for cage farming	High (Lakes Chirua, Chiúta and Amaramba)	HIGH
Nampula					
7	Ribaue	Medium cyclone risk Low flood risk Low drought risk	Good. Predominantly a clay-rich subsoil and impermeable.	High (Lalaua and Ligonha Rivers and many springs)	HIGH
8	Mussoril	High cyclone risk Low flood risk Medium drought risk	Good. Predominantly a clay-rich subsoil and impermeable.	Medium (Monapo River but with low flow)	MEDIUM
9	Larde	High cyclone risk Medium flood risk Low drought risk	Good. Predominantly a clay-rich subsoil and impermeable. Occurrence of fluvisols close to the sea.	Medium (Meluli River but with low flow)	MEDIUM
Zambézia					
10	Milange	Low cyclone risk Low flood risk Medium drought risk	Good. Predominantly a clay-rich subsoil and impermeable.	Medium (Low lying area and high-water table due to the proximity to the sea)	MEDIUM
11	Mocubela	High cyclone risk Medium flood risk Medium drought risk	Good. Predominantly a clay-rich subsoil and impermeable.	Medium (No large river crossing)	LOW

Nr	District	(Drought & Flood Risks) + Cyclones Combined	Soils Characteristics	Water Availability	Aquaculture Potential
12	Nicoadala	Medium cyclone risk Low flood risk Medium drought risk	Good. Predominantly fluvisols and acrisols with heavy clays and Low permeability. Occurrence of Mananga soils of coarse texture, very low water retention capacity	High (Low lying area and high-water table due to the proximity to the sea)	HIGH
Sofala					
13	Dondo	Medium cyclone risk High flood risk Medium drought risk	Good. Black-colored soil containing a high percentage of humus. Impermeable.	High (Pungue River, Low lying area and high-water table due to the proximity to the sea)	MEDIUM
14	Búzi	Medium cyclone risk High flood risk Medium drought risk	Good. Arenosols and Luvisols are clay-rich soils with very low permeability	High (Buzi River, Low lying area and high-water table due to the proximity to the sea)	MEDIUM
15	Gorongosa	Low cyclone risk High flood risk Medium drought risk	Good. Predominantly fluvisols with heavy clays in basin areas. Low permeability.	High (Nhandare River Dam, Pungue River and springs around Gorongosa Mountain)	HIGH
16	Beira	Medium cyclone risk High flood risk Medium drought risk	Good. Black-colored soil containing a high percentage of humus and clay. Impermeable.	High (Pungue River, Low lying area and high-water table due to the proximity to the sea)	MEDIUM
Tete					
17	Cahora Bassa	Low cyclone risk Low flood risk High drought risk	Not relevant (High potential for cage farming)	High (Lake Cahora Bassa)	HIGH
18	Magoe	Low cyclone risk Low flood risk High drought risk	Not relevant (High potential for cage farming)	High (Lake Cahora Bassa)	HIGH
19	Maravia	Low cyclone risk Low flood risk Medium drought risk	Not relevant (High potential for cage farming)	High (Lake Cahora Bassa)	HIGH
Manica					
20	Gondola	Low cyclone risk Low flood risk Medium drought risk	No predominant soil.	High (springs, low lying areas and Revue River)	HIGH
21	Sussundenga	Low cyclone risk Low flood risk Medium drought risk	Not relevant (High potential for cage farming)	High (Lake Chicamba and Revue River)	HIGH
22	Vanduzi	Low cyclone risk Low flood risk Medium drought risk	No predominant soil.	High (Springs and Pungue River)	HIGH
23	Mussorize	Medium cyclone risk Low flood risk Medium drought risk	No predominant soil.	High (springs and Buzi River)	MEDIUM

While Mocubela comes out as a high-risk area for aquaculture production it is noted that out of the 23 target districts 15 show a high potential and 6 a medium potential, with Sofala (3 out of 4) and Nampula (2 out of 3) showing more cases of medium potential. It is only the provinces of Niassa (Lago and Mecanhelas districts); Tete (Maravia, Magoe and Cahora Bassa districts) and Manica (Vanduzi and Sussundenga districts) that show significant potential for cage aquaculture in their natural (Niassa) and man-made lakes (Tete and Manica).

Depending on the approaches to be adopted, there are reasons to call for a reconsideration of Mocubela district and/or to strengthen management systems to revert the adversities that could impact negatively on the productivity of this district while optimization strategies are designed and implemented for the remaining 22 districts.

The adequate management of effluents is indubitably one of the central aspects to consider for a sustainable aquaculture development. Diverse strategies have been proven or suggested to minimize the environmental impacts of effluents. The most promising are settling lagoons, treatments with septic tanks, the implementation of systems with low or zero water exchange, the utilization of recirculation systems, the use of mangrove forests as sinks for nutrients, organic matter, and contaminants, the polyculture or integrated multitrophic aquaculture systems, and the bioremediation (Porchas and Cordova, 2012).

Achieve certification of compliance with sustainability. Additionally, certification processes can be followed to assure the sustainability of aquaculture or to compare the standards established by the different agencies and check if the practices of any farm cope with those standards (Porchas and Cordova, 2012).

Finally, there is an unavoidable need to improve research and legislation regarding evaluation and solutions for aquaculture impacts. One of the reasons of the severe environmental impacts of aquaculture is that scientific research in some developing countries is firstly focused on increasing biomass production (improvement of formulated feeds, production systems, genetically improved organisms, etc.) and later on the environmental impacts; however, it is desirable to evaluate the potential impacts of any farm that is pretended to be installed, rather than monitoring the pollution that is already being caused by any farm constructed without considering its environmental impact. In addition, there is a great heterogeneity regarding policies and legislation of aquaculture impacts among different countries; while some developed countries have complete and concrete legislation for aquaculture in order to avoid environmental impacts, others have weak policies that do not protect their environment from aquaculture wastes; under such scenario ecological imbalances and disasters have been caused, with some of them being irreversible (Porchas and Cordova, 2012).

5.8. Cumulative impacts and Management

Briefly, Subchapter 5.2. has already elaborated on the cumulative impacts that can result from undertaking multiple aquaculture developments in the same area of influence/ecosystem.

Although this is done in general terms this subchapter tries to give indications for site (district/province/region) specific identification and assessment of other interventions in the project area that could contribute to positive or negative cumulative impacts.

Cumulative impacts can be defined as impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted and within a reasonable distance from the proposed project site (Murray et al. 2015).

While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or significant) in the same geographical area, and occurring at the same time, result in a cumulative impact that is collectively significant. Thus, the impacts of this Project and more importantly of the subprojects that will come from it need to be considered in conjunction with the potential impacts from other current and future developments or activities that are underway or planned and reasonably defined and are located within a geographical scope where potential environmental and social interactions could act together with the Project to create a more (or less) significant overall impact.

To provide guidance on the Cumulative Impact Assessment (CIA) of this project, the following valued environmental and social components (VECs) are considered:

- Physical features including soil and water;
- Environmental processes;
- Ecosystem conditions (e.g. biodiversity);
- Social conditions (e.g. health, economics); and
- Cultural aspects.

In line with the nature and characteristics of the ESMF the assessment is also made in general terms and it is a rapid assessment. For the final development and approval of subprojects detailed assessments will be required. It would also be difficult to try to compile a comprehensive list of existing and planned developments in the project area at this stage, thus the assessment focus on general traits and on what is generally known.

PRODAPE interventions will not happen in isolation. They will take place near other interventions initiated by all sorts of operators/investors, i.e. household, micro, small, medium and large in areas such as agriculture (including by PROPECA and PROAQUA), tourism, infrastructure, mining, etc. and they will have the potential of contributing to increased significance for the receiving natural and social environment. These could result in increased pressure on land, soil, water, forests, wildlife, air, etc., which could exacerbate social conflicts and the degradation of the ecosystems.

Increased pressure on soil, water and vegetation are of importance for this project. In Manica, Cabo Delgado, Nampula, Zambezia, and Tete artisanal mining activities occupy an important position in local economies. Púngòè and Buzi rivers basins are known for considerable pollution by artisanal mining/gold panning that is a critical issue in the respective basins and pose serious concerns to the aquatic biota and, ultimately, to the general water users in the Púngòè basin, including agriculture (ARA Centro, 2015). Cabo Delgado is also on the way to becoming a gas hub of international calibre, together with the mining of other minerals such as graphite in Balama.

The Zambezi, Púngòè and Lúrio are already and will be recipients of large undertakings in the areas of agriculture including irrigation, mining, energy, forests, industries, tourism including ecotourism. These may pose considerable stress on water availability and quality and possibly constraint the adoption of sound integrated water resources management.

The cumulative effects of developing aquaculture in areas generally marked by deforestation and poor land use practices in the entire project areas can lead to substantial erosion and increased sediment loads in rivers that deteriorate water quality. Salt water intrusion is another important water quality limitation in the deltas of the rivers and respective tributaries falling in the project area, which undermines the potential development of all the river basins. Most of these impacts are caused by human factors such as inappropriate land use practices or overexploitation of resources.

Cumulative impacts from construction, rehabilitation and expansion of aquaculture schemes in the same river basin may pose significant stress on water availability upstream and downstream of PRODAPE sub-projects, affecting other users, such as communities, agricultural, mining, industry projects, etc.

One of the best ways of mitigating the impacts of the various uses of resources, with potential negative impact on aquaculture, while impacts from the same activity are prevented from aggravating the ambient is the adequate land, water and natural resource use planning and working together with all the entities and programs/projects that deal with these crucial aspects and environmental components. A good land use plan and siting of interventions goes a long way towards achieving impact avoidance and minimization. This is specifically true in the case of Mozambique, which is known for being well endowed in terms of natural resources and relatively low population densities.

Integrated water availability studies at river basin level are crucial to design and define water intake for each of the existing, projected and future projects/sub-projects that use water, at regional level. Regional institutions such as ARAs play a fundamental role in this matter.

5.9. Measures to mitigate negative impacts

Many strategies have been suggested, evaluated, and/or proven in order to advance in the sustainability of aquaculture. Basically, all of them respond to the criticisms and are possible solutions to the problems attributed to the activity. The main aspects that must be performed to advance toward such goal are (Porchas and Cordova, 2012):

- The correct selection of the farming sites and species;
- The implementation of the most adequate culture system;
- Use of the best feed and feeding practices;
- The use of bioremediation systems;
- Decreasing the dependence of fishmeal and fish oil;
- Adequate management of the effluents;
- Achieving certification of compliance with sustainability;
- Improving research and legislation related to evaluation and solutions for aquaculture impacts.
- Integration of aquaculture with other farming systems (fish-crop-livestock integration), which is in line with the integrated economy at the household level in rural areas in the country.

| [Error! Reference source not found.](#)Table 5-20, below, provides a structured view of the problems and possible solutions that can be adopted to mitigate the negative impacts of aquaculture.

Table 5-20: Mitigation of potential negative impacts of aquaculture

N.º	Area of operation	Issues	Potential mitigation measures
1	Site selection	<p>Avoid competition with other resource uses (such as irrigation, potable water supply, water for domestic use etc.)</p> <p>It would be absurd to select a site for aquaculture purposes if it is excellent for agriculture or livestock, unless the integration of the three also shows real potential. Unfortunately, this is the case in many regions of the world, where agricultural lands have been reconverted to aquaculture farms</p>	<ul style="list-style-type: none"> ▪ The vocation of a selected site is determined by many aspects (which can change from region to region) such as physical and chemical soil characteristics; water availability, soil fertility, topography, wild vegetal and animal communities, proximity to cities, towns, tourism zones, and so forth; priorities of the region or country (food, fuels, tourism budget, aquaculture budget, and etc.) ▪ Link the siting of aquaculture subprojects to local land uses plans. Where such plans do not exist or are incipient, the PROJECT should contribute to stimulate the formulation and adoption of such plans ▪ Consider mitigations for risks relating to other project's physical developments and decide on the best aquaculture activity for the specific site (e.g. cage culture, hatcheries, feed production, aquaparks etc.
2	Water management	<p>The carrying capacity of the water bodies, as well as the water quality, water flow patterns, and availability of water from the sites considered to supply the farms or used as effluent discharge places must be clearly assessed.</p>	<ul style="list-style-type: none"> ▪ Evaluate how much water can be taken from a water body or how much effluents it can receive without important alterations on its ecological balance. The use of advanced technologies such as remote sensing could be an excellent auxiliary in this field. ▪ Liaise with the water resource management authorities (mainly ARAs) and other water users to determine quantity and quality parameters to be adopted in aquaculture in the region, including environmental flows ▪ Consider also water management in the context of cage culture and contribute to strengthening ARAs to become more capable of exercising local water management entities.
3	Contamination of systems by fish feed	<p>Since supplemental feed is considered the main source of contamination of aquaculture systems and effluent receiving ecosystems, the improvement of these feed, as well as the feeding, strategies could be considered as an important part of the solution for a sustainable aquaculture</p>	<ul style="list-style-type: none"> ▪ Better and more precise formulations for the species to be farmed, which consider the best concentration and quality of the nutrients. A common practice of world aquaculture is the use of diets with protein contents higher than those required, thus affecting not only the price of the feed but also increasing the pollution potential, considering that protein catabolism produces ammonium nitrogen as the main metabolite. Regarding nutrient quality, it is important to use ingredients with high digestibility; the low digestibility of ingredients (protein, lipid, carbohydrate) is partially the responsible for a low retention of those

N.º	Area of operation	Issues	Potential mitigation measures
			<p>nutrients in the farmed organisms and their increase in the water column and sediment, augmenting the polluting potential.</p> <ul style="list-style-type: none"> One of the most important causes of nutrient losses of aquafeeds is the low hydro stability, which provokes fast disintegration and lixiviation, decreasing the nutrient incorporation efficiency by the farmed organisms and increasing the concentration in the water column. Fishes are faster swimmers and can consume a formulated feed within minutes, but crustaceans are usually less active and can consume the formulated feed within minutes or even hours. The hydro stability of feedstuffs can be improved by incorporation of effective binders and/or for the use of special fabrication processes. The most effective invention in this aspect is the floating pellet feed, which stays afloat for several hours, increasing the chances of being noticed and eaten by fish. Better attractability and palatability. It is necessary to produce feeds which can be consumed as soon as possible to avoid nutrient losses. This is possible with the incorporation of effective attractants and improving the palatability with ingredients such as fish oils and others.
4	Feeding strategies	Some important advances have been achieved but there are yet much more to advance in aspects such as forms to supply the feed, adjustment of the ration, and frequency of feeding	<ul style="list-style-type: none"> The use of feeding trays and the increase of feeding frequency have been demonstrated to diminish the pollution potential of the effluents in shrimp farms; however, these strategies are suitable only for high-intensity systems (intensive or super-intensive), but not economically feasible for extensive, semi-extensive or semi-intensive systems. The promotion, management, and rational utilization of natural feed, including microorganisms (biofilm, bio floc), are considered as a promising strategy for the culture of shrimp, fishes, and molluscs. The practice of sub-feeding or intermittent-feeding regimes is a strategy aimed to achieve average growth performances in aquatic organisms but supplying significantly lower amounts of formulated feed. Such alternative takes advantage of the compensatory growth process of shrimp and crustaceans
5	Selection of fish species	Avoid the introduction of exotic/invasive	<ul style="list-style-type: none"> It is always better to select native instead of exotic species. The introduction of

N.º	Area of operation	Issues	Potential mitigation measures
		species	<p>exotic species causes many and diverse problems as mentioned in the previous section. Additionally, the obtaining and maintenance of brood stock of exotic species could be difficult and expensive.</p> <ul style="list-style-type: none"> ▪ It is necessary to have the most possible knowledge about the biology and ecology of the organism that is pretended to be farmed (life cycle, feeding habits and nutritional requirements, tolerance to environmental parameters, etc.). ▪ It is important to select organisms with a good market and price when farmed for commercial purposes. A major consideration is the reproductive potential, growth performance and tolerance of the selected species (e.g. this is the main advantage farmers find in the Nile tilapia (<i>Oreochromis niloticus</i>), even if other species may have equally high demand).
6	Adoption of the best culture system		<ul style="list-style-type: none"> ▪ The type and size of farming structure. Depending on the species, intensity, land and water availability, and economic investment, it is possible to use different types of farming structures for the culture of the same species or group. Some of them are more adequate and sustainable. It has been suggested that floating or submerged cages could have a lower impact on the environment than earthen ponds, but as final decision should be based on the prevalent conditions on the ground and be site-specific. ▪ The stocking density and the consequent biomass harvested are absolutely related to the sustainability of aquaculture. The increase of the intensity implies an increase in the supplemental feed and in consequence, in the organic matter, nitrogen, and phosphorous in the effluents. Additionally, intensive or super intensive systems require the use of diverse chemicals (antibiotics, algacides, parasiticides, and etc.), which also contribute to increasing the pollution. The most adequate intensity depends on the land and water availability, as well as the carrying capacity of the water body or terrestrial ecosystems which will receive the effluents. However, recirculating and zero water exchange systems can eliminate the environmental impact while maintaining extremely high densities of aquatic organisms. ▪ An adequate design of the water inlet and outlet systems, considering the water quality, weather conditions, marine currents and tide patterns (for sea water), and hydrological patterns (for continental waters). ▪ The possibility of farming simultaneously two or more species (polycultures or integrated multitrophic aquaculture (IMTA)). This strategy has proven to be one of the most effective ways to recuperate the carbon, nitrogen, and phosphorous

N.º	Area of operation	Issues	Potential mitigation measures
			<p>supplied to the system as biomass of the farmed organisms and to diminish the environmental impacts caused by the effluents. The integrated fish-crop-livestock system involving recycling of wastes and multiple water uses e.g. fish pond, poultry, vegetable garden also has a strong potential of optimizing results.</p>

5.10. Summary of PRODAPE Subproject Mitigation Measure

As stated at the beginning of this Chapter PRODAPE physical subprojects with significant environmental and social implications will be in the form of:

- hatcheries in selected locations (the focus will be on establishing one main hatchery in each target province);
- fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs;
- earthen ponds among rural smallholders of a standard size of 500 m²;
- cage farming in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds;
- organization of smallholder operators into aquaparks and clusters to develop their activities in and around these production units
- facilitation for the development of infrastructures and services to facilitate market linkages for fish products (inputs and outputs).

In line with the descriptions and analyses made above [Table 5-21](#)~~Table 5-21~~, [Table 5-22](#)~~Table 5-22~~ and [Table 5-23](#)~~Table 5-23~~ provide a summary of a set of measures required to mitigate potential environmental and social impacts likely to result from these developments. These are further elaborated in Chapter 8 and Annexes from 3 to 7.

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Table 5-21: Overview of mitigation measures for PRODAPE physical developments

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
1	Stocking of farmed aquatic species	Hatchery development	<p>Biodiversity impact on wild species due to introduction of exotic species.</p> <p>Using local species is always recommended, however some imported species were developed specifically for commercial production. Importation of these species could contribute significantly to increase the production and productivity, which is PRODAPE's goal.</p> <p>The irresponsible transboundary movement of aquatic animals for aquaculture is a further issue, including both the introduction of exotic species and the movement of already existing species that can led to the occurrence of disease outbreaks.</p>	Medium	<ul style="list-style-type: none"> - Importing of aquaculture fish species (where necessary) requires an authorization from the responsible Ministry (fisheries), subject to analysis by the National Institute for Fishing Research and respecting the quarantine procedures. The Ministry establishes which species are not permitted to be imported (Article 9 of Decree 35/2001, General Regulation of Aquaculture). - Genetic multiplication is also subject to authorization. - Prohibit the development and use of genetically modified organisms. <p>(Box 5-1: Exotic Species in AquacultureBox 5-1: Exotic Species in Aquaculture – provides a more elaborated explanation about this subject)</p>
		<p>Hatchery development</p> <p>Pond and cage aquaculture</p>	<p>Potential escape and therefore potential genetic and biodiversity impact on wild fisheries.</p> <p>Due to exceptional weather conditions (mainly floods), vandalism or even inappropriate management stock fish from ponds or cages might escape into the rivers, dams or the coastal waters.</p>	Medium to High (Depending on the location based on CRA)	<ul style="list-style-type: none"> - Escape proof mechanism in design (screens, netting, etc.) - Escape prevention in operations (when grading and moving animals). - Security against theft. - Use wild caught brood stock where available, collect brood stock within zone of culture

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N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
					<p>facility, implement brood stock programme.</p> <ul style="list-style-type: none"> - Location of the site above the 100-year flood line. - Attain permit from the fishing sector for any species listed as alien and invasive.
2	Fish feed production	Increase feed processing (at least one processing unit per province)	<p>Promotion of agricultural production and improved integration between plant and animal production including aquaculture (positive).</p> <p>A secure market can promote agricultural development of maize and soy.</p>	High	<ul style="list-style-type: none"> - Promote an enabling environment and appropriate linkages and contracts between farmers and the feed processing industry.
3	Site location	Pond aquaculture	<p>Destruction of ecological sensitive areas.</p> <p>All conservation areas, community forests, sacred places are also ecologically sensitive. Other impacts are important if result in destruction of wetlands and mangroves. However, this kind of interventions are not eligible for PRODAPE funding and this should be adhered to in a consistent way.</p> <p>Poor siting of cages can affect negatively the landscape, water quality (depending on the number and location of cages), and it can also lead to conflict with other water uses and development sectors such as navigation and tourism.</p> <p>The actual scenario of aquaculture (and agricultural irrigation and water use in general) development is still incipient in Mozambique to reach significant levels of impact. Nevertheless,</p>	Low	<ul style="list-style-type: none"> - Ensure the protection of mangrove forests, wetlands and other ecological sensitive coastal areas. - Be consistent with the fact that the Project excludes saltwater aquaculture - Ensure protection of conservation areas, community forests and other areas of biodiversity importance.

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
			this point must be taken into consideration, especially if the aquaculture development is in a system that has other developments which could contribute negatively to pollute the environment. An additional pollution source is undesirable.		
4	Land clearing	Pond aquaculture	<p>Natural vegetation clearing.</p> <p>The establishment of an aquapark, depending on the area, may lead to land cleaning, destruction of habitats that are essential for local fauna and local community livelihoods and subsistence.</p>	Medium	<ul style="list-style-type: none"> - Minimize vegetation clearing through choosing areas already cleared. - Whenever possible, avoid destruction of large trees (diameter > 250 mm). - No aquaparks are to be established in partial protection areas (see Regulation of the Land Law). - Discourage the conversion of agricultural or cultivable land to aquaculture use. - Ensure that abandoned or degraded aquaculture sites are ecologically rehabilitated, and that the developers bear the cost of rehabilitation.
5	Use of chemical products and antibiotics	Pond and cage aquaculture	<p>Environmental contamination, bioaccumulation, resistance.</p> <p>Use of chemicals and antibiotics is not yet a common practice. However, PRODAPE interventions have the potential of taking the actual level of subsistence in aquaculture to commercial level, which often requires intensive use of chemicals and antibiotics.</p> <p>There are two food safety issues surrounding</p>	Low	<ul style="list-style-type: none"> - Promote integrated management of chemicals in aquaculture and agriculture. - Prohibit the use of toxic and bio-accumulative compounds in aquaculture operations. - Discharge of water containing chemical products, pathogens, organic matter and sediments must be done in dry and controlled land. Appropriate

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
			aquaculture operations. The chemical risk is associated with chemicals applied to the aquaculture production and the biological is associated with bacteria and parasites that can be transferred to humans from fish products.		<p>effluent treatment system must be established.</p> <ul style="list-style-type: none"> - Only secure effluent can be discharged into the environment respecting the regulation on quality standards for effluent discharges (Decree 18/2004). - Where unavoidable, only registered chemicals are to be used in this activity. - Use biodegradable chemicals. - Store chemicals correctly. - Train staff accordingly. - Antibiotics should not be used prophylactically; - Correct dosage and usage of chemicals. - Rotation of chemotherapeutics to avoid resistance. - Keep a chemical register. - Use approved therapeutic agents under veterinary supervision. - Record expiry dates of chemicals, treatments done including duration and type of chemicals. - Consider residual times. - Conduct environmental and social impact assessments and prepare and implement environmental and social management plans
6	Water abstraction,	Pond and cage aquaculture	Eutrophication, turbidity, anoxic sediment,	Medium	- Prohibit the pollution of

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
	organic waste, effluent.		<p>algal blooms.</p> <p>Overfeeding is often due to the poor technical knowledge of farmers, especially in small scale farming. Overfeeding is responsible for the deterioration of the environment surrounding aquaparks, health and financial problems. This excess of nutrients if drained into natural environment can affect natural water quality by eutrophication, sedimentation and algae blooms.</p> <p>Eutrophication of surround aquatic ecosystems due to excess feeds may lead to algal blooms due to excessive nitrogen and phosphorous present, sediment enrichment and anoxia below and in the vicinity of cages and poor water quality due to waste build up. The blooming of phytoplankton can lead to the proliferation of toxic algae which may develop into red tides.</p> <p>Organic matter and N and P nutrients are known to accumulate in sediments around cages.</p>		<p>surrounding areas resulting from the excessive discharge of organic waste.</p> <ul style="list-style-type: none"> - Feed management programme to optimize food consumption ratio, use of species and system specific feed (stability, floating, etc.). - Regular monitoring. - Effluent treatment. - Rotate cages regularly to reduce benthic impacts. - Compost freshwater sludge. - Collect baseline data prior to operation. - Regular monitoring by independent persons. - Discharge effluent tested for quality according to national standard (Decree 18/2004). - Conduct environmental and social impact assessments and prepare and implement environmental and social management plans
7	Confined animals, high stocking densities.	Pond and cage aquaculture	Increased risk of diseases spread/occurrence from farmed to wild animals.	Medium	<ul style="list-style-type: none"> - Animal health management, biosecurity programme, use of appropriate prophylactics (probiotics and feed supplements vs. antibiotics) is encouraged. - Implement quarantine. - Acquiring animal health certificates for movement of

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
					animals. - Proper training to the beneficiaries. - Contingency plan. - Correct disposal of mortalities. - Report disease outbreaks. - Vaccinations.
8	Water use.	Pond aquaculture	<p>Access of water.</p> <p>Aquaculture demands water specially if pond aquaculture, which requires extraction of water from natural environment to ponds. This water must be replaced due to evaporation, water circulation and water change/cleaning. Raw water utilization, especially for small farmers is not seen as a production input, because in most cases, this utilization falls into common use. However, development of an aquapark is considered a private use, which requires a license.</p>	Medium	- Determine the amount of water needs through environmental impact assessment studies or simple screens. - No person shall utilize water without the written authorization of the competent authority (ARAs). This is applicable to surface or underground water. This will also inform the amount of existing water and potential conflicts with other authorizations along the basin/water course. - ARAs do also impose the tariffs for the use of water. It must be emphasized that returning water to the river course is also subject to regulation. Regulation on water licensing and concessions must be enforced. - An abstraction of natural river flow to access to water is also subject to authorization from ARAs. PRODAPE Subprojects must be approved by this entity. Regulation on small dams and

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
					regulation on dam security must be enforced.
9	Feeding	Pond and cage aquaculture development	<p>Development of resistant pathogens.</p> <p>Antimicrobials used as feed additives will pose a pressure for development of resistance among natural occurring microorganisms when excessive feed and/or fish faeces containing antimicrobials are released and accumulated in the environment. Any such resistance development represents a potential risk to food safety and for the development of resistant pathogens.</p>		
10	Socioeconomics	Pond and cage aquaculture	<p>Poverty alleviation</p> <p>Among other mechanisms, poverty alleviation can be achieved through 3 main mechanisms:</p> <ul style="list-style-type: none"> - Providing revenues to aquaculture farmers, especially when fish targets the export market. - Generating affordable source of protein for consumption within and outside the farming household. - Generating labour opportunities for extremely poor households. <p>Revenue from aquaculture is still incipient in the country, especially from exportation.</p> <p>The production of freshwater fish for domestic</p>	High	Credit schemes should be made available to small and medium producers and other actors in the value chain to allow proper investment and avoiding of marketing problems associated with poor siting and improper feeding practices.

N.º	Activity	Planned physical/processual developments	General description of potential environmental and social impacts	Expected magnitude (high/medium/low)	Proposed mitigation / enhancement measures
			<p>consumption contributes significantly to providing affordable source of protein to rural communities. This contribution is also incipient compared to fish resulting from fishing.</p> <p>The aquaculture sector is not providing much employment at present but is suitable for providing alternative income generation for local communities. It can also be an activity that can be done together with agriculture, as it requires less maintenance during operation.</p> <p>Considering that the project covers almost the entire country, it can be expected to have new feed processing units along the country, which can result in more employment in all value chain (construction, feeding production, aquaculture operation, processing, and commercialization).</p>		
			<p>Resource conflicts between aquaculture and other water uses (navigation, fisheries, water supply, and other domestic uses).</p> <p>Water pollution leads also increased conflicts between resource users, even within the aquaculture sector itself.</p> <p>Poor location of cages can create conflicts with tourism, navigation and fishing sectors.</p>		<ul style="list-style-type: none"> - Participate in the water committee meetings. - Code of conducts and MoU's amongst all users. - Use of warning markers on cages. - Good site selection to avoid conflict. - Keeping of comprehensive complaints register and implement complaints procedures. - Maximize water utilization in the system (efficiency). <p>Implement water pollution prevention measures.</p>

Box 5-1: Exotic Species in Aquaculture

Exotic Species in Aquaculture

The introduction of exotic species or escape of farmed species into the natural environment is one of the adverse impacts of aquaculture that needs to be considered. The consequences of introducing exotic cultured species could be the alteration or impoverishment of native communities and populations of the invaded ecosystem, due to inter-breeding, increased predation and competition for food, space and habitat (Primavera, 2006; Casé et al. 2008). The exotic species can cause degradation of the natural environment and, the alteration of genes in host species. Foreign diseases and parasites that can infect native species are also associated with exotic species (Primavera, 2006). The impact of these foreign diseases can be catastrophic to commercial farmers.

According to (IFAD, 2017) (Social, Environmental and Climate Assessment Procedures) the introduction of invasive and exotic species can result in damage or extinction of native fish populations through predation and the spread of diseases and parasites, and genetic impacts through the escape of non-native and genetically modified organisms (GMOs). Fish farming can achieve adequate production levels without the use of GMOs, as careful selective breeding programmes can help to improve the genetic characteristics and overall productivity of cultivated species. The long-term impacts of GMOs on local biodiversity are difficult to predict and likely to be very detrimental and more research is necessary on this aspect.

Whenever possible, native species should be used for culture and measures should be taken to minimize unintentional release or escape of cultured species into natural environments (FAO, 2011). Exotic species are to be used only when they pose an acceptable level of risk to the natural environment, biodiversity and ecosystem health. The introduction of exotic species and GMOs into new environments should not be permitted until extensive research has been carried out into the potential long-term impacts.

The IUCN *Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species* says that the introduction, control and eradication of exotic invasive species are problems that have become increasingly important in the recent past. It is no longer a problem of a few "exotic" species in a few countries. In highly mobile societies and in a globalised economy the impacts of exotic species have become a threat to biodiversity world-wide. Deliberate introduction into the environment, particularly of living modified organisms, have increased in numbers. International trade, travel, transport and tourism have intensified and increased the pathways for unintentional introductions.

International and national legal frameworks are not yet in place to respond effectively to the problems. Mozambique finds itself in a more complex context in this regard due to its multiple institutional weaknesses, especially those related with research, law enforcement and quality control and monitoring. It is evident that clear, comprehensive and harmonised rules and regulations are needed. They must cover both intentional and unintentional introductions of well-defined exotic species that have the potential of being invasive. Reliable monitoring systems need to be in place as well as tools for eradication, containment and control where exotic species have become invasive.

Although genetic engineering can clearly benefit the aquaculture industry, its development and application are tied to the needs of aquaculture industries in the First World. The benefits of genetic engineering to people in the Third World countries are unclear for several reasons. The development of transgenic organisms is a highly technical and costly enterprise that requires an intensive industry working under rigid controls. An adequate return on investment may be possible in countries where aquaculture is practiced intensively (e.g., salmonid and prawn cultivation), but investments are much less likely to be viable in developing countries, where aquaculture tends to be extensive.

FAO has produced several documents to warn about the danger of introducing exotic species, such as the Codes of Practice and Procedures (FAO, 1993; Turner, 1998), and it has even prepared a database on the introduction of exotic species (FAO, 1998). Governments bear the largest responsibility when introducing exotic species.

Table 5-22: Checklist of generic potential construction and operational activities, impacts and mitigation measures

Activity	General impact	Mitigation measures
Facility and infrastructure construction	Erosion, dust, noise, waste	<ul style="list-style-type: none"> ▪ Suitable pond walls and slopes to prevent erosion. ▪ Repair eroded areas. ▪ Avoid planting rooted trees near tanks/ponds. ▪ Soil conservation and reutilization to plant grass in disturbed areas.
Roads, access and security	Dust, vegetation clearing, uncontrolled movement of individuals / vehicles	<ul style="list-style-type: none"> ▪ Control access and implement security. ▪ Limit road footprint. ▪ Maintain roads to prevent dust.
Electricity supply and communication	Safety	<ul style="list-style-type: none"> ▪ Safe electrical installations. ▪ Regular maintenance. ▪ Splash proof plugs.
Sewerage and ablution	Organic waste, contamination of groundwater	<ul style="list-style-type: none"> ▪ Link to a formal sewerage system for treatment. ▪ Sewerage conservancy / bio remedial systems. ▪ Sewerage pipes buried at adequate depth. ▪ Conservancy tanks must be emptied regularly.
Chemical and hydrocarbon fuels	Environmental contamination	<ul style="list-style-type: none"> ▪ Correct storage and handling. ▪ Train staff on the use and storage of chemicals. ▪ Prevent and check for leaks regularly. ▪ Avoid using fuel or chemicals near water. ▪ Washing equipment and vehicles in water courses are not permitted.
Stabilization and soils	Erosion	<ul style="list-style-type: none"> ▪ Topsoil stripped separately and kept, suitable vegetation cover of exposed areas. ▪ Avoid construction on steep slopes. ▪ Stabilize soil.
Fire	Fauna/flora loss, human safety	<ul style="list-style-type: none"> ▪ Fire extinguishers. ▪ Firefighting equipment. ▪ Designed smoking areas.

Activity	General impact	Mitigation measures
		<ul style="list-style-type: none"> Contingency plans to deal with fire. Display emergency contact details.
Pumps, aerators construction	Noise, light, odour	<ul style="list-style-type: none"> Add sound dampening cover to aerators, pumps, generators. Regular maintenance of equipment. Ensure that facilities operate within urban and peri-urban bylaws for noise generation. Limit loud noises to business hours where possible.
Vegetation and site clearance	Vegetation and fauna loss, heritage	<ul style="list-style-type: none"> No-go areas. Limit access to sensitive areas. Plant indigenous species. Protect heritage areas (archaeological, graves, burial grounds, wetlands, dunes, inter-tidal zones, forests, etc.).

Table 5-23: Checklist of documents which should be kept by the applicant with regards to best environmental practices and applicable legislation requirements

Legal requirement	Permits / licenses
Land law	Land title
Decree 54/2015, regulation on environmental impact assessment process	Environmental license
Ministerial Diploma 83/2002, Decree 68/99	Construction license
Decree 35/2001, General regulation on Aquaculture	Operation license
Decree 43/2007, regulation on water license and concessions	Water use license / concession, that can be obtained on behalf of associations and/or groups of associations

6. Analysis of Alternatives

All the aspects in and around the environmental and social management systems, laws and regulation, associated with the GoM and IFAD as well as with any other agencies are part of a wider process of decision making. Each intervention should be interested in assessing which route will be more appropriate from the environmental and social perspective (as well as a technical and economic viewpoint).

Alternatives analysis in environmental management in general and in ESIA is meant to bring environmental and social considerations into the “upstream” stages of development planning, as could be project identification and even earlier, as well as the later stages of site selection, design and implementation. In the absence of such considerations, those steps in the project cycle are taken solely based on technical feasibility, economics, and, at times, political preferences. Under such circumstances environmental management systems and ESIA become only an opportunity to reaffirm a project proposal. Under such cases the ESIA exercise is restricted to identification of mitigation measures. Whereas environmental and social analysis at an earlier stage might have revealed another cost-effective way of achieving the same objectives or even better at a lower cost from several perspectives.

The various SECAP tools presented in [Table 3-4](#) and [Table 3-5](#) cover different stages of project formulation and clarify precisely to ensure that the subsequent stage is achieved only after verification that there are strong chances of viability to do so, which is part of the pre-feasibility and feasibility studies, covering all the relevant aspects (economic/financial, technical, environmental and social, etc.).

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The environmental and social impacts of the alternatives at the higher levels would be evaluated and compared as an integral element of the planning process, in parallel with the economic analysis and consequently would have been considered prior to project identification.

A sound analysis of alternatives should encompass:

- Evaluation of the potential for demand side management (DSM), i.e. are the products/services to be produced in demand and to what extent;
- Identification and screening of alternative sites (which are the most appropriate, which will allow for impacts to be avoided/minimized);
- Identification and screening of environmental components that serve as inputs to the production processes (e.g. land, water, etc. and their long-term availability/quality);
- Evaluation of realistic alternative sources of the above-mentioned inputs;
- Comparative assessment of alternatives (which offer better outcomes at lower cost from a wider perspective);
- Comparison of conceptual and design alternatives for the proposed subproject.

An important aspect of this exercise is public participation and engagement appropriate to each stage of the study, in line with what is stipulated in Subchapter 7.7 (below) of this ESMF.

It is only after collecting and analysing all these elements that the best site, technology, timing, etc. will be decided upon.

The final product is designed to be useful in local and national economy; in planning by financial institutions for their activities in the region and the subsector; for planning by private investors; in identifying stakeholder concerns and building consensus; and as an input to preparation and environmental and social impact assessment of individual proposed subproject.

Chapter 7 also provides additional inputs including screening forms that can be used in the analysis of alternatives in subproject development.

7. Screening Criteria and Forms

7.1. Overview

Potential environmental and social impacts will be adequately addressed through the institutional arrangements and procedures set up under the Project interventions for managing the identification, preparation, approval, environmental licensing, implementation, monitoring, evaluation and auditing of sub-projects.

A field guide for the implementation of the ESMF will be prepared as part of the Project Implementation Manual (PIM) to guide the PCU and local implementing institutions on the screening process and subsequent procedures and requirements for approval of subprojects accordingly with the Mozambican legislation and IFAD Procedures and Systems.

The Project has been classified as Category B according to IFAD Policies and Procedures, as most if not all the of sub-projects under components 1 and 2 will fall in this environmental category and/or below, i.e. Category C. On the other hand, according to Mozambique environmental regulation, most of the sub-projects will fall within the same category B, while some others will fall in Category C. As per both Mozambican and IFAD regulations Category B projects require less stringent processes (simplified ESIA and ESMP, respectively) since the environmental and social impacts are easier to deal with; few if any of them have irreversible effects; and in most cases appropriate mitigation measures can be readily designed. Environmental and social best practices recommend that negative impacts be avoided and/or minimized, and that adequate and implementable mitigation and management measures be put in place early enough where avoidance is not feasible.

The key to environmental and social management is the environmental and social screening process, which may or may not result in the preparation of a full ESIA/ESMP document, a freestanding ESMP or no action need to be taken. The screening process should follow IFAD's SECAP and the Mozambican Regulations for Environmental (and Social) Impact Assessment Process (DM 54/2015), as established in the Chapter 3 of this ESMF that deals with the legal and institutional aspects.

The screening process will be carried out at specific sub-project sites in the field once they have been identified. The environmental and social screening process is necessary to identify if the subprojects will cause environmental and social impacts and to decide on the level of environmental and social assessment required. The environmental and social screening is part of the preparation and approval process of subprojects financed by the Project. It also can be used to ascertain the viability of a subproject including exploring alternatives from a broader perspective.

The objectives of the screening process include those meant to:

- determine which construction/rehabilitation and operation activities are likely to have potential negative environmental and social impacts;
- determine the level of environmental and social work required, including whether an ESIA/ESMP or a freestanding ESMP is required or no action need to be taken;
- determine appropriate mitigation measures for addressing adverse impacts;
- incorporate mitigation measures into the development plans for the subproject;
- indicate the need for a Resettlement Action Plan (RAP) and/or any other form of compensation/restoration of affected livelihoods. Note should be taken though of the fact that PRODAPE does not foresee that any of its subprojects will have resettlement implications. Where such can become confirmed the subproject will be restructured, resized to avoid such a phenomenon or simply be abandoned and not be pursued under PRODAPE;
- facilitate the review and approval of the construction/rehabilitation and operation proposals;
- provide an initial guidance for monitoring environmental and social parameters during the implementation and operation of project activities;

The extent of environmental and social work that might be required, prior to the commencement of construction/rehabilitation works, and during construction and operation will depend on the outcome of the screening process.

To ensure adequate implementation of PRODAPE ESMF different stakeholders will have different roles. The table below (Table 7-1, Table 7-4) summarizes roles and responsibilities of different institutions.

Table 7-1: Roles and responsibility in implementing ESMF and preparing ESIA/ESMP

Roles	Intuitional responsibilities	Assistance/Collaboration
Screening of Project Activities and Sites	DPMAIP/DFA ⁴⁹ (PCU-ESSS ⁵⁰)	PCU-ESSS, ARAs,, SDPI, SDAE and Local Authorities
Filling of the Environmental and Social Checklist	DPMAIP/DFA (PCU-ESSS)	PCU-ESSS/Professional Service Providers
Preparation of the Environmental and Screening Report		Professional Service Providers
Assigning the Appropriate Environmental and Social Categories	DPTADER	Professional Service Providers to interact with DPTADER as needed
Preparing the simplified ESIA/ESMP (Category B)	DPMAIP/DFA (PCU-ESSS)	Professional Service Providers
Good Environmental and Social Management Procedures (Category C)	PCU-ESSS	PCU-ESSS ARAs, PCU-ESSS, SDPI, SDAE and Local Authorities/ Professional Service Providers to prepare simple ESMP if needed
Subproject ESIA/ESMP Review and Approval	DPTADER	PCU-ESSS
	PCU-ESSS for IFAD requirements	Professional Service Providers to interact with DPTADER as needed
Participatory Public Consultation and Disclosure	DPMAIP/DFA (PCU-ESSS)	District/Local authorities PCU-ESSS
	PCU-ESSS for IFAD requirements	Professional Service Providers to conduct the process
Grievance Mechanism	PCU-ESSS	District/Local authorities
		Professional Service Providers/NGOs/CBOs
Monitoring/Inspection Reports and review	DPMAIP/DFA (PCU-ESSS)	PCU-ESSS District/Local authorities
	DPTADER	
Environmental and Social Audit	DPTADER/IFAD	PCU-ESSS

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7.2. Screening of Project Activities and Sites

⁴⁹ Department of Fisheries and Aquaculture at the provincial level

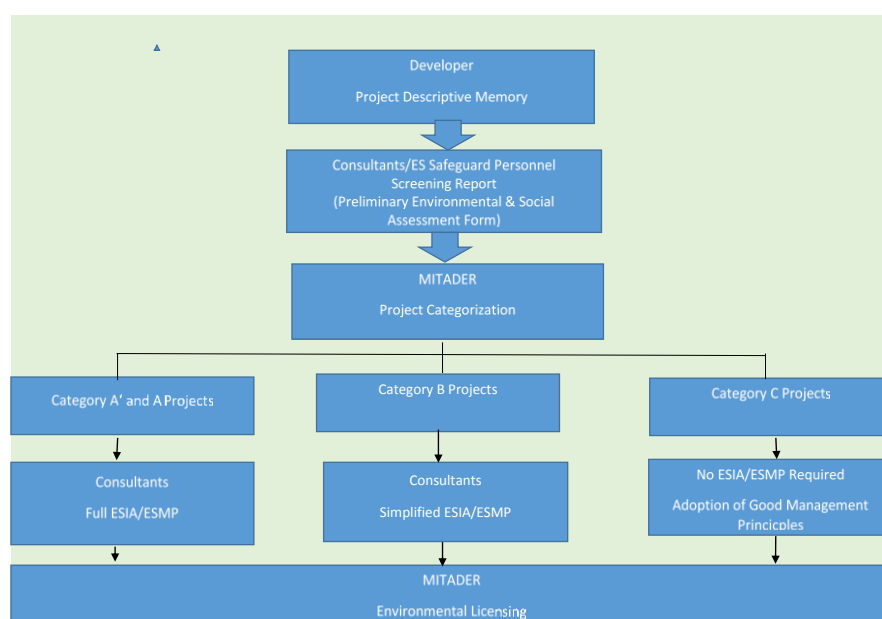
⁵⁰ Environmental and Social Safeguards Specialists

Depending on the size, nature and perceived environmental consequences of a project activity Mozambican Regulation for ESIA (Decree 54/2015) provides for four project categories, namely A+, A, B and C, with Decree 54/2015. Category A+ is more stringent and ESIA is subject to review by professional assessors and under normal A the ESIA is to be reviewed by a national inter-ministerial committee. Where project activities fall under Category B, a simplified ESIA and RAP⁵¹ [in the case of this project possibly Abbreviated RAP (A-RAP)] needs to be carried out. The screening process will be used to determine the appropriate types of studies to perform, as well as follow-up measures, depending on the nature, scope, and significance of the expected environmental and social impacts from each of the Project subproject activities. [Diagram 3-1](#) ~~Diagram 3-4~~ in Chapter 3 and [Diagram 7-1](#) ~~Diagram 8-4~~, below, are graphic representations of the process.

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Diagram 7-1: The ESIA process in Mozambique



A preliminary negative list of project activities not to be financed are the following: (i) activities inside protected areas; (ii) any activities that would lead to conversion or degradation of critical natural habitats or their supporting areas; (iii) sub-projects involving logging in natural forests, or processing of timber other than from plantations; (iv) sub-projects requiring the use of agrochemicals in WHO categories IA, IB or H; (v) sub-projects that would damage non-replicable cultural property.

Both the Environmental and Social Screening Form (ESSF in [Annex 3](#) ~~Annex 3~~) and the [Annex 4](#) ~~Annex 4~~ of Decree 54/2015 will be completed by Project Environmental and Social staff. The Environmental and Social Checklist in [Annex 5](#) ~~Annex 5~~ will also be completed by the qualified Environmental and Social Specialists of the Project Coordination Unit. Efforts will be made for all the subprojects to be categorized as Category B, which do not require a full ESIA, and will benefit from the application of mitigation measures outlined in the checklist. Project design will also ensure that PRODAPE initiatives do not require any land acquisition, which would trigger a RAP to be prepared and disclosed. In cases where minor land acquisitions will be unavoidable (e.g. not more than 20 households needing to be resettled), relevant IFAD provisions under SECAP and specifically "Guidance statement 13 – Physical and economic resettlement" and its respective FPIC will be adhered to. Where a subproject might require people to be resettled the same will be restructured, resized to avoid such a phenomenon or simply be abandoned and not be pursued under PRODAPE.

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⁵¹ Although GoM regulations stipulate that any project with resettlement implications falls automatically under Category A.

The Aquaculture environmental expert to be hired within the PMU in collaboration with DPTADER or hired External professional consultants will take care of the preparation of the screening reports to be submitted to DPTADER after clearance by the PCU and its ESSS. The screening forms, when correctly completed, will facilitate the:

- identification of potential environmental and social impacts and the identification of health and safety risks;
- determination of their significance;
- assignment of the appropriate environmental category; and
- determination of the need to conduct an ESIA/ESMP, a freestanding ESMP and/or to prepare Resettlement Action Plans (RAPs) where required or determined.

The responsible MITADER structure at Provincial or District level will need to confirm the abovementioned screening process to comply with Mozambican environmental legislation.

Preparation activities for the screening process will include a desk appraisal of the interventions (e.g. rehabilitation/expansion and operation plans) for sub-project related infrastructure.

After the desk appraisal of the interventions, the initial screening of the proposed sub-project activities will be verified in the field, with the Environmental and Social Screening Form (ESSF) prepared by the Project staff or hired consultants. The District Environmental Officers, stationed at the SDAE/SDPI and/or municipalities, will do the verification and these will be submitted to DPTADER Department dealing with ESIA processes. Subsequently, they will oversee the preparation and implementation of the required measures. In case of doubts or expertise is needed the provincial safeguard specialist or the central safeguard specialist shall go on site to identify and assess accordingly.

7.3. Assigning the Appropriate Environmental and Social Categories

The ESSF, when completed, will provide information for the assignment of the appropriate environmental and social category to a subproject. The Provincial Departments of Environmental Impact Assessment in collaboration with the Environmental and Social Specialists from the Project Coordination/Provinces will be responsible for categorizing a subproject as either B or C. No category A subprojects will be eligible for PRODAPE financing, either under IFAD's SECAP or under Mozambican legislation.

Category A (A+ and A) is more complex and sub-project activities would have significant and long-term adverse environmental and social impacts and therefore would require an ESIA and/or RAP, in accordance with Mozambican legal requirements and IFAD's SECAP. Category B projects are those with one or a few potentially significant adverse impacts, which would require an Environmental and Social Management Plan (ESMP) to address specific impacts during project construction or operation, but not a full ESIA; under Mozambican regulation, category B sub-project requires a simplified ESIA (which includes an ESMP) or a stand-alone ESMP when lower impacts are foreseen. Category C projects would not involve any significant adverse environmental impacts; they would therefore not require an ESIA or a specific ESMP, but they would require adherence to Good Environmental and Social Management Procedures (GESMP), including any applicable Environmental and Social Clauses to be included in the Contractor's Contracts. The recommended and simple way to adhere to good environmental and social practices is through a simplified ESMP. The assignment of the appropriate environmental category for the subprojects will be based on the provisions of the Mozambican ESIA Guidelines (Decree 54/2015) and in parallel following IFAD's SECAP.

7.4. Carrying out Environmental and Social Work

After reviewing the information provided in the Environmental and Social Screening Form (ESSF) and the Preliminary Environmental Information Sheets and having determined the appropriate environmental and social category, the Provincial Directorate of Environment (DPTADER) in close collaboration with the Project Coordination Unit will determine whether (a) the application of simple mitigation measures outlined in the Environmental and Social Checklist ([Annex 5](#)) and Environmental and Social Clauses for Contractors

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| (~~Annex 6~~Annex 6) will suffice (Category C); whether (b) an Environmental and Social Management Plan (but no ESIA) needs to be prepared to address specific environmental impacts (Category B); For subprojects categorized as B, either the ESMP or the Simplified ESIA, should be prepared by an environmental and social consultant certified by MITADER.

It is not expected that there will be subprojects falling under any of the A categories. Should this happen the subproject will have to be restructured (resized, relocated and/or subject to other measures) to fall under Category B or C or just be abandoned.

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7.5. Environmental and Social Impacts Assessment (ESIA)

Certain subprojects may be found to require a (simplified) ESIA⁵², according to category B projects under Mozambican legislation, although that is expected to be rare as most expected situations will be to prepare only an ESMP, also under Mozambique legislation. In the case of having to prepare the (simplified) ESIA, this would identify and assess the potential environmental and social impacts of the proposed activities, evaluate alternatives, as well as design and implement appropriate mitigation, management and monitoring measures. These measures would be captured in the Environmental and Social Management Plan (ESMP) which will be prepared as part of the (simplified) ESIA Document.

Where required, preparation of the (simplified) ESIA that includes an ESMP will be carried out by the GOM/MIMAIP/IDAPE/DPMAIP/DPA in consultation with the relevant stakeholders, including potentially affected persons. Environmental and Social Specialists of the Project Coordination Units at Provincial Level, in close consultation with the Provincial Directorate of Environment and/or DINAB and on behalf of the District Governments or Municipalities, will arrange for the (i) preparation of (simplified) ESIA/ESMP or RAP terms of reference; (ii) recruitment of a consultant to carry out the (simplified) ESIA/ESMP or RAP; (iii) public consultations and participation; and (iv) review and approval of the (simplified) ESIA/ESMP or RAP following the national ESIA and RAP approval process. SimplifiedESIAs, ESMPs and RAPs also need to be sent to IFAD for approval and disclosure, which must also be done at the local level. IFAD can also conduct a post review during Supervision if approval by local authorities has been granted and the sub-projects fall under category B. This will also be the case if an environmental and social audit will be conducted periodically.

7.6. Subproject Review and Approval

The Environmental and Social Specialists at the Provincial level assisted by Professional Service Providers in Environmental and Social Impact Assessment will fill in the environmental and social screening forms and identify the mitigation measures presented in the environmental and social checklists or additional ones not mentioned in the checklists to classify the sub-project. The final decision on the environmental category of the subproject is the responsibility of the environmental authority at the provincial level. Where an simplified ESIA/ESMP or a freestanding ESMP has been carried out, the Environmental and Social Specialists in collaboration with the Provincial Project Coordinators, as well as the Directorate of Environment/DINAB will review the reports to ensure that all environmental and social impacts have been identified and that effective mitigation measures have been proposed, including institutional arrangements for the implementation of the ESMP and a budget. Once the simplified ESIA or ESMP is approved; an environmental license will be issued by the environmental authority, after payment of environmental license fees. Depending on the cases, fees will also apply to obtain water, land, etc. licenses. Under the 54/2015 two licenses are issued, i.e. (i) one for construction, which is issued after the approval of the ESIA and RAP (when the development triggers this phenomenon); and (ii) one for operation, which is issued after DPTADER's verification that all the ESIA/RAP requirements have been satisfactorily fulfilled.

Based on the results of the above review process, and discussions with the relevant stakeholders and potentially affected persons, the Environmental and Social Specialists, in case of sub-projects that do not require an simplified ESIA/ESMP or a freestanding ESMP will make recommendations on Environmental and Social Good Management Practices to the Municipal or District Government to go ahead with the subproject implementation; these are the cases where sub-projects fall at C category under Mozambican legislation.

At present it is mainly at the provincial and central levels that solid capacity exists for conducting the ESIA/ESMP processes. At the district and municipal levels such capacity is either non-existent or weak. To ensure that all stages of the process including the verification of screening forms is completed correctly for the various sub-project locations and activities, training will be provided to members of the SDPI or SDAE and Municipalities. Technical advice and training on environmental and social impacts assessment and implementation of mitigation

⁵² PRODAPE will not finance any category A subproject, which entails a full ESIA, either under Mozambican legislation or under IFAD's Procedures and Systems.

measures will be provided by contracted safeguards specialists or by the Provincial Community Management Officials, with Project assistance.

7.7. Participatory Public Consultation and Disclosure

Local people and communities as well as their representatives need to be continuously involved in the decision-making related to the diversity of Project interventions. Mozambican legislation on land and water issues as well as environment and socioeconomic development places public consultation and participation at the top of the agenda. These must be strictly followed by the Project. Local people/communities and their representatives are properly placed to take care of the needs of local stakeholders and to promote the local resource management capacity.

IFAD's SECAP also states that "meaningful consultation by communities (especially targeted groups) and stakeholders that are likely to be affected by IFAD's operations will continue to be sought throughout the Project and project life cycle, commencing as early as possible in the programme and project development process. The objective of such stakeholder consultation is to ensure the communities contribute to the development of management plans and provide feedback on the draft ESIA report and other relevant documents, ensure broad community support to the project...".

The public participation process (PPP) is an intrinsic component of the ESIA/ESMP process with the following main objectives:

- Keep Project Interested and Affected Parties (PI&APs) informed about key issues and findings of each stage of the simplified ESIA/ESMP;
- Gather concerns and interests expressed by various project stakeholders;
- Obtain contributions/opinions of stakeholders in terms of avoiding/minimizing possible negative impacts and maximize positive impacts of the project.
- Lastly, support the social dialogue and identify from the onset, stakeholders' perceptions and expectations, which can contribute to the action planning and effective communication to minimize the impacts of the project. The process also allows for rethinking the project's technical aspects.

PPP will support a Stakeholder Engagement Plan and for it to be effective there are norms and procedures to be observed throughout. This process was initiated during CRA and ESMF preparation and it should be continued during the subsequent phases of the project.

The ESIA/ESMP process emphasizes the clear need for frequent interaction and communication between the public, parties affected by the proposed Project, local NGOs, external interested and concerned organizations, as well as Project scientists and engineers. Local people and other stakeholders should be organized into a Social Committee to easily articulate the various aspects in an organized and continuous fashion.

Each aspect of the technical investigations generally includes a data collection and verification phase, followed by analysis and evaluation, then synthesis and conclusions. The findings of each phase are communicated as appropriate to external parties.

In terms of the ESIA Regulations in force in Mozambique (Decree 54/2015 and Diplomas 129/2006 and 130/2006 and other related regulatory instruments) mandatory public consultation meetings mark the end of each main phase, e.g. scoping and definition of terms of reference as well as a public consultation on the draft final ESIA/ESMP document. Under Mozambican legislation, these should be announced at least 15 days prior to the meeting day. In addition to being invited by public notices, a certain number of participants to these meetings should be directly invited by letters of invitation drafted by the Consultant, issued, and distributed by the project developers. In this case the PCU would be at the forefront in ensuring that relevant stakeholders are invited and participate in the meetings.

During the meetings, the ESIA professional team in collaboration with the developers' (aquaculture) representatives and the engineering team, maintain PI&APs informed of the main issues and findings of each phase and collect concerns and interests expressed by the various project stakeholders. Public meetings are non-technical in nature and are expected to contribute to get stakeholders' inputs in terms of avoiding/minimizing possible negative impacts and optimizing the positive impacts of the subproject.

The Project must not contribute in any way to create land conflicts and/or exacerbate any such conflicts. The objective of creating jobs, construct infrastructure and introduce modern technologies, should not be offset by increasing the number of landless people, make local food insecurity worse, cause environmental damages, stimulate rural-urban migration, etc. due to inadequate planning and public engagement.

In compliance with both the GoM regulation and IFAD guidelines, before a sub-project is approved, the applicable documents (ESIA, ESMP and/or ARAP) must be made available for public review at a place easily accessible to beneficiary communities (e.g. at a local government office, at the DPMAIP/DPASA/DPTADER/SDPI/SDAE), and in a form, manner and language that can easily understood, including the non-technical summaries of the main documents. DM 54/2015 (article 15, point 14) specifies that for Category B and C projects comments by the public must be submitted to the team/consultants preparing the ESIA/ESMP within 15 days after the Public Consultation Meeting. ESIA/ESMP documents must also be forwarded to IFAD for approval and disclosure in Maputo and other places, including posting in IFADs Webpage. Comments on SECAP-related disclosed documents can be submitted through the SECAP Help Desk email using: ecd_secap@ifad.org.

Especially as part of ESIA/ESMPs and ARAPs public consultation and participation processes, Mozambican guidelines also have similar pre-requisites, which should be strictly followed under the Project.

7.8. Grievance Redress Mechanism

Conflicts or grievances arising from project development process are generally associated with poor communication, inadequate or lack of consultation, inadequate flow of accurate information, or restrictions that may be imposed on project affected people. Communities must be involved in awareness-raising and training concerning their rights and obligations; how to obtain legal advice and representation, and how to seek redress against what they regard as unfair practices. These are not only restricted to resettlement actions. They cover the entire project cycle from design to implementation and cover all entities involved, i.e. the Project Developers, Funding Entities, Contractors, Local Authorities, etc.

Box 7-1: IFAD's grievance and redress mechanism

IFAD has established a complaints procedure to receive and facilitate resolution of concerns and complaints with respect to alleged non-compliance of its environmental and social policies and the mandatory aspects of its Social, Environmental and Climate Assessment Procedures in the context of IFAD-supported projects. The procedure allows affected complainants to have their concerns resolved in a fair and timely manner through an independent process. IFAD may be contacted by e-mail at SECAPcomplaints@ifad.org or via its website at (click here for page). In addition, IFAD will require the borrower to provide an easily accessible grievance mechanism, process or procedure to facilitate resolution of concerns and grievances of project-affected parties arising in connection with the project (on a case-by-case basis for projects that pose special risks). Grievance redress will use existing formal and informal grievance mechanisms, strengthened or supplemented as needed with project-specific arrangements, and will be proportionate to the risks and impacts of the project. Although IFAD normally addresses risks primarily through its enhanced quality enhancement/quality assurance process and by means of project implementation support, it remains committed to: (i) working proactively with the affected parties to resolve complaints; (ii) ensuring that the complaints procedure and project-level grievance mechanism are easily accessible to affected persons, culturally appropriate, responsive and operates effectively; and (iii) maintaining records of all complaints and their resolutions

Source: SECAP (2017)

Training in conflict management for technical personnel from IDAPE/DPMAIP/DPA and district/municipal entities as well as contractors by the PCU should be carried out. Local leaders should be trained in conflict management by professional Service Providers and/or NGOs to assist in minimizing the negative impact of conflicts.

Special attention should be paid to women, the poor and most vulnerable groups in affected households as well as in host communities to ensure they understand their rights and entitlements. This may be achieved by using women social facilitators and ensuring women are included in the local Project Management Committees and with other relevant vulnerable groups in Project Monitoring Commissions.

7.8.1. Type of Potential Questions/Information Requests/Complaints (Grievances)

Potential questions/information requests/complaints/grievances Include but are not limited to:

- Questions/information requests/complaints (grievances) regarding land acquisition and/or resettlement;
- Noise of construction works;
- Presence, and potential disruption, of the construction labour force and the effects on communities, local services and infrastructure;
- Community health and safety in relation to impacts of increased traffic on nearby residents;
- Visual intrusion;
- Congestion of and access to locations;
- Damage to the surrounding natural environment;
- Disappointment related to expectations about employment from the Project.
- Negative impacts on a person or a community (e.g. financial loss, physical harm, nuisance);
- Dangers to health and safety or the environment;
- Failure of sub-contractors and their workers or drivers to comply with standards or legal obligations;
- Harassment of any kind;
- Etc.

Project affected people with grievances concerning any aspect of project development including proposed or actual resettlement and/or compensation arrangements should be able to present these to trusted entities who can act as linkages as necessary to others who may be needed to resolve the problems.

This section will describe the Project Grievance Redress Mechanism in relation to the following aspects:

- Registration and response to complaints;
- Mechanisms of appeal;
- Provisions for recourse to civil courts if the other options are unsuccessful.

The aim is to respond to PAPs complaints in a timely and transparent manner. It is believed that the proposed institutional mechanism for this project will ensure that PAPs have channels to present and resolve their grievances related to any aspect of the project. All relevant stakeholders should work hand in hand to ensure that processes are effective in terms of timely communication and reaction. The PCU and IDEPA/DPMAIP/DPA should always be informed about all issues, even in cases where they may not be directly involved in responding to those issues.

The process and procedures should be structured in the following ways:

7.8.2. Available and Accessible Procedures to Resolve Conflicts Associated with Resettlement (Grievance Redress Mechanism)

Grievance redress mechanisms should involve the local community leaders in providing a first level of listening and informal resolution. These leaders should be represented or involved in the project co-management committees and working groups covering the various aspects of project development and be involved in creating awareness that they may also be used for the transmission of grievances to these *fora* for informal resolution. Certain conflicts may be resolved by local leaders.

If issues are concerned with relationships with secondary or external stakeholders, and/or are outside the capacity of the community or local authorities to resolve, they should be presented to the PCU for processing

(e.g. transmission to district/municipal authorities, contractors, etc.). If the issues are not resolvable at this level, they should be taken to the attention of a mediation entity.

If the community member/group who lodged the complaint is not satisfied with the decision of the Project Authority, then as an ultimate recourse he/she/they may submit it to the court system.

In the case of grievances, decisions on redress and communication of these to the complainant should be timely at all levels. This will promote greater trust in the communication system and improve attitudes about the Project within the community. Information should normally be returned to the community using the same channels as those used for initial transmission. The results should be communicated to all other levels and relevant structures at the same time for coordination and awareness purposes.

In cases where conflicts or complaints are directed against governmental agencies, project management or private entities, whenever possible, Project affected people and communities will be encouraged to resolve conflicts harmoniously through informal mediation by external agencies, such as NGOs or government officers. When disputes cannot be resolved informally, more formal mechanisms will be required. Where one or more communities' conflict with a private-sector entity, the issue will be taken to the PCU/IDEPA/DPMAIP/DPA with titular responsibility for the investment.

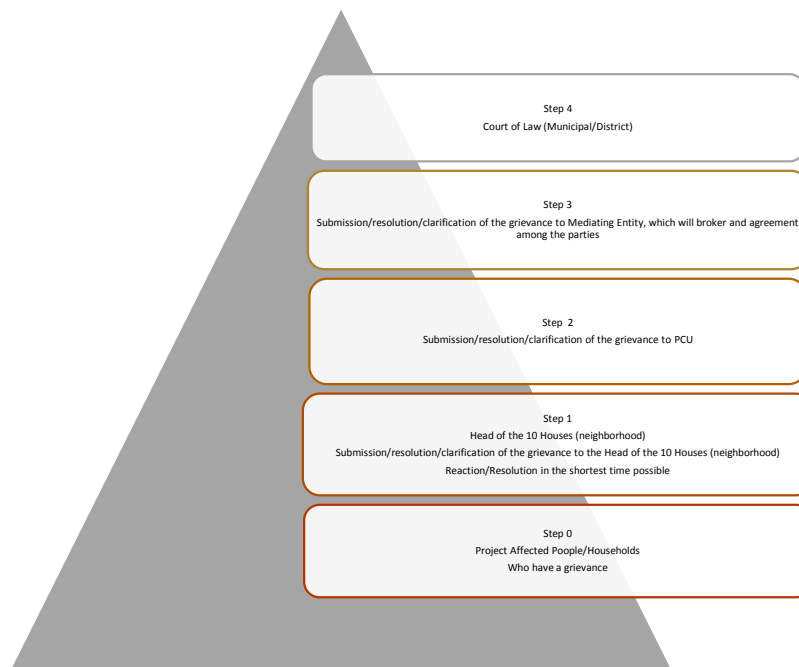
The general rule is that all grievances related with non-fulfilment of contracts, levels of compensation, seizure of assets or certain restrictions of access to resources without compensation should be brought to the attention of relevant officers and dealt with.

Communication should be done in relevant languages mainly (for verbal communication mainly written material will be only in Portuguese). General grievance forms to be used should be prepared by Project Coordination Unit/Environmental and Social Safeguards Personnel/Teams and made known and available to all potential users, although people should also feel free to use their own grievance documents at wish.

In Mozambique, at the grassroots level, mainly neighbourhood there are no unified structures to manage common matters affecting those who live there. Depending on the specific cases, these should be chosen to organize and represent the households throughout project implementation and particularly during the presentation and redressing of grievances. They should by themselves and/or assisted by other people be able to carry out all the secretarial work involved in the process, such as preparing/writing the grievances where needed, collecting them, filing, sending, translating, etc. Where affected people/households/entities want to handle the whole process by themselves they should be allowed to do so. Representation may be the best approach, but it should not be imposed.

A suggestion of the steps and procedures to be followed during the process is presented below. It includes four main steps moving from the PAPs to court, as summarized in [Error! Reference source not found. Diagram 8-2.](#)

Diagram 7-2: GRM procedures



Gender-Based Violence

In normal day-to-day situations, but particularly in times of social change such as those that can be triggered by the development of aquaculture projects, violations of the rights of persons based on gender can be common. These arise in the same forms as typified above, but not only.

It is suggested that cases of Gender-Based Violence (GBV) be transmitted directly from the affected person to the entities that form the justice system in different levels (police and the criminal courts).

Each step should be limited to a maximum of 14 calendar days from the receipt of a complaint to the decision-making.

It is strongly recommended that all necessary measures to ensure that solutions are adopted by consensus based on negotiation and agreement are taken.

Detailed procedures for compliance with the grievances and the appeal filing process should be disseminated among PAPs, which should be trained to use them when so deemed necessary. The empowerment process described in previous and following chapters should focus on these procedures, among other things. The procedures should be disseminated during all stages of the ESIA and ESMP (and RAP – where applicable).

Confidentiality and Anonymity

The Project will aim to protect a person's confidentiality when requested and will guarantee anonymity in reporting. Individuals will be asked permission to disclose their identity. Investigations will be undertaken in a manner that is respectful of the aggrieved party and based upon the principle of confidentiality. There may be situations when disclosure of identity is required. If this is the case, the PCU will identify this and ask if the aggrieved party wishes to continue with the investigation and resolution activities.

Uptake Channels

There should be multiple uptake channels for questions/information requests/complaints (grievances). These should be accessible and culturally appropriate for all potential project affected people, including vulnerable subsections of the population. Among the suggested uptake channels are physical mailboxes, a dedicated email address, a dedicated phone number (e.g. green lines), a dedicated text message number, and the possibility of submitting orally.

As indicated in [Box 7-1](#)~~Box 7-1~~, IFAD may be contacted by e-mail at SECAPcomplaints@ifad.org or via its website.

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7.9. Annual Monitoring Reports and review

Monitoring of the compliance of project implementation with the mitigation measures defined in its ESIA/ESMP and/or RAP will be carried out jointly with communities, the Environmental and Social Specialists, and the Provincial Community Management Specialists, IDEPA/DPMAIP/DPA's local representatives, extension workers and the Service Providers responsible for implementing the Project.

District (SDAE and SPDI) and municipal authorities should supervise the monitoring activities and are required to report annually on sub-project activities during the preceding year. The information to be included in these annual reports to capture experience with implementation of the ESMF procedures will be included in an annex to be prepared as part of the annual report, which will be used as a guide.

Compliance monitoring comprises on-site inspection of activities to verify that measures identified in the ESMP, and/or RAP are being implemented. This type of monitoring is like the normal tasks of a supervising engineer whose task will be by contractual arrangement to ensure that the Contractors are adhering to the contractual obligations about environmental, social, health and safety practices during construction, as prescribed in the Social and Environmental Clauses (SEC) included in the bidding documents and Contracts or as described in the Contractor ESMP.

The annual monitoring report on environmental and social safeguard performance report shall be prepared by the ESSS of the PCU and sent to MITADER and IFAD for review.

Independent local consultants, local NGOs or other service providers that are not otherwise involved with the Project, thus independent, may carry out annual reviews. Annual review should evaluate the annual monitoring report from district authorities and the annual inspection report from DPMAIP/DPA.

Of note is that annual reviews are not normal for ESIs/ESMPs under the current practices. The Project Coordination Unit at central and provincial levels need to work for this work to be done properly.

7.10. Environmental and Social Audit

Audits to environmental and social safeguard performance of subprojects are expected to be made regularly by the ESSS, as well as by MITADER, throughout the year.

Biennial external independent audits to environmental and social safeguard performance of PRODAPE shall be made by an external independent entity (independent local consultants, local NGOs or other service providers). In addition to IDEPA/DPMAIP/DPA the audit team will report to MITADER and IFAD, who will deal with the implementation of any corrective measures that are required. The audits are necessary to ensure that (i) the ESMF process is being implemented appropriately, and (ii) mitigation measures are being identified and implemented accordingly. The audit will be able to identify any amendments in the ESMF approach that are required to improve its effectiveness.

The Audit Reports will include:

- A summary of the environmental, social, health and safety performance of the sub-projects, based on the ESIAs, ESMPs, RAPs and the implementation of the Environmental and Social Clauses in the Contractor's Contracts and Contractor's ESMPs;
- A presentation of compliance and progress in the implementation of the sub-projects ESMPs;
- A summary of the environmental and social monitoring results from individual sub-projects monitoring measures (as set out in the sub-project ESMPs).

The main tasks of the audit will be to:

- Consider the project description;
- Indicate the objective, scope and criteria of the audit;
- Verify the level of compliance by the developer with the conditions of the ESMP, RAP, Environmental and Social Clauses, Workers' Code of Conduct and Contractor's ESMPs;
- Evaluate the developer's knowledge and awareness of and responsibility for the application of relevant legislation;
- Review existing project documentation related to all infrastructure facilities and designs;
- Examine monitoring programs, parameters and procedures in place for control and corrective actions in case of emergencies;
- Examine records of incidents and accidents and the likelihood of future occurrence of the incidents and accidents;
- Inspect all buildings, premises and yards in which manufacturing, testing and transportation takes place within and without the project area, as well as areas where goods are stored and disposed of and give a record of all significant environmental, social, health and safety risks associated with such activities;
- Examine and seek views on health and safety issues from the project employees, the local and other potentially affected communities; and
- Prepare a list of health and safety and environmental and social concerns of past and on-going activities.

7.11. Other Important Issues

7.11.1. Integration and harmonization with the district land use plans

In addition to defining the district as the main territorial planning unit the GOM, through the Land Planning Law (Law n.º 19/2007 of 18 of July) and its regulation, requires all districts to have land use plans. These plans are meant to provide adequate zoning for interventions based on suitability of the different land areas and respective pre-conditions. These plans are a way of exercising holistic and integrated approach to land resources management, including strategic planning. The siting of PRODAPE subprojects will benefit enormously from being harmonized with the district land use plans. An adequate zoning at the district and/or municipal level should be able to provide sound guidance regarding the best siting for each specific subproject.

Often, due to a combination of reasons existing plans are not of the best quality and the Project should assist in revising the plans to bring them up to standard.

The subprojects will also comply with the requirements of the integrated water resources management in their area. This is the work under the leadership of the water resources management entities and particularly the ARAs, which will also oversee pond/cage safety and assist in the development of IDEPA/DPMAIP/DPA personnel to work on these matters.

8. Environmental and Social Management Plan

A site specific ESMP should be conducted as part of the ESIA process, as per the *Regulamento do Processo de Avaliação do Impacto Ambiental (RPAIA)*, and should include the “monitoring of impacts, prevention plans, as well as accident contingencies”.

In an ESMP, various mitigation measures are organized into a well-formulated plan to guide the planning, design, construction and operation of the planned interventions. Under the ESIA/ESMP process and particularly under this ESMP, what is described below should be viewed as dynamic, which may require updating or revision during the implementation of the activities.

An effective ESMP for specific sub-projects will be a practical document, which will precisely set out both the goals and actions required in mitigation.

The ESMP covers a set of measures that need to be taken to ensure that impacts are dealt with in the following hierarchical order⁵³:

- **Avoidance:** avoiding activities that could result in adverse impacts. Avoiding resources or areas considered as sensitive
- **Prevention:** preventing the occurrence of negative environmental and social impacts and/or preventing such an occurrence from having negative environmental and social impacts
- **Preservation:** preventing any future actions that might adversely affect an environmental and social resource. Typically achieved by extending legal protection to selected resources beyond the immediate needs of the project
- **Minimization:** limiting or reducing the degree, extent, magnitude or duration of adverse impacts. This can be achieved by scaling down, relocating, redesigning elements of the project
- **Rehabilitation:** repairing or enhancing affected resources, such as natural habitats or water sources, particularly when previous development has resulted in significant resource degradation
- **Restoration:** restoring affected resources to an earlier (and possibly more stable and productive) state, typically ‘background/pristine’ condition
- **Compensation:** creation, enhancement or protection of the same type of resource at another suitable and acceptable location, compensating for lost resources

The management measures set forth in the ESMPs for more complex sub-projects (category B) and the Good Environmental and Social Management Procedures (category C) for simple sub-projects. In any case, Environmental and Social Clauses (ESCs – please see recommendations at [Annex 6Annex-6](#)) will be included in the bidding documents and in the various contractual clauses for the design, construction and supervision of the interventions to be adopted. All construction contracts should comply with the Environmental and Social Clauses and if relevant with the ESMP, Contractor Camp ESMP or Good Environmental and Social Management Procedures (GESMP) prepared for the specific sub-project. Their implementation is the responsibility of the contractors. The Supervising Engineers will be required to monitor the adequate implementation of these clauses, ESMPs, CESMPs or GESMP. For sub-projects the contractors will be required to employ experienced environmental, health and safety specialists for the purpose. The Supervising Engineers will be required by contractual arrangement to supervise the adequate implementation of these Contractor ESMPs, other ESMPs or GESMP and should employ an experienced environmental, health and safety officer. Procurement documents need to reflect full respect to the Environmental, Social, Health and Safety (ESHS) Enhancements, summarized in [Annex 6Annex-6](#).

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Aquaculture under the Project will follow the best practices, as outlined in SECAP's Guidance statement 4 – Fisheries and aquaculture, together with [Annex 7Annex-7](#) that shows a typical example of issues covered under

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⁵³ Ref: The World Bank. Environment Department. January 1999. Environmental Management Plans. Environmental Sourcebook Update. Number 25

an ESMP related with planning, design, construction and operation of aquaculture developments and other related infrastructures. Reference is made to:

- hatcheries in selected locations (the focus will be on establishing one main hatchery in each target province);
- fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs;
- earthen ponds among rural smallholders of a standard size of 500 m²;
- cage farming in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds;
- organization of smallholder operators into aquaparks and clusters to develop their activities in and around these production units
- facilitation for the development of infrastructures and services to facilitate market linkages for fish products (inputs and outputs).

The additional management actions may include the preparation of Integrated Pesticides Management Plans (PMPs) and/or Resettlement Action Plans (RAPs).

Pest Management Plan

While promoting intensification PRODAPE may also promote increase use chemicals to enhance production and combat diseases. Aquaculture subprojects can raise a host of pest management issues, such as:

- New land-use development or changed uses in an area;
- Expansion of agricultural and aquaculture activities into new areas;
- Diversification into new agricultural crops to feed the fish, particularly if these tend to receive high usage of pesticides, as well as increased doses of chemical fertilizers;
- Intensification of existing low-technology agriculture and aquaculture systems

Both IFAD and the GoM support strategies that promote integrated pest management (IPM) approaches, such as biological control, cultural practices, and the development and use of crop/species varieties that are resistant or tolerant to the pest. The purchase of chemicals may be permitted when their use is justified under an IPM approach and if enough capacity exists for local management.

Box 8-1: Overview of IFAD's Pesticide Management Plan

The Pesticide Management Plan (PMP) is a tool to prevent, evaluate and mitigate the occurrences of pesticides or pesticide breakdown products. The PMP includes components promoting prevention and developing appropriate responses to the detection of pesticides or pesticide breakdown products and provides responses to reduce or eliminate continued pesticide movement to groundwater and surface water. It encourages the use of a combination of pest management techniques, such as integrated pest management to suppress pest populations in an effective, economical and environmentally sound way, and minimize adverse effects on beneficial organisms, humans and the environment.

Mozambican regulation on pesticides and IFAD's Pesticide Management Plan conform to the specifications of the World Health Organization (WHO) and Food and Agriculture Organizations of the United Nations (FAO).

There are no specific policies about pest management and crop protection in the context of IPM approaches in Mozambique. Research into plant health and to a certain extent IPM approaches are carried out by IIAM (National Agrarian Research Institute) and the Faculty of Agronomy and Forestry (FAEF) of the Eduardo Mondlane University (UEM). Under the fisheries sector entities like Institute for Fisheries Research (IIP) and Aquaculture Research Centre (CEPAQ) are also involved in some forms of research. Under these agencies, IPM research will continue and the knowledge will be passed on to extension services as it becomes available.

The ESMF being prepared under IFAD's PROCABA includes more details about Pest Management Plan (PMP), which should be used, monitored and reported as part of this ESMF.

Involuntary Resettlement (Resettlement Action Plan)

Both, the Mozambican legislation **Decree 31/2012** ("Regulation on the Resettlement Process Resulting from Economic Activities") and other relevant national laws and regulations (see Chapter 3) as well as IFAD's SECAP and ESMS will apply to any sub-project with implications on land expropriation. In cases where the Mozambican regulation differs from IFAD's SECAP and ESMS, therefore the latter will prevail.

The policies in force require that the following approach be adopted in dealing with resettlement issues:

"Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing enough investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs."

"Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher".

IFAD also adopts a broad view and the phenomenon "is not restricted to its usual meaning - that is "physical displacement," it also includes economic displacement, namely adversely affecting people's livelihoods even when they do not have to relocate. Depending on the cases, a resettlement action may include (i) loss of land or physical structures on the land, including business, (ii) the physical movement, and (iii) the economic rehabilitation of project affected persons (PAPs) in order to improve (or at least restore) the levels of income or livelihood prevailing before the action causing the resettlement has taken place". This is also endorsed by the Mozambican authorities.

Based on an analysis of desktop information and project lessons from the related PROAQUA/PROPESCA projects, it has been confirmed that physical displacement, although unlikely, may be possible as a result of sub-project implementation, particularly if government-owned aquaculture developments are included in the scope of the Project. Experience shows that under PROAQUA/PROPESCA small-scale initiatives, especially pond aquaculture interfered with portions of land, crops and trees, which in many cases were not adequately compensated. This should not be the normal practice under PRODAPE, which will restructure, resize, relocate interventions to ensure that they avoid such a phenomenon. Where this will not be possible subprojects will simply be abandoned and not be pursued under PRODAPE, irrespectively of being considered or not under other initiatives. Compensation for limited losses of land, crops and tress should be in line with GoM guidance and budget resources should be included under counterpart (i.e. GoM) funds.

9. Environmental and Social Monitoring Plan

Monitoring will be systematically conducted to ensure that the objectives set forth in the ESMF and the ESMPs, (and RAPs – where these will be applicable) are being achieved satisfactorily and where there are non-conformities to, timely, introduce changes. This continuous process will include compliance and outcome monitoring. The aim is to verify key concerns on compliance with the ESMF, implementation progress and extent of effective consultation and participation of local communities.

Project Coordination Unit, especially the ESSS officials at the provincial and district levels, will have the overall responsibility for coordinating and monitoring the implementation of the ESMF, under supervision of the ESSS at the PCU HQ. They will have to conduct sensitization programs to inform stakeholders about the framework, how it works and what is expected from them. They will undertake continuous compliance monitoring and evaluation to ensure that:

- All project activities are implemented according to the environmental and social management requirements of this ESMF and, where applicable, specific Environmental and Social Management Plans (ESMPs);
- Problems arising during implementation are being addressed early enough to avoid any spill-over that could subsequently hinder the outcomes of the project (i.e. issues of Grievance Redress Mechanism); and
- Environmental and social mitigation or enhancement measures, designed as per this ESMF or additional environmental and social mitigation measures identified during project implementation and/or ESIA/ESMP preparation, are reflected within specific ESMPs, CESMPs and monitoring plans.

The Project Management Team (PMT) will consult and coordinate with the appropriate government agencies on social, environmental monitoring. Quarterly progress reports will be prepared and circulated to all relevant entities covering aspects such as:

- Implementation schedule;
- Extent of community involvement;
- Allocation of funds;
- Problems arising as well as solutions devised during implementation; and
- Efficiency of contractors in fulfilling their environmental, social, health and safety management contractual obligations, as per the ESHS Procurement Enhancements, and
- Efficiency of Supervising Engineers in fulfilling their environmental, social, health and safety monitoring contractual obligations, as per the ESHS Procurement Enhancements.

For major project activities, the Project will procure external independent consultants/firms to (i) conduct the monitoring and evaluation of the sub-project activities, and (ii) verify the effectiveness of measures for mitigation of negative impacts and enhancement of positive impacts. The Independent consultants/firms will develop a detailed monitoring and evaluation plan (including questionnaires and inventory forms) from Terms of Reference, based on the ESMPs and CESMPs submitted to and approved by the GoM and IFAD.

The following ESMF implementation indicators are suggested in order to monitor project environmental and social performance:

- Number of Screening Forms filled, submitted to IFAD and approved
- Number of Categorization process submitted to DPTADERS and approved
- Number of ESMP elaborated, submitted and approved by the DPTADERS/IFAD
- Number of environmental licenses issued
- Number of ESMP monitoring reports elaborated and submitted to DPTADERS
- Number of Environmental audits/inspections conducted by DPTADERS/ARAs or other government authorities
- Number of Non-conformities unveiled by DPTADERS/ARAs or other government authorities

- Number of Non-conformities corrected
- Number of penalties imposed by DPTADERS/ARAs or other government authorities
- Number of penalties or other sanctions imposed to the Contractor due to ESHS violations
- Number of penalties or other sanctions imposed to the Consulting Engineer due to ESHS violations
- Number of well documented ESHS trainings undertaken
- Number of well documented awareness campaigns conducted
- Number of accidents/incidents occurred
- Number of complaints received
- Number of complaints correctly, and timely addressed
- Number of farmers (men and women) trained on pest management control
- Number of farmers (men and women) trained on water management
- Number of farmers (men and women) trained on sustainable aquaculture development
- Number of meetings held with beneficiaries
- Number of meetings held with local institutions (SDAE, SDPI, etc...)

10. Capacity Building and Training for Environmental and Social Management

Effective implementation of the environmental and social management measures outlined in the ESIA/ESMPs, PMP and RAPs will determine the success of the ESMF and the project in general. Training and capacity building will be necessary for the key stakeholders to ensure that they have the appropriate knowledge and skills to implement the environmental and social management plans.

10.1. Institutional Capacity Assessment and Analysis

Descriptions made in Chapter 3 show that there has been considerable progress in institutional, legal and regulatory processes related with environmental and social management in Mozambique. However, coordination and law enforcement remain a challenge.

The various institutions, development strategies, laws and regulations are still in need of harmonization to ensure that they achieve common goals. Human and material investments are required to translate the various provisions into concrete actions. This is further compounded by the fact that most of the country's inhabitants are active in the informal sector, which makes it very difficult to regulate them.

After needs identification a specific institutional and human capacity-building program for environmental and social management will be developed as part of the Project. Beneficiary institutions will be IDEPA/DPMAIP/DPA, MOPHRH, MITADER at the various levels, mainly the provincial and district levels, including local authorities (e.g. municipalities and others such as CSOs). A detailed capacity-building program will be developed during implementation, with a focus on strengthening the District, Municipal and Provincial structures responsible for environmental and social management.

The District Services of Economic Activities (SDAE), which will host PRODAPE activities at the district level in close collaboration with the District Services of Planning and Infrastructure (SDPI), which have a unit that deals with environmental matters at the district level, should be given special attention to build their capacity to manage the ESIA/ESMP and RAP processes. It was observed in the field that these institutions are not always fully aware of the issues around the management of land, water and other environmental components as they relate to environmental licensing and good practices. Formally, up until now, these processes are managed mainly at the provincial and central level. Only limited number of districts is in position of being competently involved in ESIA/ESMP and RAP processes. Yet these are the institutions that are closer to the subprojects. Lessons learned from successful experiences in the districts should be replicated in the project area as part of the Project planning and implementation.

Fieldwork confirms the fact that a significant number of provincial and district officers, including other local stakeholders do not see the relevance of applying systematic environmental and social management principles in the development of aquaculture initiatives. This is a counterproductive mind-set, which exposes the planned developments to several risks.

The safeguards specialists at central and provincial levels will be responsible for championing this work.

Proposed Training and Awareness Programs

The general objective of the training and awareness programs for implementation of the ESIA/ESMPs, PMP and RAPs is to:

- sensitize the various stakeholders on the linkages between environment and social impacts and Project subprojects;

- demonstrate the role of the various key players in the implementation and monitoring of the safeguards' instruments (ESMF-ESIA/ESMP, RAF⁵⁴/RAP, PMP, etc.);
- sensitize representatives and leaders of community groups and associations (who will in turn convey the message to their respective communities) on the implementation and management of the mitigation measures; and on their roles in achieving environmental and social sustainability;
- ensure that both provincial and district level personnel can provide leadership and guidance as well as supervise the implementation of their components in the ESIA/ESMP, RAF/RAP, PMP, etc.;
- ensure that participants can analyse the potential environmental and social impacts, and competently prescribe mitigation options as well as supervise the implementation of management plans;
- strengthen local NGOs and teams of extension workers to provide technical support to the fish farmers and other operators in the aquaculture value chain;
- Stakeholders have different training needs for awareness raising, sensitization, and comprehensive training, namely:
 - awareness-raising for participants who need to appreciate the significance or relevance of environmental and social issues, that go even beyond just safeguards or "not doing harm" (i.e. gender mainstreaming, social accountability and/or grievance redress mechanism, etc.);
 - sensitization for participants who need to be familiar with the ESIA/ESMP, PMP and RAP and to monitor their implementation; and
 - comprehensive training for participants who will need to understand the potential adverse environmental and social impacts (mainly focused on construction of infrastructures – project components 1 and 2) and who will at times supervise implementation of mitigation measures and report to relevant authorities, focusing on their areas of expertise (e.g. water resources management, pesticides, soil conservation, climate change, etc.).

Practical ways of reaching all target groups will need to be devised for training and capacity needs assessments as well as for delivery of the training.

The "*Learning by Doing*"⁵⁵ approach including demonstrations and peer education/training in relative detriment of studies, talks and other forms of advice and assistance will be given priority. The training of trainers is also seen as a relevant approach as it will assist in the creation of basic conditions for sustainability and replication of the interventions. The outcomes of such a process will live beyond the life span of the Project.

Technical Assistance (TA)

With Aquaculture being a relatively new concept and way of working in fisheries there are extensive capacity building needs touching on all stakeholders (decision makers, technicians at the various levels, extension workers, producers, etc.). However, for it to be productive specific areas of assistance need to be carefully identified and structured before any action is undertaken.

Against the above-mentioned background the need for short, medium- and long-term Technical Assistance will be assessed carefully. The results will be used to devise the best approach to engage and deploy TA to the project (e.g. temporary TA under specific circumstances) or just not involve it altogether.

Where it will be engaged TA will be to ensure that the various external inputs from different providers of goods and services to the project are aligned and harmonized with the Project's ultimate goals. Capacity building and transference of knowledge and skills for MMAIP, DPMAIP/DPA, MPOHRH/ARAs, and MITADER and the overall environmental and social sector will be at the centre of the activities to be carried out. The provincial and district levels will be crucial as it is at this level that capacity is usually low.

⁵⁴ Although no RAF has been developed under PRODAPE.

⁵⁵ In which relevant personnel at the various levels are exposed to examples of good practices and/or where they learn by seeing and/or doing how things are approached and done.

11. Arrangements for ESMF Financing and Budget

At this stage the initial budget lines and estimate of lump sum amount necessary to cover ESMF implementation of the Project is calculated based on percentage of the total project budget dedicated to environmental and social management. The percentage is estimated at 1.2.%. The total amount to cover ESMF preparation and implementation costs stands at **US\$ 600,000.00 US\$ 0.6 million (six hundred thousand North American Dollars)**. A preliminary distribution along budget lines is made. In due course the distribution of this amount will be adjusted but one area that is going to mobilize most of the funds will be the provision of various types of services, including the formulation, implementation and monitoring and evaluation of ESIA/ESMP, training and capacity building to ensure adequate selection, design, siting, etc. of subprojects in a way that will institutionalize basic principles of avoiding/minimizing project impacts and managing them adequately where they will exist. Project funds will also cover the payment for environmental licenses to MITADER/DNGRH/ARAs/Government.

Below, the items and allocated amounts to implement the ESMF including preparing and implementing ESIA/ESMPs, monitoring, evaluation, auditing and capacity building.

Table 11-1: Estimated budget for ESMF implementation

PRODAPE Safeguard Costs	Total Costs (USD)
Environmental and Water permits fees	\$40,000.00
DUATs	\$50,000.00
Training Safeguards HR at Central, Provincial and District level	\$30,000.00
Capacity building to Aquaculture Units (Central, Provincial and District)	\$13,000.00
Capacity to Aquaculture Farmers on Safeguards	\$30,000.00
Training on Safeguards at the ground level (cage/pond, etc.)	\$60,000.00
Preparation of simplified ESIA and ESMP	\$120,000.00
Land Acquisitions (portions of land, crops and trees)	\$50,000.00
Implementation (Contractor) and Supervision (Fiscal)	\$45,000.00
Safeguard external independent Audits	\$12,000.00
Safeguard traveling costs (flights, trips, <i>per diem</i> , ...)	\$150,000.00
TOTAL	\$600,000.00

While preparation costs for submitting Environmental licenses and Water abstraction Licences will be assumed by PRODAPE budget, it is expected that expenses related to Environmental license and Water Licence fees will be a counterpart (GoM) expense. The same applies to any Land tenure (DUAT) costs needed at beneficiary level.

The Budget excludes the hiring of environmental and social safeguards personnel pending a decision on their number and mode of deployment between the various levels of project management.

12. Conclusions and Recommendations

As summarized in the introductory chapter (subchapter 1.3) this ESMF comprises twelve (12) chapters which can be used in different ways by the different users. On one hand the twelve chapters form a single document that provides the general context under which PRODAPE is formulated and is going to be implemented and managed from the environmental and socioeconomic point of view while on the other hand each chapter, except the introduction and this concluding chapter, can be used as stand-alone sections to extract contextual, conceptual and practical information about the various aspects presented. The document is also complemented by the Climate Risk Assessment (CRA) that was prepared for PRODAPE itself and PROCABA.

One of the conclusions is that PRODAPE is highly relevant in the current context of development in Mozambique, which is marked by the need of finding practical ways of building solid and functional linkages between the various sectors of the economy and of offering incentives to the small-scale and family-sector producers in the primary sectors of agriculture and fisheries to professionalize their work, scale-up their operations and incomes and contribute to national development while improving their own food security and nutrition.

The support to aquaculture is also highly relevant considering the importance that the subsector can play in local economies and the position of fish products in making animal protein available to a significant section of Mozambican population as well as the dynamic relations that can be established between aquaculture and agriculture in a country in which it is estimated that close to 70% of the people live in rural areas and rely on subsistence agriculture.

The project is also designed based on lessons learned from previous interventions in the subsector and intends to maintain this approach of learning by doing, which is also of high relevance. Adequate monitoring and evaluation should be in place to assist in the adaptation of the operations to increase project responsiveness to address issues on the ground as these come to light. It is also recognized that this will be demanding to the project managers at the various levels and call for adequate planning and resource and time allocation.

The project is expected to be associated with multiple benefits but it is also a fact that if adequate identification and measurement of environmental and social impacts is not adopted in a systematic way including delineating ways of avoiding, minimizing and mitigating such impacts the project carries the risk of worsening the conditions under which people practice their subsistence activities in the targeted 23 districts. In the foreseeable future the targeted districts and beneficiaries will continue to rely heavily on environmentally friendly systems and mechanisms to sustain their livelihoods. Complex and capital-intensive systems will not be available, henceforth the importance of avoiding and minimizing negative impacts and interferences with the nature. Simple and tested procedures can go a long way towards achieving this.

Rural communities in Mozambique are highly dependent on natural resources and are extremely vulnerable to climatic fluctuations that result in floods, droughts and cyclones, which in the last few decades have been increasingly frequent and presenting challenges to the traditional ways of living and producing. The various PRODAPE stakeholders need to be made aware of the various aspects that could put the livelihoods of the project beneficiaries and those of other rural dwellers at risk as a result of the way in which subprojects might be designed and implemented.

The ESMF identifies critical aspects that need dedicated attention during design, implementation and operation of subprojects and these include (i) careful selection and siting of subprojects (aquaculture ponds, cages and other related investments); (ii) managing natural resources (physical (mainly soil, water and air) and biological (flora and fauna)), including resources with special conservation status in a sustainable way; (iii) avoiding land insecurity; (iv) obtaining formal environmental and water licensing and other mandatory licensing of subprojects; (v) keeping PRODAPE subprojects within Category B or below and adopt systematic management of cumulative impacts in the larger area in which subprojects will be integrated; (vi) adopting formal design standards in the construction of infrastructures as opposed to informal procedures; (vii) embarking on an adequate combination of environmental impact assessments and formulation of environmental and social management plans for new

interventions and subproject auditing where subprojects are going to be inherited from past operations; (viii) consistently adhering to operations that are sustainable from the different perspectives (environmental, social, economic, human and institutional) to ensure that operations can be maintained even after the phasing out of IFAD funding and support in the medium-term.

The legal and institutional framework made mainly of GoM and IFAD provisions offers a strong basis to achieve the desired outcome of long-term sustainability, but dedicated efforts will be required for the framework to be adopted in a consistent manner and to be translated into practical actions and results. Despite increased convergence between the two sets of regulations certain differences remains and under this project it is stipulated that where such differences will exist the most stringent and elaborated regulations will prevail.

Based on both sets of regulations this ESMF presents detailed (i) guidelines for subproject screening, preparation, appraisal, approval, implementation and monitoring, including the roles and responsibilities of the various agencies and a grievance redress mechanism to be used by project affected people and other project stakeholders in the presentation and adoption of corrective measures to any nonconformities that might occur; (ii) guidelines for identifying potential impacts and preparing environmental and social management plans (iii) indications about the active involvement of all relevant stakeholders, training and capacity building, technical assistance best suited for the project, including the approaches to be adopted; (iv) project monitoring requirements; and (v) a Budget to cover the financial requirements of sound environmental and social management throughout the various phases.

The formulation of the project has been showing consistency with the adherence to a systematic involvement of the project beneficiaries and their institutions as well as of other stakeholders. This should continue adequately in the subsequent phases including finding ways of building their necessary capacity.

It is highly recommended that in the first cycle of project implementation, i.e. the first five years, efforts be made to ensure that PRODAPE subprojects, where these will only involve local small-scale producers, be kept under Category B and/or lower (i.e. C), as per GoM classification. This is assessed to be consistent with the capabilities of the project beneficiaries and local institutions. More complex subprojects with impacts of greater magnitude carry the risk of worsening existing environmental (e.g. soil, water and air pollution/degradation) and social (e.g. landlessness, poverty, inequality, etc.) problems. During or after the first cycle an assessment should be conducted to determine the extent to which the subsequent phases can adopt different approaches.

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ANNEXES

Annex 1: Minutes of the Public Meeting

Inclusive Agri-food Value-chains Development Programme (PROCAVA)

Small-Scale Aquaculture Development Project (PRODAPE) in Mozambique

Minutes of the Meeting of Public Consultation to Those Affected by the Project:

PROCAVA e PRODAPE

1. Introduction and Preliminary Aspects

On the 1st day of the month of March 2019, at 9:00 am, a public consultation meeting was held at the *Montebelo Indy Maputo Congress Hotel* (Indy Village), located in the neighbourhood of *Sommerschield*. The meeting was about the discussion of the environmental, social and climate management instruments of PROCAVA and PRODAPE projects, financed by International Fund for Agricultural Development (IFAD) in cooperation with the Mozambican government.

The **Agenda** of the meeting can be seen in **Annex 1** of these minutes.

The meeting was attended by 90 people representing the Ministries of Agriculture and Food Security (MASA), Ministry of the Sea, Inland Waters and Fisheries (MIMAIP), Ministry of Land, Environment and Rural Development (MITADER). At the central and provincial levels, there were representatives of associations and cooperatives, the civil society and people at large. The **List of Participants** can be seen in **Annex 2** of these minutes.

Before the beginning of the session, Francisco Saimone, from SALOMON LDA, took the floor to introduce those present and explained the objectives of the meeting. In view of the large number of those present, Francisco Saimone asked them to make a joint introduction, i.e. grouped by institutions or organizations they represent.

The Deputy General Director of the Agricultural Development Fund (FDA) was invited to give the opening remarks.

Mr. Abdul César Mussuale took the floor and thanked all the participants for the opportunity and their presence. He spoke of the objectives of the meeting, particularly regarding the environmental, social and climate management instruments of the two projects, PROCAVA and PRODAPE.

Later, the Deputy Director of the FDA, called for an active participation of all people, in order to allow for the gathering of more information, which will be used to enrich the documents to be presented during the meeting.

2. CRA Presentation and Processing

The first presentation was done by Dinis Juízo and the topic was "Climate Risk Assessment (CRA)" of PROCAVA and PRODAPE.

After Dinis Juízo's presentation, Francisco Saimone, opened the session for discussion.

The following issues were raised and addressed:

Table 1: Summary of main issues raised, and feedback given regarding CRA for PROCAVA and PRODAPE

N.º	Participant	Issue raised	Feedback given/other remarks
	Ernesto Paulino, Provincial Director of Agriculture and Food Security (DPASA) of Gaza	<p>What are the differences between risk A and B, because during the presentation he had missed the point of where risks A and B were?</p> <p>He also queried about Slide 33, which was a presentation on livestock. He needed clarification, about which cattle species were adapted to each specific area</p> <p>The study does not present the level of rainfall in Gaza in terms of where rainfall can bring benefits and where it might have adverse effects</p> <p>He was expecting to hear advice on the species of cattle recommended for the regions, with a predominance of drought, because, according to him the document, does not refer to these aspects in detail</p> <p>Furthermore, he mentioned that in colonial times, in Bobole, rice was produced, for this purpose, the salt water was blocked, in order to avoid saline intrusion. However, at this moment, there is no protection, due to the high state of degradation of the equipment, which facilitates the saline intrusion phenomenon, thus preventing the continued production of this crop</p>	<p>In general, it was emphasized that all the issues raised by the participants as questions, comments and contributions are being cautiously captured to be used to finalize the reports being presented in this meeting. Even at this very meeting they are not fully addressed it does not mean that they are not being considered. The simple fact that there are questions means that the reports must be more explicit</p> <p>More specific feedback given includes the following main points:</p> <p>Executive Summaries and presentations for and in public meetings are meant to be non-technical documents to ensure that all classes of participants, which sometimes can include people who are illiterate can understand. This is indeed difficult to materialize and often these end up being a hybrid of technical and non-technical.</p>
	Carvalho Ecole, Institute of Research Agricultural of Mozambique (IIAM)	<p>Wanted to know the real strategies to mitigate the risks? Because, he did not have the opportunity to have the study on the topic under discussion on time to go through it in more detail</p> <p>In his view, the executive summary did not give him the answers. It was later mentioned that there are many studies, dating from the 1960s by Mário de Andrade, which deal with the topic under discussion</p>	<p>Both PROCAVA and PRODAPE despite being at a very advanced stage of formulation they are still at the design stage. It is correct to indicate that not so many aspects are set in stone. Depending on the findings of the CRA and ESMFs and other processes downstream between the GoM and IFAD there is room to make changes that can cover as many aspects as target districts, zoning, crops, etc.</p> <p>The three documents (i.e. CRA and the two ESMFs) have been developed in English to meet the requirements of the contract between IFAD and the consultants. The translation of these documents into Portuguese will certainly happen at some stage in the process to make them widely accessible in Mozambique. This falls outside</p>
	Abdul Cesar Deputy Director of FDA	Wanted to know why the crop water analyses had focused on beans and soya	
	Adérito Mavie, Head of the Department of Agribusiness at the Centre for Agriculture Promotion (CEPAGRI) in Sofala	<p>Asked who presided over the verification of the value chains presented in the crops most practiced and described in Slide 35</p> <p>He also asked if the study could serve as a basis to facilitate the preparation and implementation of operational projects</p> <p>He said that although the executive summary did not present any specific data, it was</p>	

N.º	Participant	Issue raised	Feedback given/other remarks
		to be welcomed because it was very brief and contained substantial useful information, which responds in part to the current environmental problems To conclude his intervention, he emphasized that he did not fully understand the expected adverse impacts on the PROCAVA and PRODAPE initiatives	the scope of work of the consultants The CRA uses both the general characterization of the risks faced by the country regarding floods, droughts, cyclones and sea level rise (SLR). It then identifies how these risks are likely to interact with the two projects and specifically in the 75 districts of PROCAVA and 23 districts of PRODAPE although the latter is done in general terms.
	Eduardo Cuamba, FDA	He wanted to know to which scenarios the risks presented referred to? To a zero scenario or that associated with the implementation of the projects	
	Egidio Timba from the Agricultural Development Fund (FDA)	Made some considerations, intended to contribute to improve the content of document, clarifying that, the report refers to 2020 as the year of the implementation of the project, and not in 2019. He also pointed out the way the roads subcomponent in PROCAVA was overrated. In real terms this will be limited to small interventions to link production areas (e.g. irrigation schemes) with the local areas of interest. There would not be any extensive work to rehabilitate or build roads in general He mentioned that he did not acknowledge irrigation as a good practice, because he thinks it could result in the resettlement of the whole community as this risk was high in the development of irrigation schemes He also highlighted that the study would be beneficial in the future in building preparedness to deal with the effects of floods and droughts He also pointed out that the operational project should separate the distribution of value chains across the country. The use of pesticides should be minimized, and the most appropriate solutions should be provided to mitigate the negative impacts resulting from the use of pesticides. He highlighted in the importance of using of organic fertilizers	The presented drew attention to the need for a high level of inter-institutional coordination, at central, provincial and other levels, in order to maximize or optimize the logic of interventions in and around the management of climatic risks. He noted that while at the level of the Cabinet the coordination seemed to be satisfactory, the same could not be said at some other levels that did not have the needed fora to do so. This intervention elicited some heated discussions centred on the fact that such fora already existed, however, something is eventually failing at the implementation stage PROCAVA is by design (at this stage) going to focus on five crops. The CRA consultancy team managed to make a
	Francisco Sambo of the Provincial Directorate of Land, Environment and Rural Development (DPTADER) of Nampula	He began by congratulating the consultant, for the excellent study, however, regretted that many studies were conducted, but never implemented, and stressed his desire to see this one being implemented. He indicated that there are differences between adaptation and mitigation He pointed out that there are few people who were not able to fully follow the presentation. For this reason, he asked for the use of appropriate terminology, which is on the domain of all the present, because in the document were terms that were not all too familiar to all the people.	

N.º	Participant	Issue raised	Feedback given/other remarks
		<p>It was also mentioned that Nampula has a lot of cassava production, but the big problem is that there is no processing plant, and the issue was how to solve the problem? In the presentation, there was doubt about slide 13, which focuses on the increase of the temperature in the country, to about 1.62 ° C, corresponding to the period from 1960 to 2006</p> <p>He pointed out that the country suffers cyclically from the effects of floods, and then those of severe droughts. Therefore, he referred that the Ministry of Public Works, Housing and Water Resources (MOPHRH) may have an important role in the development of a system of reservoirs for high amounts of rainwater to be used during times of scarcity and drought. The institutional analysis must highlight the importance of MOPHRH</p> <p>He also noted that in the country there are cultural factors that influence the options, for example, the non-breeding of cattle in Nampula. He thinks the studies should contain recommendations about all these aspects</p> <p>Additionally, he regretted that the results of the studies were only presented in the English language, which in part limited access to them, because not everybody is conversant in this language, and therefore suggested that the results should be presented in both languages, i.e. Portuguese and English. He added that he had not had time to analyse the study, especially the part which refers to the areas of microclimate, to adapt to droughts, floods and extreme winds, etc</p>	<p>crop water analysis of two of these, i.e. beans and soya, which it is believed can be used to have an idea of water issues and crops in general. The team could not cover all the five crops as this is beyond their TOR.</p> <p>The occurrence of the different climate hazards is well mapped in the document and in many case various districts form part of one single area, to which risks, and mitigation measures have been identified. Since at this stage we are not discussing subprojects and related risks and mitigation measures as such the generalized level at which the presentation is made seems to be the most appropriate. It will be at the operation stage that the details associated with each area will be brought to the fore.</p>
	Ilidio Banze, IDEPA	The climate risks are not dealt with in detail with reference to each target district. This should be improved	

3. Presentation of the ESMFs for PROCABA and PRODAPE

The presentation of the ESMFs of the two projects was split in three sections. The first dealt with the common aspects of the two instruments and then the ESMF for PROCABA was presented followed by the presentation of PRODAPE. The three sections were then discussed in combination.

3.1. Common Aspects

____ Before the start the second section of the meeting, after the coffee break Francisco Saimone took the floor to introduce Dr. Mario Souto, who was responsible for presenting the General and Common Aspects of Environmental and Social Management Framework (ESMF) of PROCABA and PRODAPE. _____

3.2. Specific aspects of the ESMF for PROCABA

After lunch break Sebastião Famba presented the ESMF for PROCABA

3.3. Specific aspects of the ESMF for PROCABA

Mário Souto took the floor again to present the ESMF for PROCABA.

Table 2 presents the summary of issues that were raised by the participants and processed after these three presentations.

Table 2: Summary of main issues raised, and feedback given regarding the ESMFs for PROCAVA and PRODAPE

N.º	Participant	Issue raised	Feedback given/other remarks
	Casimiro Ussene Provincial Director of the Sea, Inland Waters and Fisheries (DPMAIP) in Nampula	<p>It will be fundamental to attract young people. Experiences from other projects should be used</p> <p>At the central level there also should be increased inter-ministerial coordination for the two projects to succeed</p> <p>Most of the risks that have been identified are not necessarily associated with agriculture and aquaculture production</p> <p>Financing of activities in wetlands should be revised, especially because IFAD does not provide funding for activities occurring in these areas.</p>	<p>The same overall feedback as the one given after the presentation of CRA was reiterated.</p> <p>More specific feedback included the following main points:</p>
	Suzana Jamal, from the National Directorate of Veterinary Medicine (DINAV) in Maputo	The term "Value Chains" should not be used in the PROCAVA initiative, and, without giving an alternative, proposed that a more comprehensive term should be adopted. In poultry production the project should go beyond the farming of chicken	
	Ernesto Paulino, Director of DPASA in Gaza	<p>The project should already have estimated the percentages of young people and women that should be involved</p> <p>In this first phase of implementation of the project, special attention should be paid to non-profit making associations, such as cooperatives</p> <p>The project should identify specific measures to attract young people. Most of them will not be patient enough to wait for more than six months to get the benefits of their investments. Most of them are not used to these long-term investments such as PROCAVA and PRODAPE in which the return on investment is not immediate. In the project, young people should be more in trade and other activities, not in production</p> <p>The project should promote local initiatives to produce animal and fish feed. Production should be in big factories not in small/artisanal ones.</p> <p>There is a need to develop specialization of the various beneficiaries to be involved in</p>	<p>PROCAVA foresees that at least 30% of the project beneficiaries should be young people and 50% women while PRODAPE includes 40% for the youth and 20% for women as minimum targets. These might not have been mentioned during the presentations but are part of the design</p> <p>Perhaps the Ministry of Finance and Economy needs to be explicitly mentioned. It is a fact that it is involved as no external funding of the magnitude of the two projects can be done without the involvement of this ministry. In the</p>

N.º	Participant	Issue raised	Feedback given/other remarks
		<p>the value chains</p> <p>Due to its strategic position in the entire production and consumption value chains maize should be one of the PROCABA crops</p> <p>In the initial phase of activities, especially the small-scale ones, there is a need to avoid contracting a considerable number of skilled labour in order to minimize large costs at the start of the investments</p>	<p>same token there is the need to consider that the institutional analyses in the documents reflect the main stakeholders identified at this stage. More stakeholders can be identified and included as the projects progress. It is usually an open-ended process</p>
	Verónica Namashulua, Director of the Institute for Fisheries and Aquaculture Development (IDEPA)	Expressed her dissatisfaction with the images illustrated in PRODOPE's presentation on the different types of aquaculture initiatives in the country, and small food production centres, arguing that the illustrated images do not portray the reality on the ground, and devalue the efforts made by the government, with a view to promoting better conditions in these areas, for the communities	
	Ricardo Jorge from IDEPA	<p>PRODAPE should include production of saltwater fish species, since the country has an extensive coastline. This would also increase the number of beneficiaries to be involved, considering that most of the country's population lives in the coastal areas.</p> <p>The central and northern regions of the country also include some of the areas that are most vulnerable to climate change and this is a critical issue</p> <p>Compensatory measures must be taken, such as mangrove reforestation initiatives, to restore areas that have suffered destruction of natural habitats</p> <p>The project should allow the use of exotic species in aquaculture, because there are experiences of countries around the world that have developed their economy using these species. However, related initiatives must obey defined principles and procedures such as: (i) make a selective choice of the type of species, and (ii) they should not harm existing species</p> <p>The project should include a system that not only employs young people, but also creates the conditions to make them independent and entrepreneurs</p> <p>To counteract the potential effects of waterborne diseases a combination of measures is required such as prevention and protection including recourse to insurance</p>	
	Francisco Sambo, from DPTADER in Nampula	He expressed his enthusiasm for the project and asked about the level of their comprehensiveness in terms of being more specific about who is affected, and if the	

N.º	Participant	Issue raised	Feedback given/other remarks
		<p>measures to be implemented reflect their needs of the various operators. There is a need to differentiate between small and large operators, as they are associated with different impacts</p> <p>He queried about the institutions involved, or rather lack of involvement and highlighted the absence of the ministry of finance, which is an important stakeholder in projects that involve funding</p>	<p>The projects will deal more directly with the Regional Water Administrations (ARAs) and Basin Management Units (UGBs), who are responsible for the day-to-day management of water resources on the ground. They represent the MOPHRH</p> <p>The ESMF budget will be include in the final versions</p> <p>There are ways of exempting subprojects with low environmental impacts from obtaining licenses on a case-by-case basis if they meet the specifications that are defined as acceptable. Both agriculture and aquaculture working together with the relevant entities (e.g. MITADER, ARAs, etc.) can agree on such specifications and then it will be a matter of confirming on the ground if the requirements have been met, instead of covering the environmental licensing cycle.</p> <p>At the stage of the ESMFs we are not yet dealing with the specific subprojects. These will be dealt with at a later stage in the form of ESIAs and/or environmental licensing</p>
	Adérito Mavie, Director of the Department of Agribusiness of CEPAGRI of Sofala	<p>The Ministry of Mineral Resources and Energy (MIREME) should also be involved and included as one of the stakeholders, especially because both agriculture and aquaculture involve fuel and energy and there are provisions to subsidize the access to both by producers, which are not well known and are generally not used by many people. He also did not understand why the ARAs appear separated from the MOPHRH (?)</p> <p>The ESMF budgets need to be included in both documents</p>	
	Baptista Zunguza, from PROSUL in Xai-Xai	<p>Wanted to know if the value chains had been selected based on any climate change considerations?</p> <p>He also expressed that the ESMFs seemed to be of little value if the subprojects will have to undergo a new cycle of environmental licensing, which could delay the implementation of the activities. Given the low impact of most planned interventions he is of the opinion that the subprojects should exempted from applying for environmental licensing</p>	
	Beatriz Xavier from DPMAIP of Cabo Delgado	Indicated having lingering questions regarding the locations identified by the PRODAPE project for implementation of aquaculture initiatives	
	Rosana Francisco, from the Ministry of Land, Environment and Rural Development (MITADER)	Expressed that she had no questions but would simply like to make a few contributions to the meeting and pointed out that there no law to exempt environmental licensing, however, there is a possibility of circumventing the categorization of projects, but never the environmental impact study	
	Narciso Manhenje, from the International Fund for Agricultural Development (IFAD) in Mozambique	<p>The current IFAD regulation is modern, it came into force in 2017, it advocates that all projects should be subject to a Climate Risk Assessment (ARC) and a specific Environmental and Social Management Framework (ESMF), however, this being a new model, the current exercise serves as learning for all parties;</p> <p>The proposed date for the commencement of activities and implementation of the</p>	

N.º	Participant	Issue raised	Feedback given/other remarks
		<p>project is 2020 (two thousand and twenty); and</p> <p>The composition of young people and women that the project wants to achieve, with the PROCABA and PRODAPE initiatives, are: 30% young and 50% female, and 20% young and 40% female, respectively</p>	

4. Concluding Remarks

Francisco Saimone took the floor, first to thank all the participants for their contributions, collaboration and participation. Because the exercise had exceeded its allocated time, he invited the Deputy Director of IDEPA to make final considerations and close the meeting.

Mrs Verónica Namashulua, took the floor, and said that she was appreciative for the opportunity and acknowledged the presence of all participants in the meeting. Additionally, she commended the initiative of the projects, which aimed to provide better conditions for communities, and highlighted that all comments in the form of doubts, questions, suggestions, observations, and recommendations should be included in the minutes and serve as reference for the Consultant for the preparation of the final documents.

Annex 2: Overview of roles and responsibilities of the institutions likely to be involved in PRODAPE operations

The Ministry of Sea, Inland Waters and Fisheries (MMAIP) will be the host ministry in the implementation of PRODAPE. The National Institute of Fisheries and Aquaculture Development (IDEPA) will be the direct manager of the project.

Key Processes for the Development of Aquaculture

Aquaculture activities, irrespective of their nature, artisanal, industrial, experimental and research, require prior authorization and licensing, handling and processing of products must comply with hygiene, health and quality standards and protection of the environment and natural resources, and still subject to the supervision of MMAIP and other public entities, subject to penalties if irregularities are detected. The specific procedures legally required and regularly applied by the sector are summarized below:

I. Aquaculture Activity Planning and Management

It is MMAIP responsibility through IDEPA to identify the aquaculture development regions and zones, specify the management and development measures and policies to be established in relation to aquaculture activities, aquaculture species or aquaculture regions, as well as the definition of the safe limits of aquaculture facilities and aquaculture establishments themselves.

The practice of land-based aquaculture in Mozambique requires the award of a land use title (DUATs) and the private use of water for inland waters.

II. Authorization and Licensing

The development of aquaculture activity requires the prior authorization and subsequent licensing of the activities. After the identification of the site where the activity will be developed, the specific production system is also identified. The authorization and licensing process are divided into the following types:

- Development of artisanal or subsistence aquaculture: this is simplified process and requires only the proponent's identification, the project site and the species to be used.
- Development of commercial, experimental and research aquaculture: processes are more complex, requiring copies or proof of the legal existence of the private or collective entity, description of the area where the activity is to be carried out, description of the project, proof of request for provisional land title authorization (DUAT) or the private use of water and the proof of the environmental license.

III. Other Entities Involved

In the development of aquaculture MMAIP/IDEPA liaise with several entities and mainly with:

Ministry of Land, Environment and Rural Development (MITADER), with mandates as specified below:

Table 1: Mandates of MITADER and relevance to the project

Legislation	Description	Relevance
Resolution 6/2015 of 26th June, Article 3)	In the field of land administration and management	Formal request of the land to implement a subproject.
	ii) Establish and implement guidelines and procedures for land use administration, inspection and monitoring	
	In the field of environment	Request for environmental license should follow guidelines and procedures established by MITADER. See Regulation on Environmental Impact Assessment Process (Decree 54/2015 of 31 st December)
	ii) establish and implement guidelines and procedures to environmental licensing of development projects	
	xi) ensure effective implementation of bilateral and multilateral agreements to respond to challenges in	All agreements must be considered, especially if water is to be transferred

environmental sectors.	from one country to another.
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Ministry of Public Works, Housing and Water Resources (MOPHRH)

MOPHRH is the central institution responsible for the implementation and management of activities on public works, construction materials, roads and bridges, urbanization, housing, water resources, water supply and sanitation. The organic statute was approved by the Resolution 19/2015 of 17th July, which defines the mandates of this entity and its subordinate operational units. The water management infrastructures for aquaculture under the project will be developed in close collaboration with MOPHRH in what relates to (i) public works, (ii) construction materials; and (iii) water resources management as shown below

Table 2: Mandates of MOPHRH and relevance to the project

Legislation	Description	Relevance
Resolution 19/2015 of 17th July, Article 3)	In the field of public works	Norms of construction of civil works must comply with relevant instructions approved by MOPHRH.
	control public civil works to ensure security and durability	
	promote construction, rehabilitation and maintenance of public infrastructures, namely roads and bridges, water supply and sanitation systems, water retention, protection and storage structures	This reinforces the fact that this project is under the core attribute of MOPHRH.
	should include earth ponds, cages, etc.	
	define the regime for design, execution and supervision of public works.	The guidelines for design, execution and supervision must be followed. See section on construction regulations in the main text.
	define technical norms and regulations for public works and buildings projects.	
	inspect public and construction works to verify compliance with regulations and guidelines.	
	regulate contractors and consultants for civil construction activities	Consultants and contractors must follow defined regulations.
Resolution 19/2015 of 17th July, Article 3)	establish regulations and norms for construction of hydraulic infrastructures	Specific norms for hydraulic infrastructure must be followed.
	In the field of construction material	Local available materials should be used for the project as much as possible.
	promote investigation and utilization of locally available construction materials	
	regulate the use of construction materials	
	control the quality of construction materials and elements	
	ratify construction systems	
Resolution 19/2015 of 17th July, Article 3)	establish construction materials and standard of elements	
	In the field of water resources	It is highly relevant. Water users are not yet significant in many parts of the country and project area, but over time the numbers will increase and so the potential for interfering with water quantity and quality
	ensure availability of water in quantity and quality to meet sustainable socioeconomic development challenges at national level.	
	promote establishment of agreements for joint management and share of water in internationally shared water basins	See section on water regulations.
	promote public-private partnerships on construction and management of water retention, protection and storage systems.	Opportunity to implement the project following PPP approach.
	regulate water resources utilization in partial protection zones	
	ensure universal access to water supply	.

Legislation	Description	Relevance
	promote participation of private sector in management of water supply systems	
	regulate the services of water supply.	

At the basin and regional level, the MOPHRH has established the Regional Water Administrations (ARAs), which have the following responsibilities:

- Participation in the preparation, implementation and revision of hydrological occupation plan of hydrological basin;
- Administration and control of water under public domain, create and maintain the Water Cadastre and register private users, as well as inform and collect fees for water utilization;
- Licensing and concession of water users, authorize effluent disposal, define administrative reserve areas as well as inspect and monitor accomplishment of the requirements in which these areas were authorized;
- Approve hydraulic infrastructure projects, authorize their execution and do inspections;
- Declare the expiry of authorizations, licenses and concessions and their extension or revocation;
- Design, construct and explore of civil works carried out with its own means, as well as those assigned to it;
- Provision of technical services related to its duties and advice to local state agencies, public and private entities and individuals;
- Collect and maintain updated hydrological data needed for hydrological basin management;
- Mediate conflicts arising from the water utilization;
- Carry out water inspections, to impose sanctions, ordering demolitions of works and to eliminate unauthorized uses, and to eliminate sources of pollution;
- Propose the definition of protection zones as indicated in the water law;
- Proceed with the recognition of traditional water utilization and promote their registration;
- Any other mandates to be attributed by law.

These are all important to the project. Among other aspects the ARA will provide authorizations related with water uses for the project.

Ministry of Agriculture and Food Security (MASA)

The Ministry of Agriculture and Food Security (MASA) was created under Presidential Decree n.º 1/2015, of 16 January. Under the Resolution of the Inter-ministerial Public Service Commission n.º 2015, of June 26 - Approval of the Organic Statute of the MASA, the MASA is the central body of the State that, according to the principles, objectives and tasks defined by the Government, directs, plans and ensures the implementation of legislation and policies in the field of agriculture, livestock, agricultural hydraulics, agroforestry and food security, having the following attributions and competences:

- Promotion of production, agro-industrialization and competitiveness of agricultural products;
- Promotion of sustainable development through the administration, management, protection, conservation and rational use of resources essential to agriculture and food security;
- Promotion of the use and sustainable development of agroforestry resources;
- Promotion of agricultural research, extension, technical assistance and food security;
- promotion, monitoring and evaluation of agrarian and food security programs, projects, plans, and
- Licensing of agrarian activities.

Given the strong links between agriculture and fisheries/aquaculture PRODAPE is and will work closely with this sector in the development of multiple activities, e.g. fish feed, extension services, land harmonization, water use, etc.

Ministry of Trade and Industry (MIC)

The Ministry of Industry and Commerce is the central body of the State apparatus which, in accordance with the principles, objectives and tasks defined by the Government, oversees and supervises the following areas of the national economy: (i) food and beverage industry; (ii) textile and clothing industry, footwear and leather; (iii) chemical industry; (iv) metallurgical industry; (v) metal-mechanic industry; (vi) electrical engineering; (vi) graphic arts and publishing; (vii) distribution, maintenance and technical assistance to industrial equipment; (viii) other light industries; (ix) trade; and (x) general provision of services.

MIC comprises the following main technical units: (i) Inspection of Industry and Commerce; (ii) (National Directorate of Industry; (iii) National Directorate of Internal Commerce; (iv) National Directorate of Foreign Trade; (v) National Directorate for Support to Private Sector Development (vi) Planning and Studies Department; and a (vii) Legal Office. It is within this Ministry that other important units with influence in the business environment and particularly MSME are found such as (i) National Institute for Standardization and Quality (INNOQ); (ii) Institute for Promotion of Small and Medium Enterprises (IPEME); (iii) Institute of Industrial Property (IPI); (iv) Agency for the Promotion of Investments and Exports (APIEX) and (v) Mozambique Stock Exchange (BMM).

It has the potential of playing a crucial role in the establishment of the necessary linkages for the aquaculture subsector, including PRODAPE initiatives to thrive.

Other Levels and Actors

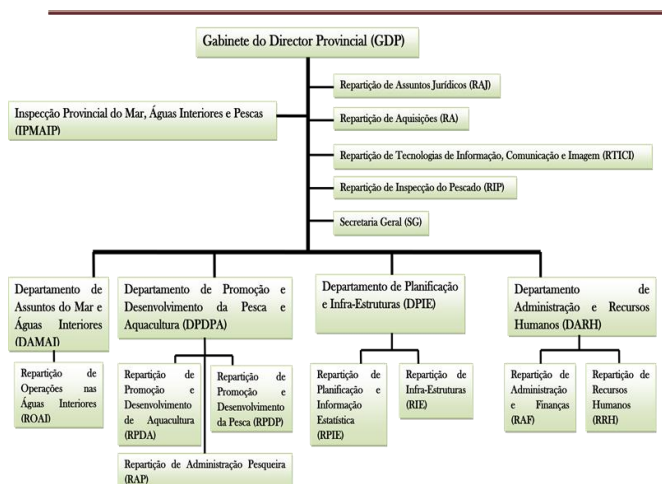
Provincial and District Levels

In line with the efforts that the country has been undertaking to promote decentralization the provincial and district entities occupy an important position in PRODAPE development. The institutions described above are also represented in different ways at the provincial and district levels.

At the provincial level the institutions at the central level are practically replicated and these have what is commonly referred to as double subordination in that they liaise with the ministerial departments to deal with sectoral issues while also subordinating to the Provincial Governor (appointed by the elected President of the Republic) in what regards the territorial and horizontal level governance.

As shown in the Diagram below the Provincial Directorates of Sea, Inland Waters and Fisheries (DPMAIP) include units that deal with aquaculture (DPDPA).

Diagram 1: Organizational structure at the provincial level



At the district level there are a few significant differences. The various sectors are amalgamated in a limited number of units although internally an attempt is made to establish technical departments that oversee technical matters in coordination with and subordination to the provincial technical units (Decree 6/2006 of Abril 12 (Statutes of District Government)). The directors of these services also report to the District Administrators nominated by the Ministry of State Administration and Public Service (MAEFP). Relevant technical units are:

District Services of Economic Activities (SDAE)

Given the fact that agriculture is the main economic activity in Mozambique all SDAEs include these services in all districts. It is only other sectors (e.g. fisheries, mining, etc.), that are only present depending on the potential of different districts. SDAEs provide assistance in the planning and implementation of agricultural activities at the district levels and also cover fisheries and now aquaculture, although it is generally acknowledged that their ability to comprehensively cover these are still incipient. Among other aspects they provide extension workers who try to provide technical assistance to producer on the ground, including in aquaculture.

Extension services are characterized by several limitations notably very few extension workers to cover wide areas, limited resources such as transport to facilitate their work and considerable isolation from centres of production of relevant technical information to be passed on to the farmers.

Under the project this would be to be reversed even if by simply targeting selected growth poles in which small changes can result in promising outcomes.

District Services of Planning and Infrastructures (SDPI)

These are responsible for: (1) spatial and land use planning; (2) water resources; (3) energy; (4) public works, infrastructures and equipment; (5) transport and traffic; (6) environmental management; (7) emergency; and (8) public services.

SDPIs can be expected to occupy an important position in the project as they are responsible for the infrastructures and also environment at district level. Now SDPI are generally weak institutions in need of many forms of support in order to fulfil their mandates.

Municipalities

Law 2/97 of May 28, which defines the base for the municipalization has been translated into the establishment of 53 municipalities across the country. Where aquaculture will be developed within the municipal jurisdiction the units responsible for supporting economic/fisheries services will take the lead. The water supply system is mainly located in the municipality territory, which turn the municipality into an important stakeholder for the implementation of the project.

Private Sector and NGOs

Since embracing the market economy in the mid-1980s and political pluralism in the 1990s Mozambique has been consolidating the position of the private sector and civil society organizations in development processes.

The private sector is present in all areas of the economy although still facing a host of challenges. Endogenously and/or in collaboration with regional and international organizations NGOs have also been multiplying. They are active in agriculture, fisheries, rural development, conservation and other areas playing different roles such as advocacy, education and capacity building, technical assistance and different forms of facilitation, demonstration, etc. Both private sector and NGOs can be expected to also play crucial roles in meeting PRODAPE objectives.

Water User Associations (WUAs)

The establishment and consolidation of WUAs will be crucial in the management of aquaculture. Initially more associated with irrigated agriculture they will certainly extend their mandates to include aquaculture and/or to interact with actors in this subsector as respective producers consolidate their existence and position. A list of such organizations in the country and project area should be compiled, updated continuously and used to meet the various functions of communication and coordination.

Annex 3: Environmental and Social Screening Form for Subprojects

Name of the Project:

Sub-project Name:

Sub-project Location:

(please include photos from different views and Google maps location)

.....

Sub-project Description:

.....

Community Representative and Address:

.....

Extension Team Representative and Address:

.....

Site Selection:

When considering the location of a sub-project, rate the sensitivity of the proposed site in the following table according to the given criteria. Higher ratings do not necessarily mean that a site is unsuitable. They do indicate a real risk of causing undesirable adverse environmental and social effects, and that more substantial environmental and/or social planning may be required to adequately avoid, mitigate or manage potential effects.

Issues	Site Sensitivity			Rating
	Low	Medium	High	
Natural habitats	No natural habitats present of any kind	No critical natural habitats; other natural habitats occur	Critical natural habitats present	
Water quality and water resource availability and use	Water flows exceed any existing demand; low intensity of water use; potential water use conflicts expected to be low; no potential water quality issues	Medium intensity of water use; multiple water users; water quality issues are important	Intensive water use; multiple water users; potential for conflicts is high; water quality issues are important	
Natural hazards vulnerability, floods, soil stability/ erosion	Flat terrain; no potential stability/erosion problems; no known volcanic/seismic/ flood risks	Medium slopes; some erosion potential; medium risks from volcanic/seismic/ flood/ hurricanes	Mountainous terrain; steep slopes; unstable soils; high erosion potential; volcanic, seismic or flood risks	
Cultural property	No known or suspected cultural heritage sites	Suspected cultural heritage sites; known heritage sites in broader area of influence	Known heritage sites in project area	
Involuntary resettlement	Low population density; dispersed population; legal tenure is well-defined; well-defined water rights	Medium population density; mixed ownership and land tenure; well-defined water rights	High population density; major towns and villages; low-income families and/or illegal ownership of land; communal properties; unclear water rights	

Completeness of Sub-projects Application:

Does the sub-project application document contain, as appropriate, the following information?

	Yes	No	N/A Or Comments
Description of the proposed project and where it is located			
Detailed design of subproject in ongoing stage			
A map or drawing showing the location and boundary of the project including any land required temporarily during construction			
The plan for any physical works (e.g. layout, buildings, other structures, construction materials)			
Any new access arrangements or changes to existing road layouts			
Any land that needs to be acquired, as well as who owns it, lives on it or has rights to use it			
A work programme for construction, operation and decommissioning the physical works, as well as any site restoration needed afterwards			
Construction methods			
Resources used in construction and operation (e.g. materials, water, energy)			
Information about measures included in the sub-project plan to avoid or minimize adverse environmental and social impacts			
Details of any permits required for the project			

Environmental and Social Checklist⁵⁶

		Yes	No	N/A Or Comments
A Type of activity – Will the sub-project:				
1	Involve the construction or rehabilitation of any small dams, weirs or reservoirs?			
2	Support existing traditional aquaculture developments?			
3	Build or rehabilitate any rural roads?			
4	Build or rehabilitate any electric energy system?			
5	Involve food processing?			
5	Build or rehabilitate any structures or buildings?			
6	Support aquaculture activities?			
7	Be in or near an area where there is an important historical, archaeological or cultural heritage site?			
8	Be located within or adjacent to any areas that are or may be protected by government (e.g. national park, national reserve, world heritage site) or local tradition, or that might be a natural habitat?			
9	Depend on water supply from an existing dam, weir, or other water diversion structure?			
<i>If the answer to any of questions 1-9 is "Yes", please see the reasonable mitigation measures to propose for the Detailed design of the Subproject and for the ESMP on how to avoid or minimize environmental and social impacts and risks.</i>				
B Environment – Will the sub-project:				
10	Risk causing the contamination of drinking water?			
11	Cause poor water drainage and increase the risk of water-related diseases such as malaria or bilharzia?			
12	Harvest or exploit a significant amount of natural resources such as trees, soil or water?			
13	Be located within or nearby environmentally sensitive areas (e.g. intact natural forests, mangroves, wetlands) or threatened species?			
14	Create a risk of increased soil degradation or erosion?			
15	Create a risk of increasing soil salinity?			
16	Produce, or increase the production of, solid or liquid wastes (e.g. water,			

⁵⁶ Please see below Supporting Information at Screening stage on Small irrigation schemes and small dams/reservoirs. This supporting information can also be use at ESMP preparation level.

		Yes	No	N/A Or Comments
	medical, domestic or construction wastes)?			
17	Affect the quantity or quality of surface waters (e.g. rivers, streams, wetlands), or groundwater (e.g. wells)?			
18	Result in the production of solid or liquid waste, or result in an increase in waste production, during construction or operation?			
<i>If the answer to any of questions 10-18 is "Yes", please see the reasonable mitigation measures to propose for the Detailed design of the Subproject and for the ESMP on how to avoid or minimize environmental and social impacts and risks.</i>				
C Land acquisition and access to resources – Will the sub-projects :				
19	Require that land (public or private) be acquired (temporarily or permanently) for its development?			
20	Use land that is currently occupied or regularly used for productive purposes (e.g. gardening, farming, pasture, fishing locations, forests)			
21	Displace individuals, families or businesses?			
22	Result in the temporary or permanent loss of crops, fruit trees or household infrastructure such as granaries, outside toilets and kitchens?			
23	Result in the involuntary restriction of access by people to legally designated parks and protected areas?			
<i>If the answer to any of the questions 19-23 is "Yes", please consult the ESMF and, if needed, prepare a Resettlement Action Plan (RAP) following SECAP "Guidance statement 13 – Physical and economic resettlement" and its respective FPIC</i>				
D Pesticides and agricultural chemicals – Will the sub-project:				
24	Involve the use of pesticides or other chemicals, or increase existing use?			
<i>If the answer to question 24 is "Yes", please consult the ESMF and, if needed, prepare a Pest Management Plan (PMP).</i>				
F Dam safety – Will the sub-project:				
25	Involve the construction of a dam or weir?			
26	Depend on water supplied from an existing dam or weir?			
G Others – Will the sub-project:				
27	Generate labour influx of ground force near rural villages?			
28	Increases already existing social issues in nearby communities?			
29	Consult local communities about subproject design, risks and impacts?			
30	Affect downstream water users?			
<i>If the answer to any of questions 1-9 is "Yes", please see the reasonable mitigation measures to propose for the Detailed design of the Subproject and for the ESMP on how to avoid or minimize environmental and social impacts and risks.</i>				

CERTIFICATION

We certify that we have thoroughly examined all the potential adverse effects of this sub-project. To the best of our knowledge, the sub-project plan as described in the application and associated planning reports (e.g. ESMP), if any, will be adequate to avoid or minimize all adverse environmental and social impacts.

Community representative (signature):

Extension team representative (signature):

Date:

REVIEW

Subproject Category:

A ☐

B ☐

C ☐

Applied Environmental and Social Assessment tool:

A: ESIA ☐

B: Simplified ESIA ☐

B: ESMP ☐

C: Good Environmental and Social Management Procedures ☐

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PRODAPE Environmental Safeguard Specialist and Social Safeguard Specialist (signature):

.....

Date:

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Desk Appraisal by Review Authority:

The sub-project can be considered for approval. The application is complete, all significant environmental and social issues are resolved, and no further sub-project planning is required.

☐ **A field appraisal is required.**

Note: A field appraisal must be carried out if the sub-project:

Needs to acquire land, or an individual or community's access to land or available resources is restricted or lost, or any individual or family is displaced

May restrict the use of resources in a park or protected area by people living inside or outside of it

May affect a protected area or a critical natural habitat

May encroach onto an important natural habitat, or have an impact on ecologically sensitive ecosystems (e.g. rivers, streams, wetlands)

May adversely affect or benefit an indigenous people

Involves or introduces the use of pesticides

Involves, or results in: a) diversion or use of surface waters; b) construction or rehabilitation of latrines, septic or sewage systems; c) production of waste (e.g. slaughterhouse waste, medical waste); d) new or rebuilt aquaculture development;

The following issues need to be clarified at the sub-project site:

.....
.....
...

A Field Appraisal report will be completed and added to the sub-project file.

Name of desk appraisal officer (print):

.....

Signature:

Date:

SUPPORTING INFORMATION FOR SCREENING

SMALL AQUACULTURE PRODUCTION UNITS

Scope of projects

Small aquaculture developments can serve a few families or an entire community. They can involve new and/or old developments, and changes or expansions to existing schemes. Water may be pumped from lakes, ponds or underground, or be diverted from streams or rivers. Pipes, channels or ditches carry the water to specific areas by gravity on the soil surface, pumps, by hand, or by other means.

Aquaculture involves complex soil-water-plant relationships, and should not be undertaken without thorough informed planning, even at a small-scale. While the benefits of aquaculture can be obvious and impressive, the adverse environmental effects can be significant, long-term, and perhaps permanent.

The most significant environmental issues concern threats to human health and soil productivity. Health effects arise from stagnant water in canals, ditches or fields that provide habitats for water-borne disease carriers. Losses of soil productivity result from poor soil drainage. These lead to waterlogging and salinization of the soils, and a reduction or complete loss of their usefulness for different activities. Salinization is the build-up of mineral salts in the soil as water evaporates from the soil surface.

Some of the environmental impacts and mitigation measures that can be applied to the target areas are presented in the Table below

Table 1: Potential environmental impacts and mitigation measures

Potential environmental Adverse effects	Mitigation measures
Human Environment	
Upsetting existing social and economic community management relationships, land tenure system, security of livelihoods and gender division of labor	Avoid sites that require: <ul style="list-style-type: none"> Resettlement, Displacement of other important land uses, or Encroachment on historical, cultural, or traditional use areas.
Conflicting demands on surface or groundwater supplies	Locate and size aquaculture developments: <ul style="list-style-type: none"> Where water supplies are adequate, and the scheme will not conflict with existing human, livestock, wildlife or aquatic water uses, especially during dry seasons So that withdrawals do not exceed "safe yield" from groundwater resources Ensure effective community organization for equitable distribution of water
Human Health	
<p>Creating habitats in canals and ditches for</p> <ul style="list-style-type: none"> disease carriers such as mosquitoes and snails responsible for spreading diseases such as malaria and schistosomiasis (bilharzia) spreading infection and disease through the inappropriate water circulation canals for water supply, bathing or human waste disposal <p>Health effects from improper storage, handling, use or disposal of chemicals (pesticides and herbicides)</p>	<p>Assess ecology of disease carriers in the project area, and employ suitable prevention and mitigation measures, e.g.:</p> <ul style="list-style-type: none"> Site and orient water works, fields and furrows to ensure adequate natural drainage of surface water, Use lined canals and pipes to discourage vectors Avoid unsuitable gradients, and creating stagnant or slowly moving water, - Construct straight or only slightly curved canals, Install gates at canal ends to allow complete flushing, Ensure adequate sub-surface drainage of fields, Avoid excessive use of water, Maintain water works, and clear sediment and weeds regularly Provide/ensure alternate facilities for domestic water supply, bathing and human waste disposal Provide education and training for farmers and other community members on: <ul style="list-style-type: none"> Efficient use of water, Proper storage, handling, use and disposal of chemicals, Adopt integrated pest management Monitor disease/infection occurrence and public health indicators, and take corrective measures (e.g. physical changes to the production units, education, medical) as needed

Potential environmental Adverse effects	Mitigation measures
Soils Waterlogging Salinization Erosion	<ul style="list-style-type: none"> Thoroughly assess project soils and their management needs Apply water efficiently Install and maintain adequate surface and subsurface drainage Use lined canals or pipes to prevent seepage <ul style="list-style-type: none"> Avoid waterlogging (above) Mulch exposed soil surfaces to reduce evaporation Flush land regularly <ul style="list-style-type: none"> Design and layout of furrows appropriately Avoid unsuitable gradients Avoid excessive use of water Install sediment traps in fields and canals to capture sediment for return to fields Minimum tillage, contour cropping, terracing and other methods of conserving soil moisture
Water Bodies and Aquatic Ecosystems Loss or damage to wetlands and their environmental services, biodiversity, and ecological productivity Reduced quality of surface and groundwater receiving excess aquaculture water or drainage (nutrients, chemicals, salts and minerals)	Avoid: <ul style="list-style-type: none"> Locating aquaculture developments on or near important wetlands, Use of water sources that may reduce wetland water supply, Draining water into wetlands Follow <i>Soils</i> mitigation measures (above) to minimize risks of waterlogging and Use chemicals appropriately (see <i>Human Health</i> above) *Prevent surface drainage of fields into nearby water bodies (streams, ponds, etc.)

ENVIRONMENTAL STANDARDS	ENVIRONMENTAL QUALITY INDICATORS
<ul style="list-style-type: none"> National legislation on protected areas (natural, cultural and built environments) National legislation on protecting natural resources (e.g. fish, wildlife, forest cover) International environmental protection conventions (e.g. RAMSAR, Biodiversity) National water quality standards and controls National controls on storage, handling, use and disposal of chemicals 	Pollution: Water quality (nutrients, chemicals, pH, Conductivity, turbidity, Sodium Absorption Rate -SAR) in water supply and drainage canals, and wells; Physical and chemical properties of soils; Environmental Health: Water table levels in project area (including wetlands); Rate of extinction of existing resources (e.g. fish, wildlife, forest cover); Rate of occurrence of disease carriers Human Wellbeing: Incidence of human and animal illness or disease; Poverty levels

Annex 4: Screening from under Decree 54/2015

Ficha de Informação Ambiental Preliminar (FIAP)⁵⁷

Nome da Actividade

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Tipo de Actividade

Turística ☐ Industrial ☐ Agropecuária ☐ Energética ☐ Serviços ☐ Outra ☐
(especifique)

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Nova ☐ Reabilitação ☐ Expansão ☐ Outro ☐
(especifique)

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Identificação do(s) Proponente(s):

Endereço/Contacto

Av./Rua:

Telefone Fixo: _____; Fax: _____

Celular: _____ / _____ / _____

E-Mail _____

Localização da Actividade

Localização Administrativa

Bairro: _____ Vila _____

Cidade _____

Localidade _____ Distrito _____

Província _____

Coordenadas Geográficas:

1. _____, 2. _____

1. _____, 2. _____

Meio de Inserção

Urbano ☐ Rural ☐ Periurbano ☐

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Enquadramento no Instrumento de Ordenamento Territorial

Espaço habitacional ☐ Industrial ☐ Serviços ☐ Outro ☐

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⁵⁷ Appears as Annex VI of Decree 54/2015 of December 31st, which regulates the environmental impact assessment process in Mozambique

Descrição da Actividade:

Infra-estruturas da actividade, suas dimensões e capacidade instalada (juntar sempre que possível as peças desenhadas e descritas da actividade).

Actividades Associadas

Breve descrição da tecnologia de construção e de operação

7.4. Actividades principais e complementares

7.5. Tipo, origem e quantidade da mão-de-obra

7.6. Tipo, origem e quantidade de matéria-prima e sua proveniência

7.7. Produtos químicos citados cientificamente a serem usados (caso a lista seja longa devese-á produzir-se em anexo)

7.8. Tipo, origem e quantidade de consumo de água e energia

7.9. Origem e quantidade de combustíveis e lubrificantes a serem usados

7.10. Outros recursos necessários

Posse de Terra (situação legal sobre a aquisição do espaço físico)

Alternativas de localização da actividade: (motivo da escolha do local de implantação da actividade indicando pelo menos dois locais alternativos)

Breve informação sobre a situação ambiental de referência local e regional:

Características físicas do local de implantação da actividade

Planície ☐ Planalto ☐ Vale ☐ Montanha ☐

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Ecosistemas predominantes

Fluvial ☐ Lacustre ☐ Marinho ☐ Terrestre ☐

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Zona de localização

Costeira ☐ Interior ☐ Ilha ☐

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Tipo de vegetação predominante

Floresta ☐ Savana ☐ Outro ☐

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Uso do solo de acordo com o plano de estrutura ou outra política vigente

Agropecuário ☐ Habitacional ☐ Industrial ☐ Protecção ☐ Outro ☐

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Infra-estruturas principais existentes ao redor da área da actividade

Informação Complementar

Mapa de localização (a escala conveniente)

Mapa de enquadramento da actividade na zona de localização (a escala conveniente)

Outra informação que julgar relevante.

Valor Total de Investimento:

Annex 5: Checklist for Environmental and Social Impacts

Project Activities	Issues to be addressed	Yes	No	If yes,
<ul style="list-style-type: none"> hatcheries in selected locations (the focus will be on establishing one main hatchery in each target province); fish feed production in-country using local ingredients (i.e. rice bran, wheat bran, maize bran, soya and various animal protein sources/by-products), with the view to reduce production costs; earthen ponds among rural smallholders of a standard size of 500 m²; cage farming in large water bodies that involve the use of cages of 125 m³ and high-level management of seeds and feeds; organization of smallholder operators into aquaparks and clusters to develop their activities in and around these production units facilitation for the development of infrastructures and services to facilitate market linkages for fish products (inputs and outputs). 	Will there any loss of vegetation during the construction and operation of the aquaculture subprojects?			If yes, in one of these issues, draw appropriate mitigation measures described in in Chapters 5 and 7
	Are there adequate services and plans for liquid and solid waste disposal during construction and operation?			
	Will the waste and trash generated during the construction and operational phases of the subprojects be cleaned up and disposed off?			
	Will there be fire-fighting equipment and safety equipment on-site in case of an emergency or accident during construction and operation?			
	Is there any risk of pollution of groundwater, surface water or soil by the subproject activities?			
	Is there any risk of air pollution by subproject activities, e.g., fish-industry processes?			
	Are there any environmentally sensitive areas in the vicinity of the area of operations that may be negatively impacted?			
	Are there impacts on the health of residents and the implementing and operating staff?			
	Are there any impacts of waterborne diseases on local communities, e.g., malaria and bilharzia?			
	Are there visual impacts caused by construction and infrastructure?			
	Are there any odors that may come from the disposal of waste from aquaculture activities?			
	Are there human settlements or sites of cultural, religious or historical importance near the subproject site?			
	Will there be any conflicts/disturbances between local people and external people working for the project?			
	Will the project interfere with any physical/cultural resources?			

Annex 6: Environmental and Social Clauses for Contractors

The environmental and social clauses presented below will be integrated (as applicable) into Contracts for the Design, Construction, Operation and Maintenance of the project.

Prior arrangements for carrying out works

Compliance with laws and regulations:

The Contractor and its subcontractors must: know, respect and enforce laws and regulations in force in the country in regard to the environment, disposal of solid and liquid waste, air emission and effluent standards and allowed noise levels, hours of work, etc.; take all appropriate measures to minimize harm to the environment and people; take responsibility for any claims related to environmental non-compliance.

Permits and approvals before work

Any work carried out must be preceded by obtaining information about permits (e.g., environmental permit) and administrative permissions. Before starting work, the Contractor shall obtain all permits necessary for carrying out the work under the contract: authorizations are issued by local communities, forest services (in the case of deforestation, pruning, etc.), mining services (in case of quarries and borrow sites), hydraulic services (in case of use of public water points), the Labour Inspection, network managers, etc. Before starting any works, the Contractor shall consult with the residents with whom he can decide to facilitate the progress of the project implementation.

Meeting before starting works

Before starting work, the Contractor and the Project Manager, under the supervision of the Client, shall hold meetings with government officials, representatives of the population in the project area and relevant technical services to inform them about the consistency and duration of works, routes involved and locations likely to be affected. This meeting will enable the Client to collect people's suggestions, raise awareness on environmental and social issues and their relationships with the workers.

Identification of concessionaire networks

Before starting works, the Contractor shall investigate a procedure for identifying concessionaire networks (water, electricity, telephone, sewer, etc.) on a plan that will be formalized by Minutes of Meetings signed by all parties (Contractor, works supervisor, concessionaires).

Release of public and private domain

The Contractor should know the perimeter of a public utility related to the operation is the perimeter that may be affected by the works. Work can only begin in the affected areas by private companies when they are released because of an expropriation process.

Environmental and social management program

The Contractor shall prepare and submit for approval by the Project Manager a detailed project environmental and social management program including: (i) a site plan showing the location of the site and the various areas of the site for project components and locations; (ii) a site plan for waste management indicating the types of waste, the type of collection considered, the storage, the method and location of disposal; (iii) the information and awareness program specifying targets, themes and selected consultation modality; (iv) a plan for accident management and health protection stating the risks of major accidents which endanger the health or safety of staff and/or public security measures and/or health protection to be applied in the context of an emergency plan. The Contractor shall also prepare and submit, for approval by the prime contractor, a plan to protect the environment of the site, which includes all security measures to protect the site and forward a site decommissioning plan at the end of works.

The environmental and social management program will also include: the organization of staff in charge of environmental, health and safety management with an indication of the officer in charge of the Project Environmental Health and Safety Department, description of the methods to reduce negative environmental, social, health and safety impacts, the water supply and sanitation management plan, the list of agreements made with the owners and current users of private sites, etc.

Construction Plant and Work Camp Rules

Location standards

The Contractor shall construct temporary construction facilities in order to cause the least disturbance possible to the environment, preferably in areas already cleared or disturbed when such sites exist, or on sites that will be reused at a later stage for other purposes. The Contractor shall strictly prohibit the establishment of a base camp within a protected area.

Display rules and staff awareness

The Contractor shall display a clearly visible internal regulation in the various camp facilities specifically prescribing: respect for local customs, protection against STI/HIV/AIDS, hygiene rules and safety and environmental measures. The Contractor shall educate its staff regarding respect for customs and traditions of the people of the area where the works are being performed and the risks of STDs and HIV/AIDS.

Use of local labour

The Contractor shall engage (besides his technical staff) as much labour as possible from the area where the works are being performed. Failing to find qualified personnel on site, it is permitted to bring a workforce from outside the work area.

Child labour

Harmful Child Labour, which consists of the employment of children that is economically exploitative or is likely to be hazardous to or interfere with, the child's education, or to be harmful to the child's health, or physical, mental, spiritual, moral or social development should not be allowed.

Respect for working hours

The Contractor shall ensure that work schedules comply with the laws and regulations in force. Any waiver is subject to the approval of the project manager. Wherever possible (except in exceptional cases provided by the prime contractor), the Contractor shall avoid performing work during the rest hours, Sundays and holidays.

Protection of site personnel

The Contractor shall make available to site personnel prescribed working clothes and in good condition and all accessories and safety protection to their activities (helmets, boots, belts, masks, gloves, goggles, etc.). The Contractor shall ensure scrupulous use of protection equipment on site. Permanent monitoring should be carried out for this purpose and, in case of violation, enforcement actions (warning, suspension, dismissal) must be applied to personnel.

Person(s) Responsible for Health, Safety and Environment

The Contractor shall appoint Health/Safety/Environment Officer(s), who will ensure that the hygiene, safety and environmental protection rules are strictly followed by all and at all levels of performance, both for workers and the population as well as others in contact with the site. He will locate health centres closest to the site to allow its staff to have access to first aid in case of accident. The Contractor shall prohibit access to the site by the public, protect it with tags and signs, indicate different access and take all order and security measures to avoid accidents.

Appointment of staff on duty

The Contractor shall provide care, supervision and safety maintenance of the site including an after-hours on-site presence. Throughout the construction period, the Contractor shall have personnel on call outside working hours, every day without

exception (Saturday, Sunday and holidays), day and night, to act with regard to any incident and/or accident that may occur in connection with the works.

Measures against traffic blockage

The Contractor shall avoid blocking public access. He must constantly maintain and guarantee the movement and access of residents during construction. The Contractor shall ensure that no excavation or trench is left open at night without a temporary fence and/or proper signage approved by the Project Manager. The Contractor shall ensure that temporary deviations allow for passage without danger.

Decommissioning of construction sites

General Rules

Upon releasing a site, the Contractor leaves the premises to their own immediate use. He cannot be released from his obligations and responsibilities without ensuring that the site is in good condition. The Contractor shall carry out all the necessary works for rehabilitation of the site and restore it to its initial or almost initial state. All equipment, materials, polluted soil, etc. will be removed and cannot be abandoned on site or surrounding area.

Once the work is completed, the Contractor shall: (i) remove temporary buildings, equipment, solid and liquid waste, leftover materials, fences, etc. (ii) rectify faults in drainage and treat all excavated areas; (iii) reforest areas initially deforested with appropriate species in relation to local forest services; (iv) protect the remaining dangerous works (well, open ditches, slopes, projections, rehabilitate quarries, etc.); (v) install functional pavements, sidewalks, gutters, ramps and other structures essential for public service. After the removal of all equipment, a report on the rehabilitation of the site must be prepared and attached to the minutes of the reception of the works.

Protection of unstable areas

During the execution of works in unstable environments, the Contractor shall take the following precautions not to accentuate the instability of the soil: (i) avoid heavy traffic and overload in the zone of instability; (ii) retain as much as possible the vegetation or restore it using native species where there are erosion risks.

Control the execution of environmental and social clauses

The Project Manager, whose team should include an environmental expert who is part of the mission control team, shall verify compliance and the effectiveness of the implementation of the environmental and social clauses by the Contractor.

Notification

The Project Manager shall notify the Contractor of any event of default or non-performance of environmental and social measures. The Contractor shall rectify any breach of the regulations duly notified to him by the Project Manager. Costs of restarts or additional works arising from non-compliance shall be borne by the Contractor.

Sanction

Pursuant to contractual non-compliance with environmental and social clauses, duly noted by the Project Manager, may be grounds for termination of the contract. The Contractor whose contract has been terminated due to non-implementation of environmental and social clauses may be subject to sanctions up to suspension of the right to bid for a period determined by the Client, with a reduction on the price and blocking the pay back of the guarantee.

Reception of the works

Failure to follow these terms exposes the Contractor to provisional or final refusal of acceptance of the works, by the reception Commission. The implementation of each environmental and social measure may be subject to partial acceptance involving relevant departments.

Obligations under the guarantee

The obligations of the Contractor run until the final reception of the works that will happen only after the complete execution of the works to improve the environment as stated in the contract.

Environmental and Social Clauses

Works signage

Prior to the opening of construction sites and whenever necessary the Contractor shall place, pre-signage and signage within an appropriate distance in line with the laws and regulations in force.

Measures for the movement of construction equipment

During the works, the Contractor shall limit vehicle speeds on site by installing signs and flag bearers. In residential areas, the Contractor shall establish the schedule and route for heavy vehicles, which must circulate outside the sites to minimize nuisances (noise, dust, risk of accidents and traffic congestion) and carry approval of the project manager.

Only strictly necessary materials will be tolerated on the site. Outside access, designated crossing places and work areas, it is prohibited to operate construction equipment.

The Contractor shall ensure that the speed limit for all vehicles on public roads, will be a maximum of 60 km/h on rural roads and 40 km/h in urban areas and through villages. Drivers exceeding these limits shall be subject to disciplinary action up to and including dismissal. The installation of speed humps or water spraying in settlements will be recommended in order to reduce the risk of accidents and reduce the nuisance of dust.

Vehicles of the Contractor shall, always, comply with the requirements of the Highway Code in force, particularly with regard to the weight of the laden vehicle.

The Contractor shall, during the dry season and depending on water availability, regularly spray water on dusty roads/tracks used by its transport equipment to avoid dust, especially in populated areas.

Protection of crossing areas and agricultural activities

The work schedule should be established in such a way as to minimize disruption of agricultural and fisheries activities. The main periods of activity must be known in particular to adapt the construction schedule to these important socioeconomic activities. The Contractor shall identify where crossings for animals, livestock and people are needed. Again, the involvement of the population is paramount.

Protection of wetlands, fauna and flora

It is forbidden for the Contractor to establish temporary installations (storage areas and parking, or paths to circumvent works, etc.) in wetlands, including the filling of existing temporary pools. In the case of vegetated areas, the Contractor must avoid or minimize any clearing of natural vegetation and be careful not to introduce new species without first consulting the forestry services. For all deforested areas lying outside the right-of-way and required by the Contractor for the purposes of its works, the top soil must be kept separate and restored afterwards.

Protection of sacred sites and archaeological sites

The Contractor shall take all necessary measures to respect the cultural and cultural sites (cemeteries, sacred sites, etc.) existing in the vicinity of the works and not interfere them with. For this purpose, he must first identify their type and location before starting the works.

If, during construction, remains of places of interest for worship, historic or archaeological value are discovered, the Contractor shall follow the following procedure: (i) stop work in the area, (ii) immediately notify the Project Manager who must take steps to protect the site to avoid destruction by defining a protection perimeter on the site within which no activity shall be carried on, and (iii) to refrain from removing and moving objects and relics. The work must be suspended within the scope of protection until the national body responsible for historic and archaeological sites has given permission to continue.

Measures for logging and deforestation

In the case of limited land clearing for project facilities, felled trees must be cut and stored in locations approved by the Project Manager. Residents should be aware of the possibility that they can make use of this timber at their convenience. Felled trees should not be left on site or burned or fled under the earth materials. Felled trees should be compensated in nature or in monetary value, depending on the existing laws.

Liquid Waste Management

The Contractor shall prevent spills and wastewater discharge, oil and all kinds of pollutants in surface water or groundwater or on soils. The Project Manager will provide treatment methods, disposal procedures, disposal sites and drainage locations to the Contractor.

Solid waste management

The Contractor shall provide an ample number of well-located waste bins for use by all construction workers and other project personnel. He shall strictly prohibit and punish any littering or unauthorized waste dumping by all employees. The Contractor shall also deposit the garbage in bins to be emptied and sealed periodically. In case of evacuation of the site by trucks, bins should be sealed to prevent the waste spillage. For hygiene reasons, and in order to not attract vectors daily collection is recommended, especially during hot periods. The Contractor shall dispose of or recycle the wastes in an environmentally sound manner. For this purpose, the Contractor should store waste in labelled containers. The Contractor shall deliver the waste, if possible, to existing disposal sites.

Protection against noise pollution

The Contractor shall limit construction noise in order not to disturb residents, either by excessively long duration, or by their extension outside of normal working hours. Thresholds are not to exceed 55 decibels (dB) during the day and 45 decibels at night.

Prevention against STD/HIV/AIDS and related diseases

The Contractor shall inform and educate staff on the risks of STD/HIV/AIDS. He must make enough and good quality condoms available to staff free of charge to be used against STDs and HIV/AIDS infections. Local communities should also be informed about the risks of STDs and HIV/Aids.

The Contractor shall inform and educate employees on safety and health at work. He must maintain the safety and health of workers and local populations and take appropriate measures for this purpose. The Contractor shall provide the following preventive measures against the health and safety risks: (i) enforce the wearing of hardhats, uniforms, boots, and other appropriate footwear and equipment; and (ii) systematically install a medical clinic at the construction site and provide free medications necessary for emergency care on site for the staff.

Site journal

The Contractor shall maintain a log yard, which will record complaints, violations, accidents or incidents that have a significant impact on the environment or impacts on the local communities. The site log is unique to the site and notes must be handwritten in ink or typed on a computer. The Contractor shall inform the general public and residents in particular, about the existence of this journal, with an indication of where it can be accessed.

Equipment maintenance and equipment project

The Contractor shall comply with the maintenance standards for construction equipment and vehicles and conduct refuelling and lubricant exchange in a place designated for this purpose. Refuelling should take place on a concrete slab. Fuel tanks should be placed within a concrete bund of 110% volume the volume of the fuel tank or tanks. Oil/water separators should be installed where there is a risk of pollution with hydrocarbons, e.g., at vehicle maintenance sites. On the site, provision of absorbent materials and insulators (pillows, sheets, tubes and peat fibre, etc.) as well as sealed containers clearly identified for receiving petroleum residues and waste, must be present. The Contractor shall perform, under constant surveillance, handling of fuel, oil or other contaminants, including the transfer to avoid spillage. The Contractor shall collect, process and

recycle all waste oil, and waste in operations and maintenance or repair of machinery. It is forbidden to discharge any hydrocarbons or other dangerous chemicals into the environment or on the construction site.

The Contractor shall drain the waste oils in sealed drums and retain oils to return it to the supplier (recycling). Used spare parts must be sent to the landfill or disposed of in another environmentally acceptable manner.

Washing areas and areas for maintenance of equipment and vehicles must be from concrete and equipped with a collection system for oils and fats, with a slope oriented to prevent the flow of pollutants to areas with bare soil. Concrete mixers and equipment for the transportation and installation of the concrete should be washed in the areas provided for this purpose.

Dust control

The Contractor shall select the location of crushers and similar equipment based on noise and dust they produce. Goggles and dust masks are mandatory.

Worker behaviour

The Contractor shall strictly prohibit, and specify transparent penalties for, any environmentally problematic or socially inappropriate activities by construction workers or any other project personnel. Examples of activities to be prohibited include hunting, bush-meat purchase, wildlife capture, plant collection, vegetation burning, or inappropriate interactions with local people.

Only properly trained and licensed security personnel may possess firearms.

Summary of Environmental, Social, Health and Safety (ESHS) Procurement Enhancements

The following table summarizes the key Procurement enhancements in contracts

	Subject	Enhancement/s
1	Declaration of contract suspension or termination	Applicants/Bidders/Proposers are required to make a declaration listing any civil works contracts that have been suspended or terminated by an employer and/or performance security called by an employer, for ESHS reason/s. This information will be used to inform enhanced due diligence.
2	Strengthened specifications/ employer's requirements	The Employer is required to set out clearly the minimum expectations of ESHS performance from the outset, to ensure that all Bidders/Proposers are aware of the ESHS requirements.
3	Workers' ESHS Code of Conduct	Bidders/Proposers are required to submit, as part of their Bid/Proposal, an ESHS Code of Conduct that will apply to their employees and sub-contractors, and details of how it will be enforced. The suitability of the Code of Conduct can be assessed and discussed as part of the Bid/Proposal evaluation and negotiations. The successful Bidder/Proposer is required to implement the agreed Code of Conduct upon contract award.
4	Contractor's ESHS Management Strategy and Implementation Plans	Bidders/Proposers are now required to submit, as part of their Bid/Proposal, ESHS Management Strategies and Implementation Plans required to manage the key ESHS risks of the project. The suitability of these strategies and plans can be assessed as part of the Bid/Proposal evaluation, and discussed during pre-contract discussions, as appropriate. These strategies and plans will become part of the Contractor's Environmental and Social Management Plan (C-ESMP). Particular Conditions of Contract now include provisions relating to the_(C-ESMP), e.g.: a requirement that the Contractor shall not commence any Works unless the Engineer is satisfied that appropriate measures are in place to address ESHS risks and impacts; at a minimum, the Contractor shall apply the plans and ESHS Code of Conduct, submitted as part of the Bid/Proposal, from contract award onwards.

5	ESHS Performance Security	The successful Bidder/Proposer is now required to provide, in addition to the standard Performance Security, an ESHS Performance Security (the sum of the two "demand" bank guarantees, normally not to exceed 10% of the contract price). The ESHS performance security is in the form of a "demand" bank guarantee." The application of this provision is at the Borrower's discretion. It is recommended for contracts where there is significant ESHS risks as advised by Social/Environmental specialist/s.
6	ESHS Provisional Sum	An additional provisional sum, specifically for ESHS outcomes, may be included in the Request for Bids/Proposals documents, and eventual contract. Normally, the payment for the delivery of ESHS requirements shall be a subsidiary obligation of the Contractor covered under the prices quoted for other Bill of Quantity/price items.
7	Key ESHS Personnel	Bidders/Proposers are now required to demonstrate that they have suitably qualified ESHS specialists among their Key Personnel. Key Personnel must be named in the Bid/Proposal, and in the contract. The quality of the proposed Key Personnel (including ESHS specialists) will be assessed during the evaluation of Bids/Proposals. The Contractor shall require the Employer's consent to substitute or replace any Key Personnel. The Engineer may require the removal of Personnel if they undertake behaviour which breaches the ESHS Code of Conduct, e.g. spreading communicable diseases, sexual harassment, gender-based violence, illicit activity, or crime.
8	ESHS Reporting	Contracts now contain specific ESHS reporting requirements. These relate to: ESHS incidents requiring immediate notification ESHS metrics in regular progress reports.
9	ESHS considerations during contract variation	As part of variation procedures, the Contractor shall provide relevant ESHS information to enable the Engineer to evaluate the ESHS risks and impacts.
10	Ability to withhold interim payment	Contracts now contain provisions allowing interim payments to be withheld where there is a failure to perform an ESHS obligation.
11	ESHS considerations included in civil works Consulting Services	The standard Request for Proposals for consulting services now include ESHS considerations to apply to the supervision of civil works.

Annex 7: Typical example of issues covered under ESMP related to planning, design, construction and operation of aquaculture development sub-projects

1. INTRODUCTION

This Environmental and Social Management Plan (ESMP) provides a set of good environmental practices that should be followed by the Developers/Consultants, Contractor(s) and the Owners/Managers involved in the planning, implementation and operation of the various components of PRODAPE. The typical ESMP is in line with the international best practices and environmental requirements in force in Mozambique. It is designed to be a resource document that should be adapted to the different subprojects and stages of their development.

As outlined in the main document of PRODAPE ESMF, in addition to the IFAD environmental, social and climate management guidelines the ESMP is based on the provisions of the Regulation on the Environmental Impact Assessment Process (Decree 54/2015 of 31 December), procedures of the General Guidelines for Environmental Impact Assessment Development (Ministerial Decree nr. 129/2006 of 19 July) and other national legal provisions, including DM 31/2012, where interventions have resettlement implications.

1.1. Purpose

The general purpose of an ESMP is to ensure that all project activities are conducted and managed in an environmental and responsible manner. Specifically, the ESMP aims to:

- Provide the entity that oversees the environmental area (currently the Ministry of Land, Environment and Rural Development - MITADER), with a tool to facilitate environmental monitoring of all project activities in line with the Mozambican environmental legislation;
- Provide clear guidelines to the Developer/Contractors (employees, service providers and others) with the domestic and international legal requirements of sustainable environmental and social standards;
- Incorporate environmental and social considerations in the Contractor's operating procedures;
- Serve as an action plan for environmental and social management and monitoring;
- Provide a framework for implementation of mitigation measures related with the environmental impacts;
- Prepare and maintain environmental performance records of project activities.

2. ORGANIZATION AND MANAGEMENT STRUCTURE

Compliance with the instructions in this document is the responsibility of the Project Developer – Government of Mozambique through the Ministry of Sea, Inland Waters and Fisheries/IDEPA. However, in order to ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project.

The following entities are likely to be involved in the implementation of the subproject's ESMP:

- Lead Environmental Authority – Ministry of Land, Environment and Rural Development (MITADER);
- Other Relevant Authorities;
- Project Manager or Developer (IDEPA);
- Environmental Consultant (ECO)
- Resident Engineer (RE);
- Environmental and Social Officer (ESO);
- Contractor;
- Occupational Health and Safety Officer (OHSO)
- Sub-contractors.

Figure below shows the relationship between the above entities/persons.

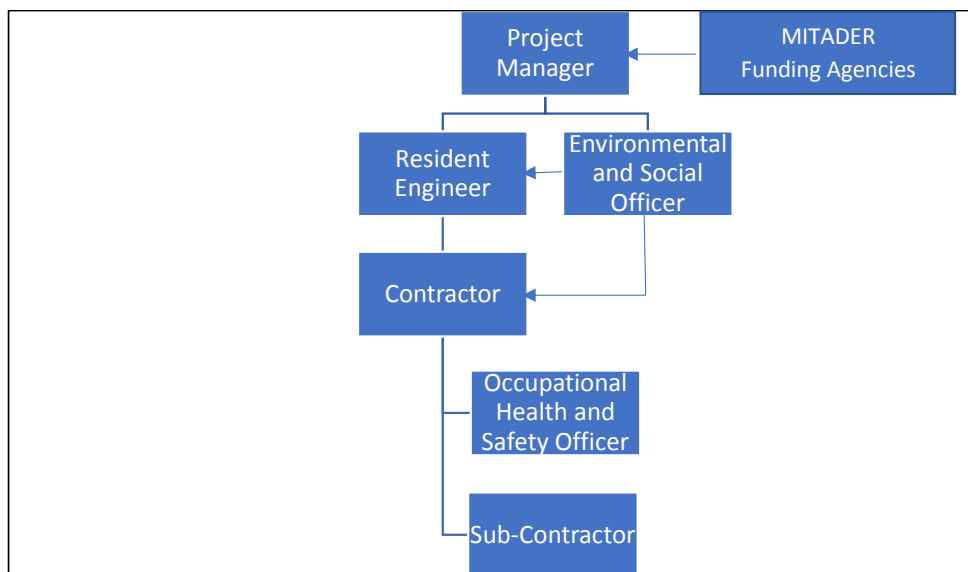


Figure 1: Generic organizational structure

The Developer (IDEPA) will hire a resident construction engineer (RE) and environmental and social officer (ESO). The first will be responsible for overseeing the technical issues related to construction and the second to ensure all environmental safeguards and provisions from the ESMF are being taken into consideration in the specific sub-project ESMP and that all the recommendations from the environmental impact assessment process are being followed accordingly.

IDEPA will also contract an environmental consultant (ECO) registered in MITADER to prepare the ESMP for Category B projects and Good Environmental Practices for Category C projects.

The Contractor will receive instructions from the RE and ESO and will be responsible for implementation of all environmental and social specifications. Depending on the complexity of the subprojects the Contractor should hire an occupational, health and safety officer (OHSO) to ensure implementation of all preventive measures to the workers. Contractors should make available the terms and conditions to their sub-contractors.

The following descriptions represent the minimum level of roles and responsibilities of above actors to implement the ESMP. The roles and responsibilities described below can be updated as necessary.

2.1. Environmental Authority - MITADER

The Ministry of Land, Environment and Rural Development (MITADER) is the national Government institution created by the Resolution 6/2015 of 26th June. At the provincial level, MITADER is represented by the Provincial Directorate of Land, Environment and Rural Development (DPTADER). Since only Category B and C interventions are eligible under PRODAPE, no national (DINAB) entity will be involved in the MITADER organization structure. DPTADER will process all submissions, categorizations, reviews, approvals and auditing.

Role

Among other responsibilities, MITADER/DPTADER will be responsible for ensuring the implementation of the environmental policies and safeguards and the enforcement of the environmental laws and regulations.

Responsibilities

- Assign a Category to the sub-projects based on information provided by the Developer (IDEPA) followed by inspection to the sub-project site and determine the type and level of environmental work required for the subproject to be approved;

- Participate in public meetings with the Project Developer and other stakeholders during preparation of ESIA-ESMP;
- Review the draft ESIA-ESMP prepared by the Environmental Consultant (ECO). Based on the review, the authority will either (i) approve the ESIA-ESMP (with or without conditions), (ii) return the ESMP for further improvement and re-submission, giving guidance on what needs to be revised or added, or (ii) reject the ESIA-ESMP, giving reasons;
- Process and issue the environmental license for construction and operation of the sub-project;
- Review monitoring and audit reports, if required;
- The environmental authority may perform random controls to check compliance with the ESMP. In case of persistent non-compliance, the Project Developer will be required to provide an action plan with corrective measures and have them approved by the authorities.

2.2. Other Authorities

Other authorities may be involved in activities relating to the ESMP. For example, local authorities may be involved in monitoring activities. Other authorities may also be involved in the development, implementation, review and approval of the ESMP. The reason for their involvement is primarily to verify the accuracy and comprehensiveness of the information provided from the viewpoint of their specific mandates and areas of responsibility (e.g. permits and licenses). Example of permits and licenses to be requested include land use title, construction licenses, water abstraction/pollution, access authorization, social development and other.

2.3. Project Manager (PM)

The Project Manager (PM) will be based at IDEPA with the overall responsibility for ensuring the implementation of the project and its ESMP. IDEPA should take into account the requirements of the following entities:

- National Environmental Authority (MITADER);
- Funding Agencies – GoM and IFAD.

Role

The Project Manager will be required to take overall responsibility for the environmental and social aspects of the project. An important part of this role will be to:

- Ensure that the ESMP approved by MITADER and the Funding Agency (if required) is included in the bid documentation for selection of contractors;
- Audit the implementation of the ESMP;
- Report on the implementation of the ESMP to IDEPA senior managers, MITADER and/or the funding agencies as and when necessary.

Responsibilities

The responsibilities of the PM will include the following:

- Hire the Contractor and supervision team (resident engineer and environmental control officer);
- Establish and maintain regular and proactive communications with the resident engineer, contractor, etc.;
- Undertake periodic site visits and site inspections to perform an environmental audit of the implementation of the project ESMP;
- Review and comment on environmental reports produced by the Resident Engineer, Contractor, etc.;
- Report to Funding Agencies and/or MITADER as and when required on the state of the environmental and social for the project ESMP;
- Ensure that the specific sub-project ESMP is reviewed and updated as necessary.

Reporting Structure

The PM will take instructions from the following:

- MITADER and/or the Funding Agencies.

The following will liaise with the PM:

- The Resident Engineer (RE), and/or
- The Environmental and Social Officer (ESO).

2.4. Environmental Consultants (ECO)

The Environmental Consultants (ECO) will be contracted by IDEPA to perform environmental consultancy for each sub-project environmental licensing.

Role

- Conduct environmental consultancy services for environmental licensing.

Responsibilities

- Prepare specific sub-project ESMP (Category B) and Environmental Best Practices (Category C);

2.5. Resident Engineer (RE)

The Resident Engineer (RE) will be appointed by the PM (IDEPA) and will be required to oversee the construction program and construction activities performed by the Contractor.

Role

The role of the RE will be to:

- Review and approve method statements by the Contractor in connection with the ESMP;
- Oversee the general compliance of the Contractor with the ESMP and other pertinent site specifications;
- Liaise between and with the contractor and the PM on environmental and social matters, as well as any pertinent engineering matters where these may have environmental consequences.

Responsibilities

The RE will be required to:

- Be familiar with the contents of the ESMP;
- Monitor the Contractor's compliance with the Environmental Specifications daily, through the Site Diary;
- Communicate to the Contractor, verbally and in writing, necessary advices to perform environmental and social management of the works;
- Request for, review and approve the Method Statements prepared by the Contractor;
- Review and approve drawings produced by the Contractor in connection with, for example, the construction site layout, access/haul roads and so on;
- Advise on materials that may be used to designate working areas and materials to be used for the works as and when necessary;
- Communicate to IDEPA, verbally and in writing, at least 10 working days in advance, any proposed actions which may have negative impacts on the environment;
- Undertake damage assessments where incidents, accidents and serious infringements have occurred on/off site;
- Review and approve all areas that have been rehabilitated by the Contractor;
- Review complaints received and make instructions as necessary;
- Accompany PM Team during site inspections and/or inform it, in writing, of any infringements of the Environmental Specifications and to issue instructions to the Contractor;
- Discuss with the PM Team the application of penalties for the infringement of the Environmental Specifications, and other possible enforcement measures when necessary;
- Issue penalties as and when necessary;
- Implement Temporary Work Stoppages where serious environmental infringements and non-compliances have occurred;
- Maintain a record of complaints from the public and communicate these to the Contractor and the PM;
- Facilitate proactive communication between all role-players in the interests of effective environmental and social.

Reporting Structure

The RE will report to PM.

The Contractor will report to the RE.

2.6. Environmental and Social Officer (ESO)

An Environmental Officer (ESO) will be appointed by the PM to monitor, review and verify the implementation of the ESMP.

Role

The overall role of the ESO is to oversee for the environmental and social safeguards for all sub-projects.

Responsibilities

The ESO will have the following responsibilities:

- Prepare in close collaboration with the project's technical team at IDEPA and provincial directorates the environmental screening reports to be submitted for subproject categorization by DPTADER;
- Review all ESMP (Category B) and Environmental Best Practices (Category C) submitted by hired environmental consultants;
- Advise the RE on the interpretation and enforcement of the Environmental Specifications, including discussions on non-compliances;
- Provide environmental information as and when required;
- Undertake regular inspections and submit reports on the Contractor's compliance with the Environmental Specifications. These reports shall be copied to the RE and to the PM;
- To communicate frequently and openly with the Contractor and the RE to ensure effective, proactive environmental and social management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts;
- Undertake damage assessments with the RE where incidents, accidents and serious infringements have occurred on/off site;
- To advise the RE on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities;
- Review and approve all areas that have been rehabilitated by the Contractor;
- Review complaints received and make instructions as necessary;
- Identify and make recommendations for minor amendments to the ESMP as and when appropriate;
- Ensure that the Contractor, his employees and/or Sub-Consultants receive the appropriate environmental awareness training prior to commencing and during activities;

Reporting Structure

The ESO will report to the PM. The ESO will advise the RE and the Contractor on environmental and social aspects.

2.7. Contractor

The PM will appoint a Contractor to undertake the construction of a given subproject.

The 'Contractor' will be contractually required to undertake his/her activities in an environmentally responsible manner, as described in the ESMP.

Role

The role of the Contractor will be to:

- Implement, manage and maintain the ESMP for the duration of the contract;
- Designate, appoint and/or assign tasks to the personnel who will be responsible for managing all or parts of the ESMP;
- Assign appropriate authority, accountability and responsibility for these personnel to carry out their duties;

- Provide appropriate resources, budgets, equipment, personnel and training – for the effective control and management of the environmental risks associated with the construction.

Responsibilities

The Contractor will have the following responsibilities:

- Be familiar with the contents of the ESMP;
- Comply with the Environmental Specifications contained in the ESMP and subsequent revisions;
- Confirm legislative requirements for the construction works, and ensure that appropriate permissions and permits have been obtained before commencing activities;
- Ensure that access to the land for the construction site and works has been acquired;
- Prepare Method Statements, program of activities and drawings/plans for submission to the RE;
- Undertake daily site inspections (with the RE) to monitor environmental performance and conformance with the Environmental Specifications;
- Review the site inspection reports and take cognizance of the information/recommendations contained therein;
- Notify the RE, verbally and in writing, immediately in the event of any accidental infringements of the Environmental Specifications and ensure appropriate remedial action is taken;
- Ensure environmental and social awareness among his/her employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them;
- Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract;
- Undertake rehabilitation of all areas affected by construction activities to restore them to their original states, as determined by the RE;
- Undertake the required works within the designated working areas.

The Contractor will also set up his/her own management system to ensure and monitor the application of the sub-project ESMP and associated Environmental Specifications. This system shall, at a minimum, provide for:

- The preparation of Method Statements as required by the sub-project ESMP;
- The effective and accountable management of construction activities relative to the Environmental Specifications;
- Reporting on a regular basis and as required to the ESO on environmental issues;
- Recording, in writing, all communication/correspondence with all pertinent stakeholders and other parties on environmental and social issues;
- The development of emergency and contingency plans for the key range of accidents and emergencies that may be associated with the project;
- Regular, constructive and proactive liaison with the PM, ESO and RE.

Reporting Structure

The Contractor will receive instructions from the RE, ESO and PM.

2.8. Occupational Health and Safety Officer (OHSO)

Role

The Occupational Health and Safety Officer (OSHO) will be hired by the Contractor to ensure the health and safety of both workers and the community.

Responsibilities

- Ensure compliance with the specifications;
- Conduct workers' induction and regular sessions on occupational health, safety and environment, including emergency procedures;
- Ensure that the material and human conditions for response to accidents at work are available and on standby.

Reports

The OHSO receives instructions from the Contractor.

2.9. Sub-Contractors

Role

The subcontractors will be hired by the Contractor to perform certain activities related to the project.

Responsibilities

The Subcontractors must comply with the Environmental Specifications and instructions given by the Contractor to ensure compliance with the same specifications.

Sub-contractors and their workers should be induced on Environmental Specifications by the Contractor.

Reports

The Subcontractors received instructions from the Contractor.

3. STAKEHOLDER ENGAGEMENT PLAN

3.1. Overview of Existing Stakeholder and Community Relations

The level of communications at local levels about the project is still superficial. It varies among the provinces where the project will be implemented. Communication between province and districts have commenced in order to identify locations to establish earthen ponds and secure the land and in many of them construction has started and, in a few cases, completed. Community engagement is also at different stages of development. In some cases, this has been systematically conducted and in other there are issues that can put subproject development and sustainability at risk.

3.2. Future Stakeholder Engagement Plan

In addition to addressing the complex issues engagement and ownership, including capacity building, from the environmental and social point of view there are three processes that need community and stakeholders' engagement to implement the project in the Mozambican territory, namely:

- 1) Public meetings for land title (if the land was not formally acquired);
- 2) Mandatory public meetings for environmental licensing;
- 3) Stakeholder Engagement Plan (Construction and Operation Phase).

3.2.1. Land Title Meetings

Under the regulation of Land Law there is a need for public consultation for land title.

3.2.2. Environmental Licensing Meetings

Under the environmental license process additional public participation meetings will be necessary to comply with national environmental regulation as stipulated by both Decree 54/2015 and Ministerial Diploma 130/2006 and other related regulatory instruments.

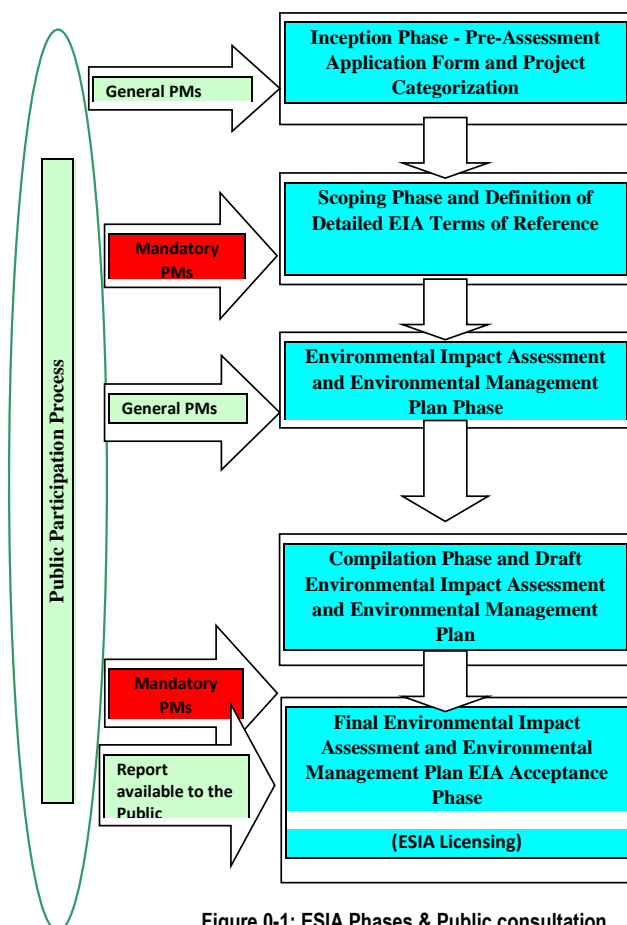
Under the above-mentioned regulations and guidelines, the ESIA process emphasizes the clear need for frequent interaction and communication between general public, affected parties by proposed Project, external interested and concerned organizations, as well as project scientists and engineers.

Each aspect of the technical investigations generally includes a data collection and verification phase, followed by analysis and evaluation, then synthesis and conclusions. The findings of each phase are communicated as appropriate to external parties. The ESIA process is usually sub-divided into five major phases, namely:

- Inception Phase: Pre-assessment application form and Project categorization
- Scoping Phase and definition of detailed ESIA Terms of Reference (ToR)
- Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) Phase
- Compilation Phase and Draft ESIA and ESMP
- Final ESIA and ESMP

Each of the above-mentioned phases should be marked by a series of public meetings in which relevant Interested and Affected Parties (I&APs) are present. The end of the Scoping Phase and the presentation of the Draft Final Report should be marked by mandatory public meetings. These must be announced 15 days prior the meeting day. In addition to being invited by public notice (most appropriate disclosure means, usually most circulated newspaper), a certain number of participants to these meetings have to be directly invited by letters of invitation to be drafted by the Consultant and issued and distributed by the Developer (IDEPA). In line with the regulations, the hard copies of the Scoping Report need to be made available to the public in certain places such DPTADER and District (SDAE/SDPI) and DPMAIP.

All the public meetings should be non-technical and are expected to contribute to get stakeholders' inputs in terms of avoiding/minimizing negative impacts and optimizing the positive impacts of the project. Minutes of these meetings should be produced, and the public participation process report has to be drafted and included in the Final Reports.



3.2.3. Project Stakeholder Engagement Plan

Objectives of the Plan

The Stakeholder Management Plan (SEP) aims at summarizing the methods, procedures and activities that will be implemented by the Developer to inform stakeholders in an inclusive and timely manner about the potential impacts of the project.

The SEP contains a stakeholder identification table where all relevant stakeholders are identified with the most appropriate communication channels and strategies, information disclosure and grievance processes that will be adopted. If there are stakeholders who are not included in the SEP they can get in contact with the Developer to receive information about the Project and be added to the stakeholder engagement programme in this SEP.

General Stakeholder Communication Record Maintenance

Consultation records, minutes of meetings and write-ups of informal consultations will be maintained by the Environmental and Social Officer (ESO) clearly logging the key information provided to stakeholders and also the key incoming communications, complaints and questions along with a summary of actions taken. The minutes of meetings should, among other aspects, contain:

- 1) Date
- 2) Venue – City, Village
- 3) Summary of the main issues presented during the meeting by the developer and/or his/her representative (ESIA and/or Engineering team)
- 4) Summary of the main issues presented by the participants (Note: all concerns and interests expressed should be recorded)
- 5) Feedback given
- 6) List of participants including names and position of the organizers as well as contact details of all who attended the meeting.

As part of this communication procedure, the ESO will record and update these stakeholder engagement activities on an on-going basis and will prepare monthly reports summarizing the activities and key emerging themes raised by affected people.

Stakeholder Identification

This section will identify all relevant stakeholders including interested parties and other affected communities, local, district and provincial level authorities. Stakeholders could also be individuals and organizations that may be directly or indirectly affected by the project either in positive or negative way, who wish to express their views.

Relevant stakeholders must be identified during sub-project's ESIA process. However, below minimum stakeholders must be invited for public meetings:

- Affected/beneficiary households;
- Government (e.g. IDEPA, DPTADER, SDPI, SDAE, District Government representative, local and traditional leaders);
- Local non-governmental organizations;
- The media;
- International (e.g. International NGOs)

If stakeholders are not on the list above and would like to be informed about the Project, contact should be made with the ESO or other members of the local authorities.

Disclose of Information

The types of information disclosed and the specific methods of communication to be undertaken by the local authorities for this Project is summarized in the Stakeholder Engagement Programme (SEP) in the table below.

The SEP is a live document that will be revisited and updated if necessary, on an annual basis to reflect the changes in stakeholder engagement due to project developments and new stakeholders, if any. The information that is required to be disclosed may change if there are changes in the Project design, schedule or area of influence. The external and internal communication methods and information for disclosure identified in the Table are not exclusive, the Developer may choose to disclose more information upon request by stakeholders.

Local authorities will be responsible for internal and external communication regarding the project and they will appoint the ESO to be the main contact point for affected people. All related Project documents and communications related to the Project will be available and undertaken in Portuguese.

Table 1: Future stakeholder engagement programme

Stakeholders	Communication method	Information to be disclosed	Timeframe
People affected by land acquisition	Personal visits to herders, fish-farmers, and farm houses.	Grievance mechanism, ESIA, SEP, timeline of construction.	Prior to construction. During project implementation: weekly update on grievance.
All affected people, residents and employees of farms, and villages, informal land users.	Personal visits in affected villages.	Grievance mechanism, vacancies, SEP, timeline of construction.	Prior to construction. During project implementation: weekly update on grievances and quarterly update on vacancies.
Regional public	Internet. Newspapers. Telephone. E-mails	Information about the project. Grievance mechanism. Vacancies	Quarterly update
Local NGOs	Telephone, newspaper, documents and meetings on request.	Project information on request	Quarterly update
Village area and district government	Meetings, telephone, e-mail, information boards in district administration.	ESIA, ESMP, SEP, vacancies	Quarterly update
Construction works	Information boards and meetings in construction camp.	Health and safety requirements, workers protection requirements, workers' grievance mechanism.	Prior to construction, weekly updates during construction.
International NGOs and all above.	No direct contact, documents available on IDEPA/IFAD websites.	ESIA, ESMP	Immediately after approval.

Monitoring, Reporting and Feedback Mechanism

The RE and ESO will monitor the communication channels such as media, one-to-one meetings and periodic meetings and will provide feedback as appropriate. A complaint and suggestion box will be available for stakeholders participating in public consultation meetings and will also be available at the city/town major/district government's office, at the office of Construction Supervision (Resident Engineer - RE). The messages left in the box will be registered in the book for complaints and suggestions. Those messages will be supervised by RE and ESO for further consideration.

Grievance Mechanism

A grievance mechanism will be implemented to ensure that the Developer is responsive to any concerns and complaints particularly from affected stakeholders and communities. Special attention will be given to the training of the designated staff

involved in the management of the grievance mechanism. This grievance mechanism covers both employees and non-employees (i.e. affected people and other relevant stakeholders).

Any comments or concerns can be brought to the attention of the project management/contractors/authorities verbally or in writing (by post or e-mail) or by filling in a grievance form. The grievance form will be made available in the construction camp office, community centres and other public places that are accessible for all relevant stakeholders, alongside a description of the grievance mechanism. Grievance forms can then be submitted to the ESO. But people can use any other platform they find appropriate.

All grievances will be:

- Acknowledged within 14 working days;
- Responded to no later than within 30 working days;

The grievance log presented in the Diagram below will assist in recording comments, complaints and grievances for monitoring purposes. The grievance procedure is depicted in Figure below.

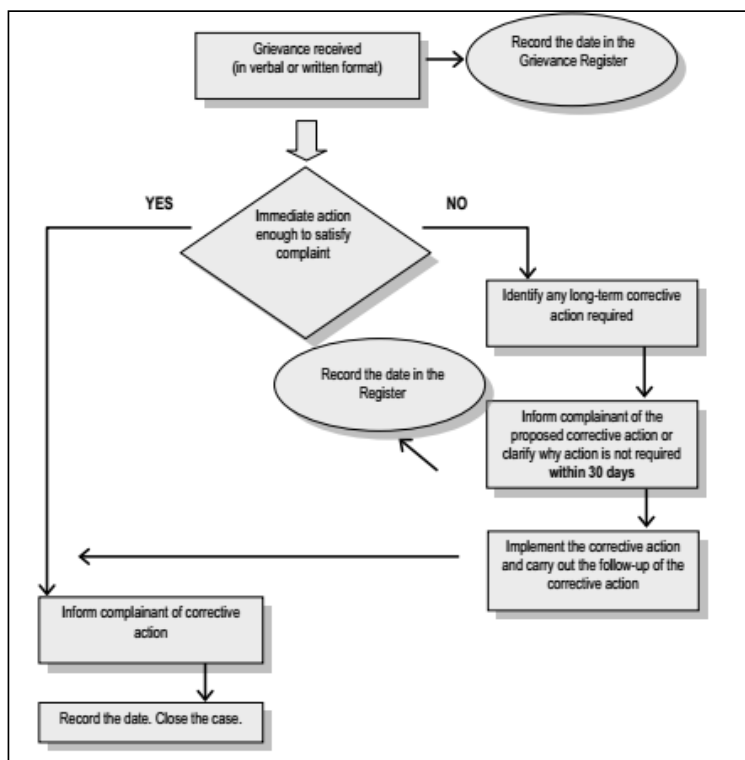


Diagram 1: The Grievance Procedure

Table 1: Public grievance form

Reference No:	
Full Name <i>Note: you can remain anonymous if you prefer or request not to disclose your identity to the third parties without your consent</i>	First Name: _____ Last Name: _____ <input type="checkbox"/> I wish to raise my grievance anonymously <input type="checkbox"/> I request not to disclose my identity without my consent
Contact information <i>Please mark how you wish to be contacted (mail, telephone, e-mail)</i>	<input type="checkbox"/> By post: please provide mailing address: _____ _____ <input type="checkbox"/> By Telephone: _____ <input type="checkbox"/> By E-mail: _____
Preferred language for communication	<input type="checkbox"/> Portuguese <input type="checkbox"/> Local language <input type="checkbox"/> Specify _____
Description of incident or grievance:	What happened? Where did it happen? Who did it happen to? What is the result of the problem?
Date of incident/grievance	
Frequency of incident/grievance	<input type="checkbox"/> One-time incident/grievance (date _____) <input type="checkbox"/> Happened more than once (how many times? _____) <input type="checkbox"/> On-going (currently experiencing problem)
What would like to see happen to resolve the problem?	

Table 2: Grievance log

Name/Contact details	Date received	Details of complaint/comment	Responsibility	Action taken	Date resolved

Roles and Responsibilities

The RE/ESO together with local authorities and traditional leaders will have the overall responsibility for handling the consultation and information disclosure process, including organization of the consultation process, communication with identified stakeholders' groups, collecting and processing comments/complaints and responding to any such comments and complaints. Depending on the nature of a comment/complaint, some comments or complaints will be provided to the appropriate person/entity for a response.

Environmental and Social Officer

The Developer will contract an Environmental and Social Officer (ESO) who will be responsible for community liaison and arranging communications with local communities. The ESO will be available throughout the Project and will be largely responsible for implementation of the SEP, particularly receiving and channelling comments and concerns during the construction phase as well as management of the grievance mechanism during the construction and part of the operational phase. The ESO will be based at IDEPA with regular travel to project sites. Locally he/she will be represented by the RE who should liaise with the ESO in order to respond to potential grievances.

3.3. Environmental Specifications

To facilitate the use of the present ESMP, the environmental and social instructions are presented according to the sequence of the subproject stage of activities as the following:

- 1) Detailed Design;
- 2) Planning;
- 3) Site Establishment;
- 4) Site Clearance;
- 5) Site Housekeeping;
- 6) Construction Activities;
- 7) Completion of Contract and Decommissioning of the Site;

3.3.1. Detailed Design

3.3.1.1. River Diversion

- Not applicable under PRODAPE.

3.3.2. Planning

3.3.2.1. Environmental Principles for the Construction Works

- The environment is composed of both biophysical and social components.
- Construction interferes with the environment, including the social environment and there is a need to consider all measures to minimize the impact on the affected parties
- Minimization of areas disturbed by construction activities to minimize many environmental impacts associated with the construction and reduce the need for rehabilitation and costs.
- All relevant standards relating to international, national, provincial and local legislation, as applicable, must be adhered to. This includes requirements relating to waste emissions, waste disposal practices, noise regulations, road traffic ordinances, etc.
- All relevant permits and permissions shall be obtained from relevant authorities to undertake construction activities as necessary.
- Every effort should be made to minimize, reclaim and/or recycle waste material.
- The Contractor will be required to prepare an Environmental Policy Statement that will state his/her commitment to achieving the basic principles for environmental protection and control for the duration of his/her contract. This statement will be displayed at the site as part of the Environmental Information display Poster.

3.3.2.2. Compliance with Environmental Legislation

- The Contractor shall ensure that all pertinent legislation concerning the protection of the natural environment and prevention of pollution is strictly enforced;
- This includes:
 - Mozambican legislation (including any international standards and criteria that have been adopted in absence of Mozambican standards)
 - Funding Agency requirements (IFAD).
- The Contractor shall maintain a database of all pertinent legislation, regulations and guidance pertinent to the environmental and social of the project for the duration of the contract.

3.3.2.3. Site Inspection

The RE, ESO and the Contractor shall undertake a pre-construction inspection of each project implementation and all ancillary sites. The inspections shall involve a site review of the project component technical specifications and any identified ancillary sites required by the Contractor. It will serve to:

- Identify site-specific construction or environmental problems;
- Identify services that are required to be reinstated; identify cut and spoil disposal or storage sites;
- Identify workforce camp and work compound sites; and plan the phasing of construction along the road alignment.

3.3.2.4. Permits and Permissions

The Contractor shall ensure that all pertinent permits, certificates and permissions have been obtained prior to any activities commencing on site and are strictly enforced/adhered to. This includes, for example, land mine clearance certificates.

The Contractor shall maintain a database of all pertinent permits and permissions required for the contract and for pertinent activities for the duration of the contract.

3.3.2.5. Negotiation for Land Access and Compensation

- In general, no potential sub-project site should be selected if it requires resettlement;
- A detailed survey shall be carried out to identify all the displaced people, agricultural plots, fruit trees, houses and other structures to be affected by the project;
- A Compensation Plan must be prepared and implemented before the start of activities;
- Negotiations for access to land and payment of compensation for partial or total loss of property shall be undertaken by the Developer (IDEPA);
- The Contractor will be required to:
 - Negotiate with appropriate landowners for land to be used as access areas outside the designated construction site and provide appropriate compensation for the temporary loss of such land.
 - Make a representative available, where required by the RE, to discuss issues raised by residents regarding property and related issues and to help resolve any conflicts.
- IDEPA and the District Government shall establish terms and conditions for compensation jointly without trampling of legal provisions and best practices internationally accepted for this purpose.
- District authorities shall be involved in compensation agreements and implementation;
- The awareness approach about rights and proceedings for relocation and compensation to be used by the Government teams in the interactions with the community shall be participative, encouraging the involvement of the community members in the decision-making that affects their own future;
- Compensations for agricultural crops and trees should be done according to the values established by the provincial directorates for Agriculture and Food Security.

3.3.2.6. Construction Method Statements

- The Contractor shall submit written Method Statements to the RE for approval before commencement of any activity.
- Method Statements shall indicate what will be done to comply with relevant environmental (and technical) specification and shall state clearly:
 - Timing and location of activities.
 - Materials, equipment and staffing requirements.
 - Transporting the materials and/or equipment to, from and within the site.
 - The storage provisions for the materials and/or equipment.
 - Emergency procedures.
 - The proposed construction procedure designed to implement the relevant Environmental (and Technical) Specifications.
 - Other information deemed necessary by the RE and/or ESO.
- Method Statements shall be submitted at least ten (10) working days prior to the proposed commencement of work on an activity to allow the RE (and/or ESO) time to study and approve the method statement;
- The Contractor shall not commence work on that activity until such time as the Method Statement has been approved in writing by RE;
- The Contractor shall carry out the activities in accordance with the approved Method Statement;
- Under certain circumstances the RE may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the RE, and appropriate records retained;
- Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel;
- Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract.

3.3.2.7. Existing Services and Infrastructures

- The Contractor shall ensure that existing services (e.g. roads, water pipelines, power lines and telephone services) are not damaged or disrupted unless required under the contract and with the permission of the RE;
- The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted;
- Such repair or reinstatement will be at the Contractor's cost and shall receive top priority over all other activities;
- A time limit for the repairs may be stipulated by the RE in consultation with the Contractor;
- It is the Contractor's responsibility to familiarize himself with the position of existing services and infrastructure that may get damaged due to construction activities.

3.3.2.8. Site Location and Contractor's Camp

- The site for the Contractor's Camp shall be determined in collaboration with the RE and ESO, taking into consideration:
 - Preferentially to be located on land already cleared wherever possible;
 - It should also avoid area where the soil has higher erosion risk.
 - The need to be more than 20 meters from watercourses and wetlands in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse;
 - Communities shall be involved in the site location to avoid destruction of any ritual site or any other conflict.
- The Contractor's Camp layout shall consider availability of access for deliveries and services and any future works;
- The Contractor's Camp should also be of enough size to accommodate the needs of all sub-contractors that may work on the project.

3.3.2.9. Environmental Training and Awareness

- The Contractor and sub-contractors shall be aware of the environmental requirements and constraints on construction activities contained in the provisions of the ESMP;
- The Contractor will be required to provide for the appropriate Environmental Training and Awareness as described in this instruction in his/her costing and programming;
- An initial environmental awareness training session shall be held prior to any work commencing on site;
- The target audience is all project personnel;
- The training should include, but not be restricted, to the following:
 - Basic awareness and understanding of the key environmental features of the work site and environs;
 - Understanding the importance of and reasons why the environment must be protected;
 - Ways to minimize environmental impacts;
 - Relevant requirements of ESMP;
 - Prevention and handling of fire;
 - Health risks pertinent to the site, including prevention of diseases such as malaria and cholera;
 - Awareness, prevention and minimization of risk about the contraction and spread of HIV/AIDS and other sexually transmitted diseases.
- Registers of attendance shall be maintained by the Contractor and ESO.
- The Contractor shall erect and maintain Environmental Information Posters for his employees regarding HIV/AIDS, protection to wildlife and forest;
- The Environmental Information Posters shall be erected at the eating areas and any other locations specified by the RE.

3.3.2.10. Occupational, Health and Safety (OHS)

- All new employees must undergo OHS induction to ensure that they are familiar with the basic rules of work on site and personal protection and those of their colleagues;
- The training should consist of basic hazard awareness, site-specific hazards, safe work practices and emergency procedures in case of fire, evacuation and natural disasters. Any hazard warning system or colour codes in use should be used as part of the orientation;

- Redemption liability with workers and first aid should receive dedicated training so that they do not exacerbate the exposure for themselves unduly or for their colleagues. Training should include the risk of becoming infected through contact with blood and body fluids and tissues;
- Through contractual specifications and monitoring, ESO must ensure that service providers, as well as hired labour and subcontractors, are adequately trained before starting any work.

Guidelines for Visitors

- Visitors are in principle are not allowed to enter in unauthorized service areas. If necessary, guidance should be given to safeguard their safety;

Training of Contractors and New Tasks for Workers

- The complex should ensure that workers and contractors have received proper training before the start of new works. Training should adequately cover:
 - Knowledge of materials, equipment and tools;
 - Knowledge of dangers in operations and how to control them;
 - The potential risks to health;
 - The hygiene requirements;
 - Use of personal protective equipment;
 - The appropriate response to extreme operations, incidents and accidents.

Signage in the Area

- Dangerous Areas (shelter for generators, compressors, etc.), installations, materials, safety measures and emergency exit etc. must be properly marked;
- The signs must be in accordance with international standards and be well known, and easily understood by workers, visitors and the general public.

Labelling of Equipment

- All containers/pipes that may contain hazardous substances due to their chemical and toxicological properties, or temperature or pressure, should be labelled according to their content and danger or appropriate colour code;
- The pipes can also indicate the direction of flow and check valves.

Communication of Danger Codes

- Danger code system Copies shall be posted on the outside of the infrastructure in emergency exits to call attention to workers;
- Information on the type of hazardous materials stored, handled and used on site should be shared by emergency and security services personnel to provide appropriate response when needed;
- Representatives of local emergency and security services should be invited to participate in periodic training and inspections to ensure familiarization with the potential impacts of the various materials.

3.3.2.11. HIV/AIDS awareness and prevention campaign

- The Contractor shall institute HIV/AIDS awareness and prevention campaign amongst his workers for the duration of the contract;

3.3.2.12. Malaria awareness and prevention

An effective program of malaria control can be based on the ABCDE model:

- **A** – Awareness
- **B** – Bite Prevention
- **C** – Chemoprophylaxis

- *D – Diagnosis and Treatment*
- *E – Environmental Control*

A – Awareness

Workers should be sensitized to the key points of information:

- *Malaria kills*

Malaria is major cause of death in Mozambique, being responsible for death of around 30% of patients that reach health facilities.

- *Malaria is a parasite that is spread by mosquitoes*

There are four types of malaria parasites that cause diseases in humans. *Plasmodium falciparum* is the most common parasite responsible for more than 90% of infection cases while *P. malariae* and *P. ovale* are responsible for the rest of 10% of infections. They are spread by a species of mosquito, Anopheles. Major Anopheles species are *A. funestus*, *A. gambiae* and *A. arabiensis*.

- *A mosquito bite is enough just to give you malaria*

A mosquito bite is enough to transmit malaria. The Anopheles bites are not necessarily large or are itching and may go unnoticed.

- *Malaria causes fever and flu symptoms appear*

The initial symptoms of malaria are fever with headache, extreme tiredness, body aches. This disease may progress rapidly (within 24 hours) to coma and death.

- *Expatriates will never develop immunity*

Some people who live from childhood in malaria areas can develop the so-called semi-immunity. But expatriates will never develop such protection. And even with semi-immunity, there is still a risk of catching malaria.

- *The malaria mosquitoes bite at night*

The greatest risk is in the morning and late in the day. Staying outside should be avoided and if this is the case, one should use repellents. Should sleep under mosquito nets.

B – Bite Prevention

Focus on preventing bites by taking measures such as distributing mosquito nets to workers; wearing long sleeves and distribution of repellents for night shifts; and design accommodations and lodging with nets on doors and windows.

C – Chemoprophylaxis

While no medication can fully protect against malaria, prophylactic drugs, if taken correctly and consistently, can reduce the risk of contracting malaria. Most offer of 75-95 % protection, and this should be taken into consideration for workers who come from malaria-free countries. Only a doctor can prescribe the use of chemo prophylactic.

D – Diagnosis

Malaria suspicion is a medical emergency

If left untreated, severe malaria is almost always fatal. And even with the best available treatment, 15-20 % of people die. For this reason, it is essential not to ignore the initial symptoms.

Knowing the prevalence of malaria is based on: (i) clinical signs and symptoms of the patient; (ii) detection of malaria parasites through blood samples (test).

Workers should be encouraged to take the test as soon as the first symptoms are felt. Rapid Diagnostic tests can be acquired and made available in the doctor's office complex and establish an appropriate procedure for treatment.

E – Environmental Management

Malaria can also be prevented by reducing the mosquito population, killing adults and larvae mosquitoes. This can be achieved by: (i) control of larvae - Chemical control (fumigation); (ii) use of insecticides in the interior to kill adult mosquitoes.

3.3.2.13. Labor force

- Wherever possible, the Contractor shall use local labour, with a minimum of 15% being women.
- Community Liaison/Monitoring Groups shall be involved in the recruitment and in the development of the construction works.
- The Contractor shall select a local Human Resource co-director.

3.3.2.14. Cultural heritage

- The ESIA process should verify with relevant authorities (ex. ARPAC) and local authorities the presence of cultural heritage features in the proposed sub-project's site;
- In case of identification of any archaeological artefacts during excavation process, the Contractor should stop the operation and notify the RE which must inform the relevant authorities for future inquiry.

3.3.3. Site Establishment

3.3.3.1. Site Identification

- The Contractor will produce a plan illustrating the proposed construction camp and proposed working and 'no-go' areas. The plan must be approved by the RE and ESO. The plan should include reference to the following aspects where pertinent as and where these are required:
 - Proposed working areas;
 - 'No-go' areas;
 - Contractor's Camp;
 - Quarries, borrow pits and spoil areas;
 - All buildings, offices and/or hostels. Cooking and eating areas, Sanitation/ablution facilities;
 - Storage, spoil, stockpile and lay down areas;
 - Hazardous and fuel storage areas;
 - Batching plant and workshop/equipment maintenance areas;
 - Vehicle wash areas;
 - Waste disposal facilities;
 - Access routes;
 - Security gates and gatehouses;
 - Parking areas and other infrastructure required for the running of the site.
- The working areas shall be kept to a minimum to reduce the total physical 'footprint' of the construction site and to reduce environmental damage;
- The Contractor shall not use the land forming or connected with the construction site for any purpose other than for the proper carrying out of the works under the contract.

3.3.3.2. Working Areas and No-go Areas

- The Construction Site shall be divided into working areas and 'no-go' areas and shall be marked on appropriate plans for reference;
- Working areas are those areas required by the Contractor to construct the works and as approved by the RE and ESO.
- 'No-go' areas are generally those large areas outside the designated working areas, and may include, but not be limited to:
 - Occupied villages and homesteads;
 - Ritual and historical sites;
 - Large trees (> 200 mm in diameter);
 - Cultivated lands and all fruit and nut trees;
 - Riparian and wetland areas.

3.3.3.3. Site Demarcation

- Prior to commencing construction, the Contractor, RE and ESO shall inspect the site and identify any sensitive environments and other 'No-go' areas.
- The Contractor shall clearly mark out the extent of clearing within the approved worksite areas with pegs or tape at 25 meters intervals or less. No construction activity shall occur outside defined work areas. The maximum width of clearing shall be two meters beyond the limits of the road prism.
- Locate, peg out and seek approval for each ancillary site prior to the commencement of related activities.
- Where necessary, the No-go areas shall be demarcated using materials as specified by the RE. These shall include fencing, plastic tape or other approved materials or means.
- Identify and fence or otherwise protect individual trees or groups of trees and shrubs for retention within the marked area of clearing. This is especially important at ancillary sites where this vegetation provides screening, shade and erosion protection.
- Instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas.
- Stockpile cleared shrub foliage within the road corridor for later use as a brush layer and seed stock.
- Any areas disturbed outside the demarcated areas or without the permission of the RE shall be subject to rehabilitation at the Contractor's cost.

3.3.3.4. Contractor's Camp

- The Contractor shall implement the following, as required:
 - A suitable storm water drainage system to prevent soil erosion, protect storage areas and to prevent stagnant ponds forming;
 - A suitable potable water supply;
 - Suitable facilities for bathing, washing clothes or vehicles – site staff will not be permitted to use open water bodies for such activities;
 - Suitable sanitation facilities, adequate for the number of staff on site;
 - Facilities for cooking;
 - Facilities for solid waste collection;
 - Facilities for waste water management.
- The method for provision of these services will be approved by the RE and ESO.

3.3.3.5. Water supply

- Abstractions from natural, municipal and/or private water resources (e.g. streams, lakes, boreholes and well points) for potable water and construction water shall be approved by the RE;
- The Contractor shall arrange for the necessary approvals/permits from respective ARA for raw water abstraction.

3.3.4. Site Clearance

3.3.4.1. Land Mine Clearance

- The Contractor shall obtain a de-mining certificate for the construction site.

3.3.4.2. Site Clearance

- The Contractor shall ensure that all negotiations and compensation for land, crops, trees, houses, grave sites and other relevant items have been satisfactorily completed as defined in the Environmental Instruction, before the site is cleared;
- Where specified, areas may be cleared of grassland and scrub vegetation. No large trees (trunk diameter > 200mm) shall be removed unless approved by the ESO;
- Wood obtained from clearing and grubbing operations remains the property of the Developer and may only be disposed of after consultation with the Developer;
- Cleared fibrous vegetation shall be separated in piles, and made available for local community use;
- No soil, vegetation or construction material shall be dumped in wetlands or water bodies;
- No burning of vegetation to clear the Site will be permitted;
- The works shall be supervised by an expert in archaeology to identify eventual archaeological sites, giving the proper instructions to the Contractor;
- The Contractor shall notify the RE if any previously unidentified graves or artefacts of archaeological or cultural significance are uncovered during site clearance. Work shall be stopped while the appropriate authorities (ARPA) are notified, they have inspected the site and given approval to proceed.

3.3.4.3. Topsoil Conservation and Stockpiling

- Where topsoil occurs within the limits of the area to be cleared and grubbed, the Contractor shall remove the topsoil to reuse for replanting;
- Wherever practical the Contractor should use hand labour for topsoil removal;
- Where specified, topsoil shall be excavated to the base of the organic rich A-Horizon and stockpiled separately. The topsoil shall not be mixed or contaminated with any other material;
- Storage mounds for topsoil shall have a maximum depth of two meters. In borrow pits, topsoil is to be stored to the longitudinal side of the pit;
- Subsoil shall be stockpiled separately;
- Compaction of the topsoil stockpiles is not permitted;
- Topsoil stockpiles are to be maintained in a weed free condition;
- Erosion of soil stockpiles will not be permitted and appropriate protection of the stockpiles from wind erosion and water erosion must be provided;
- The movement of soils from one part of the construction site to another should be minimized and undertaken with the consent of the ESO;
- Where soil is to be stockpiled for several months, these stockpiles should be seeded with a quick germinating, annual grass species to stabilize the stockpiles. Alternatively, the stockpiles may be protected by a mulch cover (which is free from alien vegetation and seeds);
- No materials classed in terms of this Specification as topsoil shall be used as backfill for any excavation.

3.3.4.4. Access Roads

- The Contractor shall comply with all applicable legislation and by-laws regarding road safety and transport;
- Access to the construction site and works area shall utilize existing roads and tracks where possible;
- Upgrading of the access roads shall not be undertaken outside the existing confines of the road, unless otherwise agreed with the RE;
- Movement of vehicles is to be confined to identified roads as far as possible and vehicles may not drive through or make turning circles in wetland areas, "Machambas" (farms) or yards of homesteads under any circumstances;
- All temporary access routes shall be rehabilitated at the end of the contract to the satisfaction of the RE;
- Damage to the existing access roads as a result of construction activities shall be repaired to the satisfaction of the RE. The cost of the repairs shall be borne by the Contractor.

3.3.5. Site Maintenance

3.3.5.1. Site maintenance

- The Construction Site and surrounding areas must always be maintained in a clean orderly and presentable condition;
- Regular inspections by the Contractor and the ESO will be undertaken using checklists to ensure a minimum standard of orderliness is maintained;
- Construction activities shall avoid causing unnecessary disruption and nuisance to adjacent settlements, and the public.

3.3.5.2. Workshop, Equipment Maintenance and Storage

Workshop

- Where practical, all maintenance of equipment and vehicles on Site shall be performed in the workshop;
- If it is necessary to do maintenance on site, but outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities;
- The Contractor shall ensure that there is no contamination of the soil, vegetation or surface water in his/her workshop and other plant or emergency maintenance facilities;
- The workshop shall have a smooth impermeable floor either constructed of concrete or suitable plastic covered with sufficient gravel to protect the plastic from damage; The floor shall be bonded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil); Drip trays shall be used to collect the waste oil and lubricants during servicing and shall also be provided in construction areas for stationary plant (such as compressors); The drip trays shall be inspected and emptied daily. Drip trays shall be closely monitored during wet weather to ensure that they do not overflow;
- The workshop shall always be kept tidy.

Equipment Maintenance and Storage

- All vehicles and equipment shall be kept in good working order, serviced regularly and stored in an area approved by the RE;
- Leaking equipment shall be repaired immediately or removed from the site;
- All washing of equipment shall be undertaken in the workshop or maintenance areas which shall be equipped with suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low phosphate/nitrate and low using-type detergents;
- Rivers and streams shall not be used for washing of equipment and vehicles.

3.3.5.3. Cooking Facilities

- The Contractor shall designate cooking and eating areas, subject to the approval of the RE;
- Any cooking on site shall be done on well maintained gas cookers and locating them away from flammable vegetation or construction materials;
- The Contractor shall provide kerosene stoves and fuel (or other alternative non-wood stoves) for workers to cook;
- The following will not be permitted:
 - Cooking outside the designated areas and beyond the site;
 - Open cooking fires or fires for heating;
 - The use of surrounding and/or indigenous vegetation for cooking or heating fires;
 - The feeding or leaving of food for animals.
- Enough bins for waste disposal, as described in the Environmental Instruction, shall be present in this area.

3.3.5.4. Security

- Appropriate fencing, security gates, shelter and/or security guards are to be provided at the Construction Site to ensure the security of all plant, equipment and materials, as well as to secure the safety of site staff;
- The Contractor must ensure that good relations are maintained with local communities and their leaders to help reduce the risk of vandalism and theft;
- Valuables are to be stored in secure, locked areas;

- Site staff that are found to be involved in incidences of theft or pose other security risks to the local community are to be dismissed and reported to the authorities.

3.3.5.5. General Materials Handling, Use and Storage

- All materials shall be stored within the Contractor's camp unless otherwise approved by the RE;
- Stockpile areas shall be approved by the RE;
- All imported fill, soil and/or sand materials shall be free of weeds, litter and contaminants. Sources of imported materials shall be listed and approved by the RE;
- Topsoil stockpiles shall be located and managed in accordance with the above instructions;
- The Contractor shall ensure that delivery drivers are informed of all procedures and restrictions (including 'No go' areas) required;
- Any electrical or petrol driven pumps shall be equipped and positioned so as not to cause any danger of ignition of the stored product;
- Collection containers (e.g. drip trays) shall be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure contamination from any leaks is reduced;
- Regular checks shall be conducted by the Contractor on the dispensing mechanisms for all above ground storage tanks to ensure faulty equipment is identified and timely replaced;
- Only empty and externally clean tanks may be stored on bare ground. All empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

3.3.5.6. Waste Disposal Sites

- Where the Contractor is required dispose waste material, environmentally acceptable waste disposal sites must be identified and approved by the RE, taking into consideration:
 - Preferentially to be located on land already cleared wherever possible;
 - Avoidance of the areas with more dense forest;
 - The need to be more than 20 meters from watercourses and wetlands in a position that will facilitate the prevention of storm water runoff from the site from entering the watercourse;
 - Communities shall be involved in the waste site location to avoid destruction of any ritual/sacred sites or any other conflict.
- The development and rehabilitation of waste disposal areas shall include the following activities:
 - Stripping and stockpiling of topsoil;
 - Removal (to a nominal depth of 500mm) and stockpiling of subsoil;
 - Contouring of spoil site to approximate natural topography and drainage and/or reduce erosion impacts on the site;
 - Placement of excavated subsoil and then topsoil over spoil material;
 - Contouring and re-vegetation.
- The Contractor shall ensure that waste disposal is done in such a manner to minimize the spread of materials and the impact on surrounding vegetation and that no materials 'creep' into 'no-go' areas.

3.3.5.7. Fuels, Oils, Hazardous Substances and other Liquid Pollutants

- Hazardous materials shall not be stored within 2 kilometres of the top water level of public water supply reservoirs;
- Hazardous materials shall be stored above flood level and at least 20 meters from any watercourse;
- Areas for the storage of fuel and other flammable materials shall comply with standard fire safety regulations;
- Total fuel tank storage volume shall not exceed 5000 litres unless written approval is granted from the Developer/Project Manager based on a specific environmental risk assessment;
- Chemicals and fuel shall be stored in storage tanks within a secure compound. All chemicals and fuels shall be stored in accordance with manufacturer's instructions;
- Compounds shall be constructed of waterproof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them;
- The minimum compound volume shall be 110% of the capacity of the largest tank system, plus 25% of the total capacity of all other separate tanks and containers within the compound. Containment compounds shall have enough capacity to retain spilt chemicals and not be overtopped during rainfall events. Additional capacity for rainfall captured within the compound shall be calculated using a rainfall depth of 100mm over the entire

compound. The compound shall also capture any leak or jet of liquid from any perforation of the tank or associated equipment;

- In drinking water areas, underground pipe-work carrying product from the tank to facilities outside the containment compound shall not be acceptable. In these areas above ground pipe-work shall be double contained. In other areas, any underground pipe-work shall have double containment. Pipe-work within the containment compound does not require double containment;
- In drinking water catchments, the containment compound shall be enclosed or roofed to prevent accumulation of storm water. The roof shall be extended at least 1 meter past the edge of the compound. Side walls or vertical roof turn-downs shall be used (if appropriate) to prevent intrusion of wind-driven rainfall;
- Tank equipment such as dispensing hoses, valves, meters, pumps, and gauges shall be located within the containment compound;
- The base of the containment compound shall grade towards a liquid retention sump to facilitate recovery of spilt liquids. The compound if exposed to storm water intrusion, shall be emptied by pumping, not through a valve gravity outlet, which could inadvertently be left open. Enclosed containment compounds shall have adequate inspection and venting ports. They shall not have "speed bumps" or irregular surfaces that may cause accidents with containers;
- Gully pits used for collecting spills shall have a sealed base and be easily accessible for pump-out. Pits that capture run-off from large areas shall drain to a lined storage basin which can be isolated by valving. This is to avoid leakage to surrounding soil or external drainage systems. Pits shall never discharge direct to soaks where contaminated waste could easily leach into groundwater or surface water;
- Security shall be provided to guard against vandalism when the site is unattended. This includes:
 - Fencing of the tank compound with locks or other adequate security controls at the site;
 - Locks on unattended dispensing hoses;
 - Emergency procedures shall be prepared, documented and approved by ANE prior to commencement of construction activities;
 - Depositing of any substance which may contaminate waters is strictly prohibited;
 - Appropriate training for the handling and uses of such materials is to be provided by the Contractor as necessary. This includes providing for any spills and pollution threats that may occur;
 - Extreme care will be taken when transferring chemicals and fuels from storage vessels to equipment and machinery on an impervious sealed area which is kerbed and graded to prevent run-off. Chemical and fuel transfer areas shall drain away from the perimeter bund to a containment pit. The design shall provide for the safe and efficient movement of vehicles;
 - All chemicals stored within the bonded compounds shall be clearly labelled detailing the nature and quantity of chemicals within individual containers. Sight gauges indicating the current volume are recommended for tanks larger than 250 litre capacity;
 - Any chemical or fuel spills shall be cleaned up immediately on discovery. The spilt liquid and clean-up material shall be removed, treated and removed and transported to an appropriate site licensed for its disposal;
 - The compound shall be maintained in a clean condition and the accumulation of storm-water and litter will be prevented. Only storm-water assessed as uncontaminated may be released to the environment;
 - Storm-water shall be diverted away from the containment compound and an oil water separator shall be provided to treat any rainwater collecting in the compound. Any liquid released to the environment shall be equivalent or better quality than raw water for drinking water supply.
 - Bulk containers used to decant chemicals or fuel shall be fitted with drip trays.

3.3.5.8. Solid Waste Management

Most of sub-projects' sites do not have adequate waste management structures. Even in Municipality areas, the waste management systems are still elementary and include collection and disposal in open spaces environments. The project's direct influence areas are rural, and people are used to burning or burying directly wastes on the soil.

The Contractor shall consider these constraints and respect the following basic rules for the duration of the works:

- Waste minimization and waste management:
 - The site is to be kept always clean, neat and tidy;
 - No burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted;
 - All personnel shall be instructed to dispose of all waste in a proper manner;

- At all places of work the contractor shall provide litter collection facilities;
 - The final disposal of the site waste shall be done at the project site, whose location shall be approved by the RE, after agreement of the Local Administration and Local Leaders (see below);
 - The provision of enough bins (preferably vermin and weatherproof) at the camp and work sites to store the solid waste produced on a daily basis;
 - Wherever possible, materials used or generated by construction shall be recycled;
 - Provision for responsible management of any hazardous waste generated during the construction works.
- Waste Disposal on Site:
- The landfill shall be constructed in marginal site (for example a disaffected borrow pit or quarry) to avoid disturbing additional areas. It shall be in an impermeable ground (clayey soil) and at least 200 meters from the nearest house or farm so that the local community is not affected by odour, noise, flies or aesthetic impacts;
 - The landfill location shall be approved by the RE;
 - The landfill shall not be in a designated drinking water catchment;
 - The landfill shall be located at least 200 meters from an active water source used by the local community;
 - The base of the landfill shall be at least 3 meters above the highest water table level;
 - The landfill shall not be located on land which is used for commercial or other land uses important to the local community;
 - If the landfill is to be in a borrow pit, the pit must have been exhausted of its resource or waste disposal kept separate from resources use to prevent contamination of resource materials with wastes or water contaminated by wastes. Separation includes measures such as placing wastes down-slope of the resource materials to prevent water contaminated by the wastes flowing into the resource material;
 - Surface drains and bonding shall be used around the perimeter of the landfill to prevent surface run-off entering in contact with the wastes. The only water infiltrating the landfill shall be direct rainfall;
 - Waste shall be disposed into the landfill pit in lifts so that each lift can be compacted and covered on disposal. The cover layer shall comprise stockpiled material dug from the pit and shall be at least 10 cm depth once compacted. Daily compaction and covering prevents windblown litter, discourages birds and vectors and reduces rainfall infiltration;
 - Vehicles transporting waste to the landfill shall be covered to prevent windblown litter;
 - Vehicles operating at the landfill shall be kept free of wastes and litter to prevent trucking of waste outside the landfill area;
 - Once land-filling is complete the whole landfill shall be covered by soils and compacted. The compacted depth of cover shall be at least one meter. Soils containing impermeable material such as clays are preferable as they will promote run-off and minimize infiltration of rainwater into the wastes. Some infiltration is beneficial to promote decomposition of wastes;
 - The surface cover of the landfill shall be contoured to fit in with the surrounding landscape. Finished slopes shall not be steeper than 4 horizontals to 1 vertical;
 - The surface of the landfill shall be revegetated with grasses and small shrubs. Trees should be avoided as their roots will penetrate the wastes and provide channels for water ingress;
 - Panels will be placed near the landfill to signal its presence during and after operation.
- Awareness and training:
- Awareness campaign will concern all personnel working on the site including heads of services and subcontractors. It will be made periodically through weekly and monthly meetings.
 - The Heads of Services shall provide continuous awareness sessions to the workers under their responsibility. They will create a climate in their teams for the good receptivity of "behaviour to be" which will be provided by the HSE Team.
 - The training concerns persons who will implement the operational part of the SWMP. It will focus on guidelines to be followed when collecting, sorting and transferring waste.
- Traceability in the waste removal
- Traceability is required upon removal of certain waste produced on the site such as used oil, mechanical parts and tools, used tires, scrap metal, etc.
 - The amounts of the various types of waste produced on site must be registered and monthly monitoring must be done in the Monthly Report.

- Before signing outsourcing contracts for solid waste management, subcontractors are subject to the approval of the RE.
- During the preparatory phase, the Contractor shall develop a Solid Waste Management Plan (SWMP) that considers the installation sites of camps, workshops, mechanical garages, quarries, borrow pits, etc., in which it shall:
 - ensure compliance with the regulatory framework for waste management in Mozambique;
 - identify all wastes that may be produced on site;
 - determine the sorting modes, collection, storage and disposal;
 - identify possible courses of treatment, disposal and recovery (e.g. local community can potentially reutilize some of materials);
 - ensure as far as possible the traceability of waste during its management;
 - ensure awareness and training of staff for the collection, sorting and storage of waste and minimization of waste generation.

The following table can be used as an example to follow and adapt to the actual conditions and terrain constraints.

Table 3: Solid Waste Management Plan

Waste Category	Type of waste	Production site	Storage mode	Method of disposal	Collection frequency	Responsibility
Non-Hazardous Wastes	Paper/cartons	Camps	Drums and bins	Controlled incineration (without smoke)/Reuse of cartons	1 to 2 times per week	Occupational Health and Safety Officer (OHSO)
		Mechanical workshop	Drums and bins			
		Offices	Barrels			Restaurant manager
		Restaurant	Plastic bags and bins			
	Plastic bottles and bags	Mechanical workshop	Carton/Trash bags	Reuse bottles (local residents)/Landfill to create (Plastic bags)	Continuously	All staff/Occupational Health and Safety Officer (OHSO)
		Offices				
		Camps				Restaurant manager
		Restaurant				
	Pallets/Wood	Mechanical workshop	Storage in reserved area	Reuse by employees and local residents	Continuously	All staff/Occupational Health and Safety Officer (OHSO)
	Ink cartridges	Offices	Storage in cartons	Reuse	Continuously	Occupational Health and Safety Officer (OHSO)/IT Manager
		Mechanical workshop				
	Scrap	Mechanical workshop	Storage in reserved area	Removal by licensed subcontractors (Recycler)	Storage threshold	Equipment Supervisor/Occupational Health and Safety Officer (OHSO)
	Used tires	Mechanical workshop	Storage in reserved area	Removal by licensed subcontractors (Recycler)	Storage threshold	Equipment Supervisor/Occupational Health and Safety Officer (OHSO)
	Marketable diameter wood logs	Trace	Storage along the track or in the woods parks	Sale to mills/Use for the job needs	As of production	Work Supervisor/Occupational Health and Safety Officer (OHSO)
	Debris and branches	Trace	Storage along the track or in the woods parks	composting	As of production	Work Supervisor/Occupational Health and Safety Officer (OHSO)
	Wooden ball diameter of recoverable for Trunks	Trace	Storage along the track or in the woods parks	Made available to local populations	As of production	Work Supervisor/Occupational Health and Safety Officer (OHSO)

Waste Category	Type of waste	Production site	Storage mode	Method of disposal	Collection frequency	Responsibility	
Inert Waste	Excavated materials	Trace	Embankment	Reuse in the works	Continuously	Foreman	
	surplus excavated materials	Trace	Deposit	Final deposit			
	Concrete cylinders	Trace	Provisional deposit	Reuse			
	Rubble	Trace	Final deposit	Final deposit			
	Concrete demolition	Trace	Deposit	Final deposit			
	Topsoil	Trace/Borrow pits/Provisional final deposits and	Provisional deposit under special conditions	Reuse in the framework of the restoration of sites and areas used by the Contractor			
Hazardous Waste	Used batteries	Mechanical workshop	Storage on a concrete, sealed and covered area	Removal by licensed subcontractors (Recycler)	Storage threshold	Equipment Supervisor	
	Used oils	Mechanical workshop	Storage tanks in	Recycling/Use for formwork/Surplus entrusted to a recycler	Storage threshold	Equipment Supervisor	
	Used filters	Mechanical workshop	Storage in a container after draining	Removal by licensed subcontractors (Recycler)	Storage threshold	Equipment Supervisor	
	Waste water	Mechanical workshop	Hydrocarbons/ Water Separator	Infiltration after natural treatment	Continuously	Equipment Supervisor/Occupational Health and Safety Officer (OHSO)	
		Camps	Septic tanks				
		Offices					
	Soiled fabrics	Mechanical workshop	Storage in a covered tank	Controlled incineration (without smoke)	1 time per week or as needed	Occupational and Safety (OHSO)	Health Officer
	Medical waste	Infirmaries/Dispensaries	Storage in a covered tank	Controlled incineration (without smoke)	1 time per week	Occupational and Safety (OHSO)	Health Officer
	Used bitumen drums	Asphalt plant	storage on defined areas	Reuse by the Contractor	Continuously	Occupational and Safety	Health Officer

Waste Category	Type of waste	Production site	Storage mode	Method of disposal	Collection frequency	Responsibility
				Removal by licensed subcontractors (Recycler)		(OHSO)
	Bitumen - Oil	Emulsion/asphalt plant	Barrels	Removal by licensed subcontractors (Recycler)	Continuously	Occupational Health and Safety Officer (OHSO)/Laboratory Manager
				Mix asphalt oil added to asphalt to scrap runway layout of the site		
	Hydrocarbon sludge and contaminated waste	Mechanical Workshop/Oil separator and decanter	Barrels	Temporary storage in special tanks waterproofed with geotextile	Storage threshold	Occupational Health and Safety Officer (OHSO)/Equipment Supervisor

3.3.5.9. Sanitation

- Adequate washing and toilet facilities are to be provided close to the workers;
- Portable toilets shall not be located on flood plains where the possibility of flooding exists, and must be at least 50m from any water bodies;
- All temporary/portable toilets shall be secured to the ground to the satisfaction of the RE to prevent them from toppling over;
- The type and exact location of the toilets shall be approved by the RE prior to establishment. The use of septic tanks may only be done after appropriate investigations have been made and the selected option has been approved by the RE;
- All toilets shall be maintained by the Contractor in a clean sanitary condition to the satisfaction of the RE;
- Toilet paper shall be provided;
- A wash basin with adequate clean water and soap shall be provided alongside each toilet. Staff shall be encouraged to wash their hands after use of the toilet, in order to minimize the spread of possible disease;
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are removed from the site to an appropriate location/facility;
- Discharge of waste from toilets into the environment and burial of waste is strictly prohibited;
- The Contractors shall instruct their staff and sub-contractors that they must use toilets provided and not the veldt, bush or streams;
- Staff shall not be permitted to wash themselves or their personal effects in rivers.

3.3.5.10. Wastewater and Contaminated Water Management

- No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent watercourses and/or water bodies shall be permitted;
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies;
- Potential pollutants of any kind and in any forms shall be kept, stored and used in such manner that any escape can be contained, and the water table not endangered.
- Wash areas shall be placed and constructed in such a manner to ensure that the surrounding areas (including groundwater) are not polluted;
- The Contractor shall notify the RE of any pollution incidents on site.

3.3.5.11. Storm-water Management and Erosion Control

- The Contractor shall take reasonable measures to control storm-water and the erosive effects;
- During construction the Contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works.
- Areas affected by construction related activities and/or susceptible to erosion must be monitored regularly for evidence of erosion – this includes:
 - Areas stripped of topsoil;
 - Soil stockpiles;
 - Spoil sites;
 - Borrow pits;
 - River banks;
 - Steep slopes.
- On any areas where the risk of erosion is evident, special measures may be necessary to stabilize the areas and prevent erosion. These may include, but not be restricted to:
 - Confining construction activities;
 - Using cut off berms;
 - Removing grass sods before construction and replacing them after backfilling;
 - Using mechanical cover or packing structures such as geofabric to stabilize steep slopes or hessian, gabions and mattress and retaining walls;
 - Straw stabilizing;
 - Mulch or chip cover;
 - the vegetation cover planting;
 - Constructing anti-erosion berms.
- The erosion prevention measures must be implemented to the satisfaction of the RE;
- Where erosion does occur on any completed work/working areas, the Contractor shall reinstate such areas and areas damaged by the erosion at his own cost and to the satisfaction of the RE and ESO;
- Traffic and movement over stabilized areas shall be restricted and controlled. Any damage to the stabilized areas shall be repaired and maintained to the satisfaction of the RE;
- The Contractor shall be liable for any damage to downstream property caused by the diversion of overland storm-water flows.

3.3.5.12. Noise Control

- The Contractor shall keep noise level within acceptable limits and construction activities shall, where possible, be confined to normal working hours in the residential areas;
- Silencers are to be installed and maintained in good working order on machinery, plant and equipment where practical;
- The Contractor shall not use sound amplification equipment on site unless in emergency or as instructed by RE;
- Noise levels exceeding 85 dB(A) shall only be permitted where approved by RE;
- Any such approved construction activities generating output levels of 85 db(A) or more, in residential areas, shall be confined to the hours 07h30 to 17h00 Mondays to Fridays;
- Schools, hospitals and other noise sensitive communities shall be notified by the Contractor at least 5 days before construction is due to commence in their vicinity. Any excessively noisy activity shall be conducted outside of school hours, where approved by the RE;
- Any complaints received by the Contractor regarding noise will be recorded and communicated to the RE.

3.3.5.13. Traffic Control

- The Contractor will be required to prepare Method Statements on traffic safety measures for construction traffic entering and exiting public roads and for the general control of construction traffic;
- Any need for temporary disruption shall be indicated in the Method Statements and informed in advance to the RE and local/traditional leaders/authorities;
- On the gravel or earth roads within the site and within 500m of the site, the vehicles of the Contractor and his/her suppliers shall not exceed a speed of 45 km/h;
- Appropriate traffic warnings signs shall be erected and maintained;

- Trained and equipped flagmen shall be used where access roads intersect any intense traffic zone, reduced visibility zones or along the settlements;
- Any complaints received by the Contractor regarding traffic disruption will be recorded and communicated to the RE.

3.3.5.14. Disruption of Access to Property

- Disruption of access to property must always be kept to a minimum;
- Where such disruption is unavoidable, the Contractor shall advise the affected parties and the RE, at least seven working days in advance, of such disruption.

3.3.5.15. Dust Control and Air Pollution

- The Contractor shall ensure their vehicles and equipment are perfectly maintained to minimize air pollution;
- Dust is regarded as a nuisance when it reduces visibility; dust is aesthetically displeasing and affects palatability of grazing. Dust generated by construction related activities must be minimized;
- The Contractor shall be responsible for the control of dust arising from his/her operations and activities;
- Workers shall be trained on dust minimization techniques;
- The removal of vegetation shall be avoided until such time as clearance is required and exposed surfaces shall be re-vegetated or stabilized as soon as practically possible;
- Do not carry out dust generating activities (excavation, handling and transporting of soils) during times of strong winds. The RE shall suspend earthworks operations wherever visible dust is affecting properties;
- Water sprays shall be used on all earthworks' areas within 200 meters of houses and agriculture plots. Water shall be applied whenever dust emissions (from vehicle movements or wind) are visible at the site boundaries in the opinion of the RE;
- Vehicles delivering soil materials shall be covered to reduce spills and windblown dust;
- Vehicle speeds shall be limited to minimize the generation of dust on site and on access roads;
- Cover crop shall be sown on each top soiled batter within two days of top soiling;
- Any complaints received by the Contractor regarding dust will be recorded and communicated to the RE and ESO.

3.3.5.16. Protection of features of Cultural, Historical and/ or Archaeological Importance

- The Contractor will be required to produce Method Statements for all construction activities that will occur within or close to grave sites, graveyards or other cultural, historical or archaeologically sensitive areas;
- Local leaders shall be notified by the Contractor at least 5 days before construction is due to commence in the vicinity of grave sites, cemetery, and cultural, historical and archaeological areas;
- If remains or artefacts are discovered on site during earthworks, work shall cease, and the Contractor shall immediately inform the RE and contact the relevant authority.

3.3.5.17. Protection of Sensitive Environments and Natural Features

- Sensitive environments and natural features within and/or close to a construction site will be designated as 'no-go' areas and will be subject to the conditions described in the Environmental Instruction;
- No subproject will be approved into a legally or traditionally recognized conservation area.

3.3.5.18. Rivers and Streams

- The Contractor shall ensure that the footprint of construction activities is minimized at river and stream crossings;
- Sedimentation from the construction works of rivers and streams must be minimized;
- No construction materials shall be stockpiled within areas that are at risk of flooding;
- The Contractor shall ensure that all construction activities within the flood plain and water bodies, including the removal of vegetation, stockpiling of top material, excavating of pipeline route, laying of pipeline, backfilling of excavations and rehabilitation occur within as short a period as possible;
- All temporary and permanent fill used adjacent to, or within, the river/stream bed shall be of clean sand or larger particles. Silts and clays shall not be permitted in the fill;
- Plastic sheeting, sandbags or geofabric approved by the RE shall be used to prevent the migration of fines through the edges of the fill into the river;
- Banks shall be suitably stabilized incrementally immediately after construction allows. Upkeep of stabilization facilities shall be continuously maintained;
- The Contractor shall not modify the banks or bed of a watercourse other than necessary to complete the specified works. If such unapproved modification occurs, the Contractor shall restore the affected areas to their original profile;

- The Contractor shall preserve all riparian and wetland vegetation for use in rehabilitation of those environments. This vegetation shall be kept moist until replanting. Replanting is to be undertaken immediately after surface reinstatement has been completed;
- The Contractor shall not pollute the watercourse through any construction activities;
- Rocks for use in any gabion baskets or other structures must not be obtained from a watercourse.

3.3.5.19. Wetlands

- Wetlands shall be avoided where at all possible and practicable. Where unavoidable, the footprint for construction activities and associated damage to the wetland shall be minimized;
- Construction shall not permanently alter the surface or subsurface flow of water through the wetland;
- Wetlands shall not be drained at any stage;
- If construction activities unavoidably affect a wetland, the Contractor shall remove and store all wetland vegetation with their root balls intact as indicated by the RE and ESO. This vegetation shall be kept moist until replanting. Replanting is to be undertaken immediately after surface reinstatement has been completed;
- No construction materials shall be stockpiled in any wetland areas;
- No spoil material shall be deposited in any wetland areas;
- No vehicles shall be driven through wetland areas;
- Any affected wetland areas are to be restored to as similar state as before construction commenced. The surface reinstatement of wetland areas is to ensure that no depressions, ridges or channel features remain that could affect the hydrological regime of the wetland.

3.3.5.20. Residential dwellings or Machambas (farm areas)

- The Contractor shall avoid working near residential dwellings, machambas (farm areas) and cultivated lands wherever possible;
- Where this is not possible, the Contractor shall minimize impacts of construction by abiding by the relevant terms of this ESMP and instructing all site staff accordingly.

3.3.5.21. Natural Features

- The Contractor shall not deface, paint, damage or mark any natural features (such as rock formations) situated within or around the site for survey or other purposes unless agreed with the RE;
- Any features affected by the Contractor shall be restored/rehabilitated to the satisfaction of the RE at the expense of the Contractor;
- The Contractor shall not permit his staff to make use of any natural water feature, including springs, streams or open water bodies for the purposes of swimming, personal washing and the washing of machinery or clothes.

3.3.5.22. Fire Prevention and Control

- The Contractor shall take all reasonable and precautionary steps to ensure that fires are not started because of his/her activities on site;
- Permitted heating and cooking facilities are described in the Environmental Instruction. No cooking fires are to be left unattended;
- The Contractor shall ensure that there is basic fire-fighting equipment available on site. This shall include, but not be limited to:
 - Rubber beaters when working in grass/bush areas;
 - At least one fire extinguisher of the appropriate type when welding or other 'hot' activities are undertaken;
- The Contractor shall supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other areas identified by the RE with tested and approved firefighting equipment;
- Flammable materials should be stored under conditions that will limit the potential for ignition and the spread of fires;
- 'Hot' work activities shall be restricted to a site approved by the RE;
- Smoking shall not be permitted in those areas where there is a fire hazard. These areas shall include:
 - Workshop;
 - Fuel storage areas;
 - Any areas where vegetation or other material is such as to make liable the rapid spread of an initial flame.

- The Contractor shall ensure that all site personnel are aware of the fire risks and how to deal with any fires that occur. This shall include, but not be limited to:
 - Regular fire prevention talks;
 - Posting of regular reminders to staff.
- Any fires which occur shall be reported to the RE immediately and then to the relevant authorities;
- In the event of a fire, the Contractor shall immediately employ such plant and personnel as is at his disposal and take all necessary action to prevent the spread of the fire and bring the fire under control;
- Costs incurred through fire damage will be the responsibility of the Contractor.

3.3.5.23. Emergency Procedures

- The Contractor shall submit Method Statements covering the procedures for the main activities which could generate emergency situations through accidents or neglect of responsibilities. These situations include, but are not limited to:
 - Accidental fires;
 - Accidental leaks and spillages;
 - Vehicle and plant accidents.
- Specific to accidental leaks and spillages:
 - The Contractor shall ensure that his employees are aware of the procedure for dealing with spills and leaks;
 - The Contractor shall also ensure that the necessary materials and equipment for dealing with the spills and leaks is always available on site.
- Specific to hydrocarbon spills:
 - The source of the spill shall be isolated, and the spillage contained using sand berms, sandbags, sawdust, absorbent material and/or other materials approved by the RE;
 - The area shall be cordoned off and secured;
 - The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown the spill;
 - The quantity of such materials shall be able to handle a minimum of 200 l hydrocarbon liquid spill;
 - The Contractor shall notify the relevant authorities of any spills that occur.
- The Contractor shall assemble and clearly list the relevant emergency telephone contact numbers for staff and brief staff on the required procedures;
- The treatment and remediation of areas affected by emergencies shall be undertaken to the reasonable satisfaction of the RE at the cost of the Contractor where his staff have been proven to be responsible for the emergency.

3.3.5.24. Health and Safety General

- The Contractor shall comply with all standard and legally required health and safety regulations as promulgated by Mozambican law.
- The Contractor shall provide a standard first aid kit at the site office.

Public Liability

- The Contractor shall ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases, particularly HIV/AIDS and how to prevent or minimize such risks;
- The Contractor shall be responsible for the protection of the public and public property from any dangers associated with construction activities, and for the safe and easy passage of pedestrians and traffic in areas affected by the construction activities;
- All works which may pose a hazard to humans and domestic animals are to be protected, fenced, demarcated or cordoned off as instructed by the RE. If appropriate, symbolic warning signs must be erected;

- Speed limits appropriate to the vehicles driven are always to be observed on access and haul roads. Operators and drivers are to ensure that they always limit their potential to endanger humans and animals by observing strict safety precautions.
- Telephone numbers of emergency services shall be posted conspicuously in the Contractor's office near the telephone.
- No unauthorized firearms are permitted on the site.

Diseases, Heat Stress and Wounds

Consideration must be given to the following:

- Malaria is prevalent in the area and the Contractor must ensure that regular monitoring occurs amongst construction staff for symptoms of malaria to enable timely treatment;
- Open trenches and other depressions that accumulate stagnant water should be backfilled as soon as possible to prevent the creation of breeding areas for malaria carrying mosquitoes;
- Cholera and dysentery outbreaks are possible during times of flood. Outbreaks of these diseases must be prevented by providing uncontaminated potable water, suitable ablution, sanitation and eating facilities for site staff;
- The Contractor should be aware of the signs of heat stress/heat stroke. Plenty of drinking water must be made available on site to prevent dehydration and overheating;
- Open wounds must be timely treated with antiseptic/antibiotics to prevent the development of tropical ulcers.
- Contractor shall provide at least 100 condoms (free) a year to each worker.
- Establish, staff and maintain a clinic at or close to the worker camps. The clinic shall be staffed and equipped to enable the screening, diagnosis and counselling of STDs and HIV/AIDS cases within all workers. Each clinic shall provide free treatment for general STD cases. HIV/AIDS cases shall be referred to a Province's general HIV/AIDS program.

3.3.5.25. Community Relations and Control of Community Disruption

General

- ESO and the RE shall liaise with Community Liaison Groups on a regular basis.
- If so required, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions required by the RE;
- Such boards shall include contact details for complaints by members of the public.

Community Disruption

The Contractor shall minimize any disruption to adjacent communities through any or all of the following, at a minimum through the application of the relevant instructions in this ESMP:

- Destruction of graves or others ritual sites;
- Use of natural resources;
- Sexual abuse of members of the community;
- Dust nuisance;
- Disruption to access;
- Risk of accidents from traffic or the works themselves.

Private Land and Community Properties

- Prior to commencing construction activities, the Contractor shall provide appropriate advance warning as described above;
- Temporary fences may be required in certain circumstances as instructed by the RE;
- Are shall be taken not to damage trees, crops, structures and roads etc. on properties of members of the local community. No site clearance will be allowed to proceed without the prior written approval of the RE and the Community.

Grievance Mechanism

- The RE is to establish a formal grievance mechanism through which affected people can lodge a grievance and to help ensure a speedy satisfactory resolution of any disputes;
- The Contractor will be required to minimize the risk of grievances with the local communities through implementing the specifications described in the ESMP;
- Where grievances occur, the Contractor will be required to assist in the process to investigate and resolve the grievance as effectively and quickly as reasonable;
- The Contractor shall keep a 'Complaints register' on Site. The register shall contain:
 - All contact details of the person who made the complaint and information regarding the complaint itself;
 - The investigations undertaken, and responses provided;
 - Actions taken and by whom;
 - Any follow-up actions taken;
 - Copies of complaints received are to be copied to the RE, and where pertinent, the ESO.

3.3.6. Construction Activities

3.3.6.1. Manual Excavation

Wherever practically possible, excavation activities shall be done manually and not with machine excavators. This is necessary to reduce negative environmental impacts and to enhance the economic benefits to the local communities.

3.3.6.2. Planning Borrow Pits and Quarries

- All borrow pits sites shall be clearly indicated on a plan and approved by the RE. If possible, only previous authorized borrow pits and quarries should be used, subject to verification on accomplishment of best environmental practices by RE and ESO;
- The Contractor will be responsible for ensuring that appropriate authorization to use the proposed borrow pits and quarries has been obtained before commencing activities;
- Borrow pits and quarries shall be located more than 20 meters from watercourses and wetlands in a position that will facilitate the prevention of storm-water runoff from the site from entering the watercourse. It shall also not be located where the soil has higher erosion risk, neither more than 2 km far from the road;
- The Contractor shall give 14 days' notice to nearby communities and farmers of his intention to begin excavation in the borrow pits or quarries;
- The Contractor shall prepare and implement borrow pit plans and borrow pit rehabilitation plans, which would minimize the risk of erosion.

3.3.6.3. Blasting

- The Contractor will be responsible for obtaining a current and valid authorization from the relevant authorities prior to any blasting activity. A copy of this authorization shall be given to the RE;
- All Mozambican laws and regulations relating to blasting activities shall be adhered to at all times;
- A qualified and registered blaster shall supervise all blasting and rock-splitting operations at all times;
- The Contractor shall ensure that appropriate pre-blast monitoring records are in place (i.e. photographic and inspection records of structures in close proximity to the blast area);
- The Contractor shall ensure that emergency services are notified, in writing, a minimum of 24 hours prior to any blasting activities commencing on Site;
- The Contractor shall take necessary precautions to prevent damage to special features and the general environment, which includes the removal of fly-rock. Environmental damage caused by blasting/drilling shall be repaired at the Contractor's expense to the satisfaction of the RE;
- The Contractor shall ensure that adequate warning is provided to the local communities immediately prior to all blasting. All signals shall also be clearly given;
- The Contractor shall use blast mats for cover material during blasting. Topsoil shall not be used as blast cover.

3.3.6.4. Cement/Concrete Batching

- Concrete batching plant shall be located more than 20 m from the nearest river/water body;
- Topsoil shall be removed from the batching plant site and stockpiled as above instructions;
- The batching plant site shall be bonded with earth berms or sandbags such that runoff cannot escape from the plant site;
- Concrete shall not be mixed directly on the ground;
- The concrete batching works shall be kept always neat and clean;
- Contaminated storm-water and wastewater runoff from the batching area and aggregate stockpiles shall not be permitted to enter streams/river;
- Unused cement bags are to be stored so as not to be affected by rain or runoff events;
- Used bags shall be stored and disposed of in a manner which prevents pollution of the surrounding environment (e.g. via windblown dust);
- Concrete transportation shall not result in spillage;
- Cleaning of equipment and flushing of mixers shall not result in pollution of the surrounding environment;
- Suitable screening and containment shall be in place to prevent windblown contamination associated with any bulk cement silos, loading and batching;
- Waste concrete and cement sludge shall be scraped off the site of the batching plant and removed to an approved disposal site;
- All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete and disposed at an approved disposal site. Washing the remains into the ground is not acceptable;
- All excess aggregate and sand shall also be removed;

- After closure of the batching plant or any area where concrete was mixed all waste concrete/cement sludge shall be removed together with contaminated soil. The surface shall then be ripped to a depth of 150mm and the topsoil replaced evenly over the site and re-grassed as per the Environmental Instruction.

3.3.6.5. Work Stoppage and Temporary Site Closure

- The RE shall have the right to order work to be stopped in the event of significant infringements of the Environmental Instructions contained within this ESMP, until the situation is rectified in compliance with the specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses;
- In the event of temporary site closure (i.e. a period exceeding one week) the Contractor's Safety Officers shall check the site, to ensure that the conditions pertain and report on compliance with this clause. The check shall be made in consultation with the RE.

3.3.6.6. Retaining Walls and Gabions

- Rocks for use in gabion baskets/reno mattresses shall be obtained from a source approved by the RE;
- Rocks for use in gabion baskets/reno mattresses shall not be obtained from a watercourse.

3.3.7. Completion of Contract and Decommissioning of the Site

3.3.7.1. Completion of Contract

Prior to completion of the Contract, the RE is to timely notify the PM of 'Practical Completion', arrange meeting and 'preparation of a snag list' and to provide an opportunity to identify outstanding or incomplete work.

The RE is to timely inform the ESO and DNAAS of the Contract Completion so that a final audit can be arranged.

3.3.7.2. Decommissioning of the Site

On completion of the Contract, the Contractor shall decommission the Contractor's Camp and works. This shall include the following:

- Removal of all remaining structures, services, facilities, unless sold or given to the "landowner";
- Removal of all remaining construction rubble and waste, to be disposed of at an appropriate waste disposal site;
- Reinstatement and rehabilitation of all remaining disturbed area, including temporary access routes, turning circles, parking areas, etc.

3.4. Monitoring plan

3.4.1. Planning Phase

3.4.1.1. Resettlement and Compensation

- The District Governments shall create a team responsible for monitoring of the effectiveness of the compensation, i.e. the District Resettlement Commission, as foreseen in the DM 31/2012.

3.4.2. Construction Phase

3.4.2.1. General

- The RE shall:
 - Liaise with the Employer and ESO as appropriate.
- The ESO shall conduct quarterly audits to ensure that the system for implementation of the ESMP is operating effectively. The audit shall check that a procedure is in place to ensure that:
 - The ESMP being used is the up to date versions;
 - Variations to the ESMP and non-compliance and corrective action are documented;
 - Appropriate environmental training of personnel is undertaken.
 - Emergency procedures are in place and effectively communicated to personnel;
 - Keep a register of major incidents (spills, injuries, complaints, legal transgressions, spot fines and penalties etc.) and other documentation related to the ESMP;
 - Ensure that appropriate corrective and preventive action is taken by the Contractor once instructions have been issued through the RE;
 - Liaise with the RE on a regular basis.
- The Contractor shall:
 - Inspect the site daily to ensure that the environmental specifications are adhered to.
 - Report weekly to the RE on the implementation of the ESMP.
 - Maintain records of major accidents (spills, impacts, complaints, legal transgressions, etc.) as well as corrective and preventive actions taken.
- The PM team shall:
 - Undertake independent environmental audits to ensure that the system for implementation of the ESMP is operating effectively, and that the ESO is undertaking his tasks effectively.

3.4.2.2. Labour Force

The Community Liaison/Monitoring Groups shall monitor the relation between the Contractor, local labour and the community. At least the following aspects should be monitored:

- **Women participation** – meeting the goal of women's participation, verify if women are involved in the decision-making process in connection with community liaison/monitoring, and that women did not desist from work, including finding and addressing the issues that could be behind such;
- **Youth participation** – will consist on verifying the extent to which youth's participation has been met, the extent of their involvement in the decision-making process in connection with community liaison/monitoring, and that the youth did not desist from work, including finding and addressing the issues that could be behind such;
- **Work conditions and campsite facilities** – task division between men and women, considering the physical and mental characteristics of each gender and local behaviour, salaries paid without delays, individual employment contracts updated with copy for the worker, medical assistance and proper treatment, condom distribution and treatment of DTSs, existence of sanitation facilities separated by sex, distribution of potable water for workers during the work).
- The ESO shall quarterly monitor the same items, reporting it to PM for Gender, Poverty Alleviation, HIV/AIDS and Environment.

3.4.2.3. HIV/AIDS

The ESO shall monitor activities regularly to assess effectiveness and impact of HIV/AIDS prevention awareness campaign. This should include an initial, interim and final assessment of basic knowledge, attitude and practices (KAP) considering existing data sources and recognizing the limitations due to the short timeframe to show behaviour change. The KAP will be supported by qualitative information from focus group discussions.

3.4.3. Tolerance

- Environmental and social management is concerned not only with the results of the Contractor's operations to carry out the works, but also with the control of how those operations are carried out.
- Tolerance with respect to environmental and social matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the works.
- It is thus required that the Contractor shall comply with the environmental and social requirements on a regular basis and any failure on his/her part to do so will entitle the RE to certify the imposition of a penalty subject to the details set out in the contract.

3.4.4. Penalties

- Penalties will be issued for the transgressions and non-compliances where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications. The Contractor is deemed NOT to have complied with this Environmental Specification if:
 - a. There is evidence of contravention of the Environmental Specification within the boundaries of the site, site extensions and/or haul/access roads.
 - b. Environmental damage ensues due to negligence.
 - c. The Contractor fails to comply with corrective or other instructions issued by the RE within a specific time.
 - d. The Contractor fails to respond adequately to complaints from the public.
- Penalties may be issued per incident at the discretion of the RE. The value of the penalty imposed shall be as defined in the contract and enforcement shall be at the discretion of the Employer.
- The RE will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the contract.
- The penalty monies will become the property of the Employer.
- Payment of any penalty in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
- An Environmental Performance Guarantee of at least 5% of the contract value shall form part of the 'Performance Bank Guarantee (Unconditional)' which the Contractor is required to provide as part of the Contract with Developer. This guarantee shall be used in the event of non-conformance or contraventions of the ESMP.
- Penalties for the typical incidents detailed below, will be imposed by the RE on the Contractor and/or his sub-contractors.

Table 4: Typical incidents incurring penalties

Incident	Penalty (US\$)
Failure to submit Method Statements timorously	200 – 500
Failure to demarcate working servitudes and/or maintain demarcation tape	10 – 200
Working or parking vehicles outsider of the demarcated servitude and/or within the boundaries of a no-go area.	10 – 200
Failure to strip topsoil with intact vegetation.	10 – 200
Failure to stockpile topsoil correctly.	100 – 500
Failure to stockpile materials in designated areas.	50 – 200
Pollution of water bodies – including increased suspended solid loads.	50 – 500
Failure to provide adequate sanitation, waste disposal facilities or services.	200 – 500
Failure to demarcate 'No-go' areas before commencing construction clearance and other activities.	200 – 500
Insufficient education of staff regarding environmental matters and site housekeeping practices.	100 – 500
Use of soil in an unspecified manner	50 – 200
Inappropriate mixing of cement/concrete and poor management of slurry	50 – 200
Untidiness and litter at camp.	50 – 250
Unauthorized removal of indigenous trees, fruits and nut trees, medicinal or other plants.	100 – 500
Failure to erect temporary fences as required.	50 – 200
Failure to reinstate disturbed areas within the specified timeframe.	50 – 500
Failure to provide equipment for emergency situations.	50 – 500
Defacing, painting or damaging natural features.	50 – 500
Damaging cultural, historical and/or archaeological sites of importance.	100 – 500
Failure to maintain basic safety measures on site.	50 – 500
Failure to obey site protection measures specified by the RE.	50 – 500
Failure to carry out required community liaison, damage to property etc., without prior negotiation and/or compensation and other social infringements.	200 – 500
Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling.	50 – 200
Failure to provide drip trays and/or empty them frequently.	100 – 300
Inappropriate use of bins and poor waste management on site.	50 – 200
Inappropriate offsite disposal of waste from site.	50 – 250
Dust or excess noise on or emanating from the site.	100 – 200
Inappropriate use of adjacent watercourses and water bodies – such as for unapproved water abstraction, washing of vehicles, wastewater disposal and use by staff for washing.	100 – 500
Construction vehicles not adhering to speed limits.	100 – 200
Failure to maintain a register of incidents on site.	50 – 200
Failure to rehabilitate damaged areas after completion of the Works.	50 – 250
Any other contravention of the environmental specification.	50 – 500

Annex 8: List of People Contacted During Preparation of the ESMF and CRA

Date	Person met	Position	Location	Contact details
20/11/2018	Ilario Rea	IFAD's consultant	Maputo, IFAD	i.rea@ifad.org
	Ilídio Banze	IDEPA		ilidiobanze@gmail.com
26/11/2018	Verónica Namashulua	IDEPA - General Director	Maputo, IDEPA office	kimashulua@gmail.com
	Selso Cuaria	IDEPA – Director for Studies, Planning and Socioeconomic Development		selsocuarria@gmail.com
	Ilídio Banze	IDEPA		ilidiobanze@gmail.com
03/12/2018	Juvêncio de Rosário	Provincial Director of Sea, Inland Waters and Fishing - Manica	Chimoio, DPMAIP-Manica	825301636
	Micas Pacule	Head of Department of Planning and Infrastructures, DPMAIP-Manica		824662410 845207900
	Juvêncio Amido	Head of Department of Promotion of Fisheries and Aquaculture - Tete		825999040
04/12/2018		SDAE - Director	Sussundenga District	
	Beatriz Xavier Isidoro	Head of Department of Fisheries Resources & Aquaculture	Pemba, DPMAIP-Cabo Delgado	84 063 7377
	Tony Naiteiana	Head of Department of Planning and Infrastructure		84 0602489
	Ilídio Cabral	Head of Department of Promotion of Fisheries and Aquaculture		84 076 1865
	Domingos Arlindo	Aquaculture Technician		84 013 9082
05/12/2018	Eng. Mangachai	ISPM	Chimoio	825295877
06/12/2018	Fátima Armando Cinco-Reais	Provincial Director of Sea, Inland Waters and Fishing - Tete	Tete, DPMAIP-Tete	843844838
	Clara Fole	Head of Department of Promotion of Fisheries and Aquaculture - Tete		845405379
	Portássio Palito	INGC - Tete		84577712/823284539/833284539
	Mahando Sunate	Head of Department of Planning and Infrastructure/Acting Provincial Director	Nampula, DPMAIP-Nampula	84 448 0846
	Rosalina Tomas Avilanatro	Expert in Aquaculture & Fisheries		84 201 6057
	Omar Ussene	Head of Matibane Locality	Mussoril, Nampula Province	
	Benedita Guilhermina Colaço	Aquaculture Extension Worker		84 906 4077

Date	Person met	Position	Location	Contact details
	Victor Laveque	President of the Agrobusiness Association of Kavaca/Naupipe		84 393 1644
	Carlos Adriano	Member of the Agrobusiness Association of Kavaca/Naupipe		
	Waronhe Selemane	Agrobusiness Association of Kavaca/Naupipe		
	Almirante Gabriel	Worker employed by one of the members of the Agrobusiness Association of Kavaca/Naupipe		
07/12/2018		Administrator – Cahora Bassa	Cahora Bassa District, Tete	
		SDAE Cahora Bassa- Director		
	Zane Heyns	Mozambezi		zane@mozambezi.com
	Fred	Bronic		
11/12/2018	Clemente Nicolau	Head of Department of Promotion of Fisheries and Aquaculture - Niassa	Lichinga, DPMAIP-Niassa	828066220
	Friday Taibo	INGC – Niassa	Lichinga, INGC – Niassa	844854753/861354113
	Modesta Intelá	Fingerlings producer	Lichinga, Bairro Namacula	
12/12/2018	Sibekile Mtetwa	Consultant – Team Leader PROCAVA ESMF	Maputo – Salomon Office	mikemtetwa@live.com
	Henrieta Zharare-Mutsambi	Consultant – ESMF PROCAVA	Maputo – Salomon Office	henrietazharare@gmail.com
17/12/2018	Julio Bastos Picardo	Provincial Director of Sea, Inland Waters and Fishing - Zambezia	Quelimane, DPMAIP-Zambezia	824047180
	Amandio Mandara	Head of Aquaculture Promotion Section		822360420 845055835
18/12/2018	Mário Macaza	Administrator of Milange	Milange District - Zambezia	826930060 849157704 866261171
	Eusébio Rosse	Director of SDAE – Milange		849804860
		Head of Tengua Administrative Post		
	Ilario Rea	IFAD's consultant	Maputo, IFAD	i.rea@ifad.org
	Custodio Mucavele	IFAD Manager	Maputo, IFAD	c.mucavel@ifad.org
19/12/2018	Ezélia	Director of SDAE - Nicoadala	Nicoadala District - Zambezia	847794634