UT-REDD +

The National Environment Fund (FUNAB)

Consultancy Services for the Strategic Environmental and Social Assessment (SESA) under REDD+ financed by National Environment Fund (FUNAB)

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Draft Strategic Environmental and Social Assessment (SESA) Report

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Synopsis: This document presents the consultant's Draft SESA Report for the Consultancy Services for the Strategic Environmental and Social Assessment (SESA) under REDD+ financed by National Environment Fund (FUNAB), for UT-REDD+.		
Aim of the Report: To present the Strategic Environmental and Social Assessment of REDD+ in Mozambique		
Recommendation:		

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Acronyms

Acronym	Definition
AFOLU	Agriculture, Forestry, and Other Land Use
AKF	Aga Khan Foundation
APD	Avoid Planned Deforestation Activities
ARR	Afforestation, Reforestation and Revegetation
ALM	Agricultural Land Management
AUDD	Avoid Unplanned Deforestation and Degradation
CBD	Convention on Biological Diversity
CBNRM	Community Based Natural Resource Management
CC	Climate Change
CENACARTA	National Center for Cartography and Remote Sensing
CITES	Convention on International Trade in Endangered Species
CF	Carbon Fund
COP	Conference of Parties
CT-CONDES	Councils of the National Technical Council for Sustainable Development
DNA	Direcção Nacional de Água
DNEA	National Directorate for Agriculture
DNFFB	National Directorate of Forest and Wildlife
DNTF	National Directorate of Land & Forestry
DP	Delivery Partners
DUAT	Direito de Uso e Aproveitamento de Terra
ESIAs	Environmental Social Impact Assessments
ESMF	Environmental Social Management Framework

FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FdN	Florestal de Niassa Limitada
FIP	Forest Investment Program
FPIC	Free, Prior, and Informed Consent
FM	Fire Management
FRI	Fire Return Interval
FUNAB	National Environment Fund
GCCCT	Climate Change Cross-cutting Solutions Green Team
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoM	Government of Mozambique
ICP	Informed Consultation and Participation
IIED	International Instiutute For Environment and Development
IFC	International Finance Corporation
IFM	Improved Forest Management
IGF	International Foundation for Conservation and Development
ISFL	Initiative for Sustainable Forest Landscapes
IP	Indigenous People
IUCN	International Union for Conservation of Nature
IWM	Indigenous Woodland Management
LtPF	Logged to Protected Forest
MASA	Ministry of Agriculture and Food Security
MDG	Millennium Development Goals
MICOA	Ministry for Coordination of Environmental Affairs

MINAG	Ministry of Agriculture and Forestry
MITADER	Ministry of Land, Environment and Rural Development
MLT	Mozambique Leaf Tobacco
MRV	Measurement Reporting and Verification
NASCCM	National Adaptation Strategy and Climate Change Mitigation
NGO	Non-governmental organisations
NIRAP	National Rhino and Ivory Action Plan
NTFP	Non-timber Forest Products
PS	Performance Standards
REDD+	Reduction in Deforestation and Degradation
RPF	Resettlement Policy Framework
R-PP	Readiness Preparedness Plan
R-PIN	Readiness Plan Idea Note
RVF	Rift Valley Forestry
SEA	Strategic Environmental Assessment
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management
SPER	Provincial Agricultural Extension Services
SWMOZ	Scott Wilson Mozambique Lda
TFCA	Transfrontier Conservation Area
TN	Tree Nurseries
TPT	Tree Planting and Tending
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change

UT-REDD	Technical Unit of REDD
VCS	Verified Carbon Standard Association
WB	World Bank
WOFA	Working on Fire Africa
WWF	World Wide Fund for Nature
ZACPPLAN	Action Plan for the Environmentally Sound Management of the Common Zambezi River System

Definitions

APD	Activities to Avoid Planned Deforestation (APD) are those activities that reduce GHG emissions by stopping or reducing deforestation on forest land that is both legally authorized (by relevant government authorities) and documented to be converted to non-forest land.
AUDD	Activities to avoid unplanned deforestation and degradation (AUDD) are those activities that reduce deforestation and/or degradation on forest land that is either not legally authorized or is not documented for conversion to non-forest land.
Deforestation	The direct, human induced conversion of forest to non-forest land
Degradation	The persistent reduction of canopy cover and/or carbon stocks in a forest due to human activities such as animal grazing, fuel-wood extraction, timber removal or other such activities, but which does not result in the conversion of forest to non-forest land (which would be classified as deforestation). For example, degradation occurs when trees are selectively cut and used for fuel-wood, but the area where the trees were removed still meets the definition of forest.
De Minimis	Carbon pools and GHG sources which do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than 5% of the total GHG benefit generated by the project
IFM Projects	Activities that reduce GHG emissions by protecting forests that would otherwise have been logged (or by protecting currently logged or degraded forests from further logging) are considered IFM Logged to Protected Forest (LtPF) projects. To qualify under IFM, the baseline logging activities must have been sanctioned by a national or local regulatory body (e.g. as a timber concession or plantation).
REDD Projects	Activities that stop unsanctioned and/or illegal degradation (e.g. through the removal of fuel-wood or timber).

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Executive Summary

1 Introduction

1.1 Background to REDD+ in Mozambique

REDD+ stands for Reduction of Emissions from Deforestation and Forest Degradation. It is a global effort designed to create a financial value for the carbon stored in forest, providing incentives for developing nations to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. The scope of REDD+ goes beyond deforestation and degradation to include the relevance of conservation, sustainable management of forest and enhancement of carbon stock.

The Government of Mozambique (GoM) is among countries participating in the preparation process of Reduction of Deforestation Emissions and Degradation of Forests (REDD+) and has been implementing its Readiness Plan for REDD+ (R-PP) since 2012. One of the goals of the R-PP was to prepare a REDD+ Strategy for Mozambique. The GOM has been undertaking a Strategic Environmental and Social Assessment (SESA) in its strategy preparation process by assessing how REDD+ strategic options address environmental and social priorities that are linked with the current standards of land use and forest management.

Implementing REDD+ projects has triggered the following World Bank (WB) safeguards policies: OP4.01 (Environmental Assessment), OP4.09 (Pest Management), OP4.04 (Natural Habitats), OP4.11 (Physical Cultural Resources), OP4.12 (Involuntary Resettlement), OP4.37 (Safety of Dams) and OP7.50 (Project on International Waters). As the result of this, the WB recommend that, at the initial stages, the borrower fully complies with environment and social safeguards guidelines and integrates comprehensive environmental and social considerations for the relevant sub-sectors (agriculture, energy, conservation) in the project intervention areas. Hence, UT-REDD were also required to develop the safeguard studies, Environmental and Social Management Framework Study (ESMF) and Resettlement Policy Framework (RPF) in addition to the SESA.This SESA was prepared through participative, transparent and comprehensive approaches. The SESA is implemented by the Technical Unit of REDD+ (UT-REDD+), funded through the National Environmental Fund (FUNAB) and financially supported by the World Bank Fund for Forest Partnership (FCPF), and will be overseen by the Review Technical Committee (RTC).

Generally, the SESA is designed to influence the way to address a REDD+ strategy in Mozambique, with consideration of local mechanisms of adaptation of species and ecosystems, as well as land use

and forestry practices of local populations. It also assesses the potential impacts of national policies and programs related to REDD+, as well as formulates alternatives and design mitigation mechanisms to minimize the potential impacts of a REDD+ program on Mozambique's bio-physical and social environment.

The SESA is a premise and part of the procedures of FCPF to adjust the country to the REDD+ national strategy design, identify in advance and in a transparent, participative way the environmental and social issues that need to be addressed at sub-sector level, before investment opportunities are prioritised. It is also essential for ensuring the incorporation of biodiversity conservation elements in the strategy (for example, considering conservation area plans) as well as to ensure the protection of the local communities from the potential impacts of REDD+ on their way of living and sustainability (for example, land ownership and traditional land use rights). The SESA also facilitates social and environmental concerns to be integrated into longer-term development, policy design and future program and investment plans for Mozambique.

1.2 Objectives of the SESA

Identify ex-ante opportunities for the mitigation of environmental and socio-economic risks deriving from the implementation of REDD+ projects or development programmes, as well as the mechanisms through which these opportunities could be integrated in REDD national strategy.

1.2.1 Specific Objectives

Identify opportunities that could:

- Allow the understanding of REDD+ operational grounds including the parties involved and the socio-environmental dimensions of the causes of forest cover changes;
- Visualize and evaluate possible environmental and social impacts and the issues related with REDD+ programme;
- Visualize and evaluate potential development programmes in forest cover changes;
- Develop a multilateral involvement approach to address these impacts and;
- Propose methods and measures to mitigate environmental and socio-economic risks during the implementation of REDD+ strategy.

1.3 The concept of SESA vs EIA

SESA derives from environmental impact assessment (EIA). Most of the traditional terms associated with EIA, including “impact”, “baseline”, and “mitigation” are strongly associated with project thinking, physical dimensions and descriptive approaches usual in EIA. Strategic thinking involves values, not physical structures, is more focused and collaborative, and based on dialogue and futures-thinking (do Rosario Partidario, 2012). What this means is that SESA is not about the direct assessment of the environmental impacts of proposals (on water, air, soil, etc.) as in project assessment, but instead is about the assessment of development conditions (institutional, policy, economic, social issues, etc.) towards the creation of better environmental and sustainability decision contexts and outcomes. Whereas the EIA process traditionally follows a standardized technical process, SESA is not prescriptive and there is no single way of doing it. SESA is less about technical studies, and more about setting a platform for the establishment of an enabling physical, social, environmental and economic context for development to be able to proceed in a sustainable way. This is the strategic form of assessment, instead of, as in EIA, attempting to directly assess the environmental effects of a project proposal and the management of the impacts thereof.

The development and adoption of SESA as a tool has gained momentum in recent years. Not only have more countries revised their approaches vis-a-vis the integration of environmental and social assessment at different tiers of the decision-making process, but the international arena has also played a key role in emphasizing the importance of SESA through the endorsement of two legal documents, namely, the European SEA Directive (2001/42/EC) and the United Nations Economic Commission for Europe (UNECE) 2003 SEA Protocol. Moreover, international financing institutions (IFIs) and bilateral and multilateral cooperation organizations have increasingly introduced their own SESA processes requiring beneficiary countries to adopt and mainstream SESA into their planning and decision-making (Chaker & El-Fadl, 2006).

The WB follows the Organization for Economic Cooperation and Development (OECD) definition of Strategic Environmental Assessment (SEA) as “analytical and participatory approaches that aim to integrate environmental considerations into policies, plans, programs and evaluate the inter-linkages with economic and social considerations” (OECD, 2006). In the WB, SEA is mainly known as SESA to stress the inclusion and relevance of social issues as well as environmental ones. In response to a

mandate for strengthening SESA in its activities, in the mid-2000s the WB embarked on a testing program for applying SESA at the policy level. Since the mid-2000s SESAs have been undertaken with increasing frequency, with each successive SESA providing the opportunity to refine the approach to SESA and incorporate lessons learned.

Box1: Evaluation of Risk in SESA

SESA derives from environmental impact assessment. Most of the traditional terms associated with EIA, including “impact”, “baseline”, and “mitigation” are closely associated with project thinking, physical dimensions and descriptive approaches usual in EIA. Strategic thinking involves values, not physical structures, is more focused and collaborative, based on dialogue and futures-thinking (do Rosario Partidario, 2012).

In practice this means that SESA is not about the direct assessment of environmental impacts of proposals (on water, air, soil, etc.) as in project assessment, but instead, is about the assessment of development conditions (institutional, policy, economic, social issues, etc.) towards the creation of better environmental and sustainability decision contexts and outcomes.

Whereas the EIA process traditionally follows a standardized technical process, SESA is not prescriptive and there is no single way of doing it. SESA is less about technical studies, and more about setting a platform for the establishment of an enabling physical, social, environmental and economic context for development to be able to proceed in a sustainable way. This is the strategic form of assessment, instead of, as in EIA, attempting to specifically assess the environmental effects of a project proposal and the management of the impacts thereof. As such, evaluation of risk in a SESA must reflect strategic risks and so, the values of participants in determining and creating future outcomes.

2 Methodological Approach

Following from the above, Scott Wilson Mozambique's approach to the Mozambique REDD+ SESA can be thought of as one which seeks to facilitate a shared understanding at all levels of Mozambique society of the synergies, trade-offs, and weaknesses of the REDD+ program in order to assist the GoM to identify priority actions that can be taken to foster the environmentally sustainable and socially equitable development of the program.

Central to the SESA was the use of the strategic options from the draft REDD+ national strategy in order to draw the picture of REDD+ program in Mozambique. The draft national strategy provides six strategic options but for the purpose of this SESA only the first five strategic options are evaluated, because the sixth option was not fully described by the authors of the national strategy at the time of writing this report. The first five strategic options include:

A. **Agriculture:** Promoting alternative farming practices to ensure increased productivity of subsistence and cash crops;

B. **Energy**: Increase access to alternative sources of biomass in urban areas and increase the efficiency of production and use of biomass energy;

C. **Conservation areas**: To strengthen the system of protected areas and find safe ways of generating income;

D. **Sustainable Forest Management** : Promote the system of forest concessions with adding value to forest products;

E. **Forestry Plantations:** To improve the business environment of forest plantations and the relationship between forestry companies and local communities.

F. **Urban Expansion:** A topic recently introduced by participants of the stakeholder consultations for the national REDD+ strategy and so has not been fully expanded upon at the time of writing this report (this option is not evaluated in this SESA report).

Each of the five strategic options includes specific actions to be implemented to help ensure successful achievement of the strategy goals. Identification of these actions facilitated making a preliminary assessment of potential environmental and socio-economic impacts associated with each strategic option. Under our discussion of each strategic option, the SESA team provides suggestions of possible responses to manage these impacts for environmentally sustainable and socially equitable outcomes. A detailed risk assessment of each option is provided in Section 8.

2.1 Key milestones and deliverables

According to the Terms of Reference (ToRs) key deliverables for this SESA were the following:

- Task 1: Analysis of concerned parties
- Task 2: Initial description of the social and environmental situation of the forest sector and other forms of land use that could alter the forest cover in Mozambique
- Task 3, 8: Design governing, political and legislative principles (GAP analysis)
- Task 4: Outline of REDD+ strategic options
- Task 5: Formulation of execution regulations
- Task 6: Analysis of specific institutional needs within the time of REDD+'s implementation framework
- Task 7: Analysis of possible impacts of different strategic options scenario
- Task 9: Background discussion paper
- Task 10: Translating assessment into practical recommendations (ESMF)

2.2 Approach to this SESA

2.2.1 Literature review

Prior to undertaking field work and stakeholder consultation, the SESA team reviewed SESAs prepared for other REDD programmes for other developing countries in order to provide a context and framework for our analysis. SESA's reviewed include:

- Strategic and Social Assessment PROIRRI - Sustainable Irrigation Development Project (February 2011)
- Reducing Deforestation and Forest Degradation in Nepal: A Strategic Environmental and Social Assessment of Nepal's REDD+ Strategy by ICEM Asia, IIED and SchEMS (August 2014)
- SESA for REDD+ in Ghana by SAL Consult Ltd (September 2014)

2.2.2 Stakeholder consultation

Stakeholder consultation is critical for SESA under REDD+ as it ensures a means to integrate the views of different stakeholders into REDD+ national strategy. These consultations were conducted at community, district, provincial and national levels, and below is the description of the process.

2.2.2.1 Preliminary field visits and community consultations

The SESA consultant team conducted preliminary visits and community consultation meetings within the areas that have implemented or are implementing REDD+ related projects. These areas included Manica, Sofala, Zambézia, Cabo Delgado and Zambézia provinces. The Table 1 Description of REDD+ related projects visited below briefly describes the projects visited at this stage of the consultation.

Table 1 Description of REDD+ related projects visited

Proj Nr.	Organization	Location	Project features
01	MICAIA Foundation	Manica district	Micaia has been running REDD+ conservation projects co-funded by the World Bank focusing on adding value through co-owned business in forest, agriculture, livestock and natural products and tourism. These projects are implemented in the buffer zone of the Chimanimani National Reserve. The area has hosted relevant testing of REDD+ delivery models and studies funded by the Norwegian Government. The testing and studies aimed to provide a detailed landscape-level analysis across the Beira corridor of the rate and drivers of deforestation and degradation, projecting investment packages including calculation of their implementation transaction costs in order to inform the national debate on REDD readiness preparation process.
02	Envirotrade "The Sofala Community Carbon Project"	Gorongoza district in Sofala Province	The project occupies the buffer zone of the Gorongoza National Park. In partnership with local association "**Associacao Nfuma Ya Nhambita**". The project focuses on conservation based on carbon finance and sustainable forest management. It uses fire prevention and management (early season burning), community conservation, restoration and sustainable forestry in a holist manner.
03	Envirotrade	Quissanga, Macomia and Meluco districts in Zambézia provinces	The project was implemented within the Quirimbas National Park. It focused on prevention and management (early season burning), community conservation, restoration and sustainable forestry in a holist manner. Having started in 2008 the project was halted in 2011 due to lack of investors.
04	Gilé REDD+ Project	Pebane and Gilé districts in Cabo Delgado Province	The project is implemented within the communities in the buffer zone of the Gilé National Reserve (GNR). The main aim is to promote conservation agriculture to achieve both food security and forest conservation.

			REDD+ related activities are at its early stage and this involves- quantification of carbon stocks and historical deforestation rate, seek international recognized standard for the project to be developed, support smallholder families to adopt agro-ecological practices and strengthening the management of the GNR focusing on anti-pouching, infrastructure, biodiversity monitoring and fire prevention.
05	JICA	Mabalane district in Gaza province	JICA initiated the "One Forest One Community for Food Security Project", since continued by a private company in Japan, to designed to promote alternative livelihood and carbon offset business cashew nuts trees carbon sequestration. The project is expected to generate livelihood alternatives, promote food security, promote agro-forestry with conservation agriculture practice and promote fuel efficiency stoves and expand areas of support by carbon offsets and protect the natural forest. To achieve this, the project works with organized local groups, mainly involved charcoal exploitation with few exceptions in agriculture

During preliminary visits and community consultation, the team of consultants conducted informal and formal meetings with members of the communities. Focus group discussions (following an approved fieldwork discussion guide) were held with communities which were separated into groups of young men/older men and women. More informal key informant interviews were held with various traditional leaders and local authority figures. Lists of participants can be found in Annex A.

Figures 1 and 2 show the communities visited in Cabo Delgado and Zambezia.

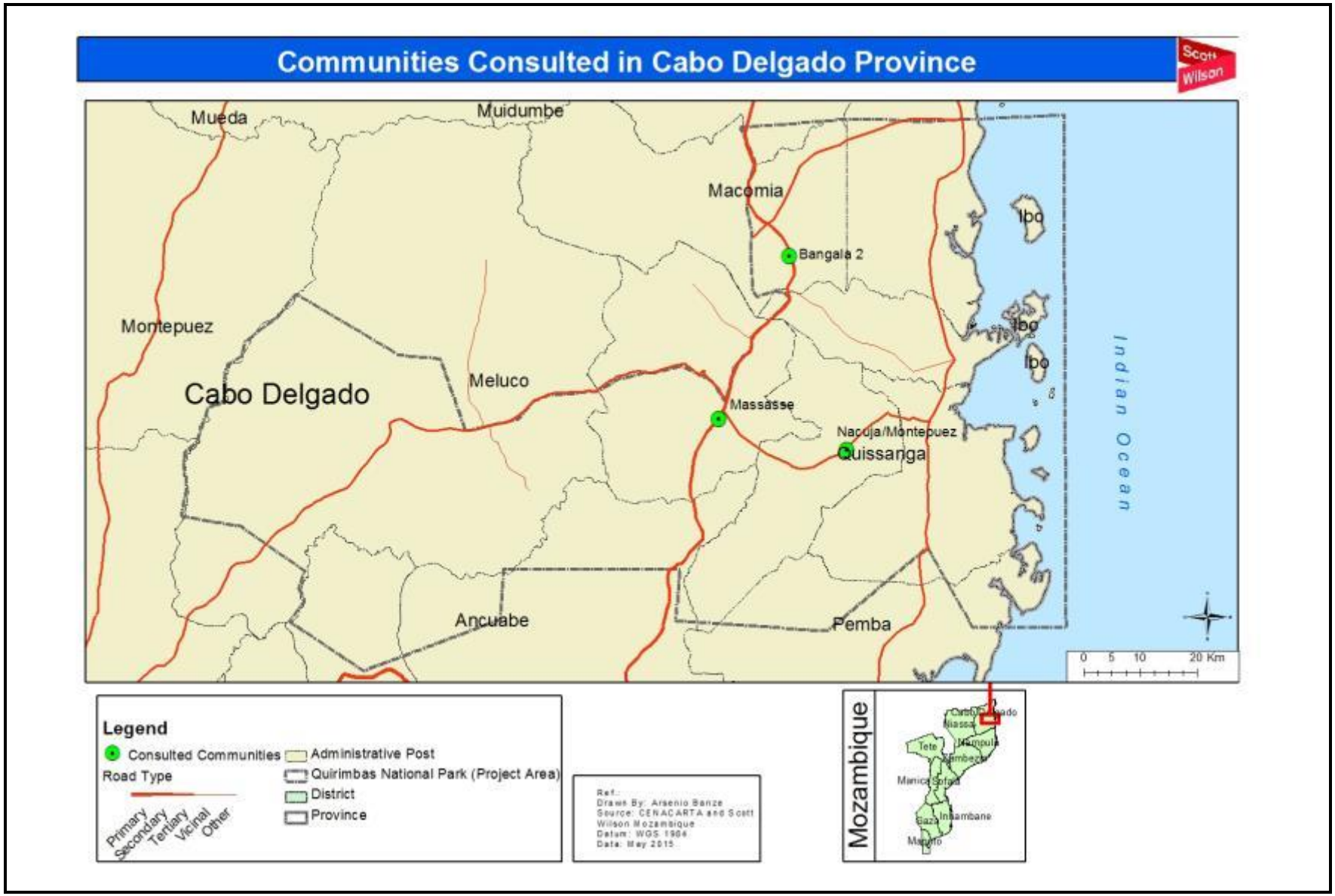


Figure 1 Map of communities consulted in Cabo Delgado

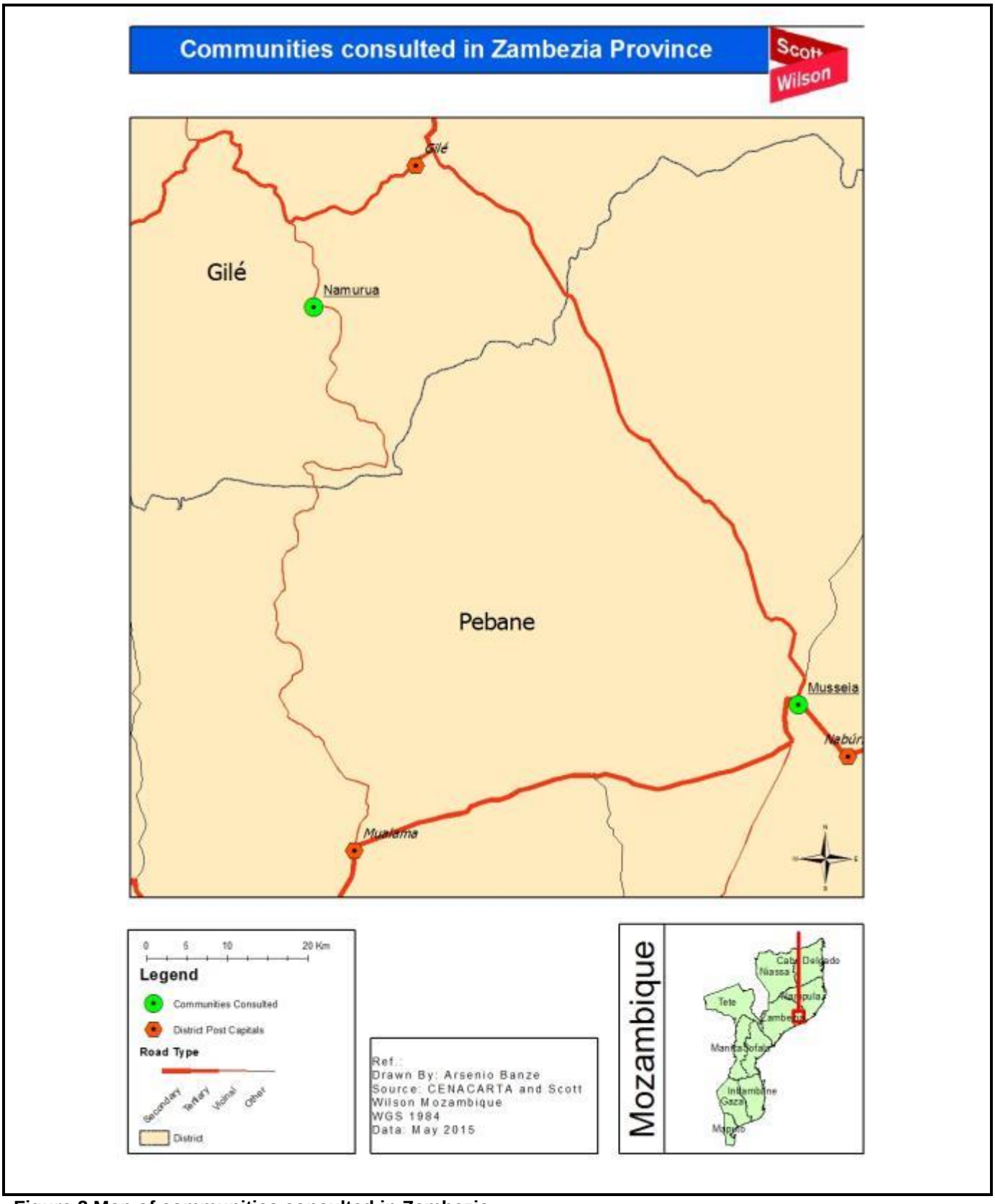


Figure 2 Map of communities consulted in Zambezia

The following table provides the geographic and demographic coverage of community consultation coverage.

Table 2 Community Consultation Coverage

Province	District	Communities	Male participation			Female participation		
			Adults	Elderly	Youth	Adults	Elderly	Youth
Cabo Delgado	Quissanga	Nacoja	23	29	40	55	31	0
		Montepuez	19	42	19	21	0	0
	Macomia	Bangala II	26	15	0	20	0	0
	Meluco	Massasse & Nguya	16	11	28	23	0	0
Zambézia	Pebane	Muceia	35	0	18	17	0	0
	Gilé	Namarrua	42	0	52	23	0	0
Gaza	Mabalane	Mavumbuque	21	5	11	30	0	0
		Chaves	27	0	0	11	4	7
Total			**209**	**102**	**168**	**200**	**34**	**7**

The consultations process covered three provinces evenly distributed across the three main regions of Mozambique. In the south, Gaza; the central zone, Zambézia; and the north zone, Cabo Delgado. Nine communities were consulted in six districts. 720 community members were consulted for this SESA, of which 479 were male and 241 were female. In terms of demographic groups, 175 young people, 409 adults, and 136 elderly people were consulted.

A focus group discussion guide was developed and administered as part of the Stakeholder Engagement Plan. The guide was developed based on the best practices for SESA for REDD+ and it was used to broadly explore issues around the drivers of deforestation and forest degradation, land use and land tenure, social and environmental protection and sustainable forest management as summarized in Table 3 Issues consulted on below.

Table 3 Issues consulted on

Themes	Key issues for consultation	Key target stakeholders
Understanding drivers of deforestation and degradation	• Deepening the understanding on causes and drivers of deforestation and degradation with links to REDD+ programs • Mitigation measures and strategies to slow down the current rate of deforestation • The pros and cons of proposed mitigation measures and strategies	Communities, local government and NGOs,
Land use and land tenure	• Understanding potential impact of REDD+ on land use/tenure given the incentive provides (cash) • What would be the mitigation measures • Can REDD+ be applied as designed?	Communities, local government and NGOs,

	• If not, what changes to be made to adjust to local context?	
Social and environmental protection	• Understanding the social impacts of REDD+ • Appropriate mechanisms to mitigate the impacts • How can these impacts be monitored?	Communities, local government and NGOs, central government
Sustainable forest management	• Understanding the current economic, social and environmental value of forest and the implications for future generations	Communities, local government and NGOs, central government

2.2.2.2 Provincial workshops

Besides community consultation, two provincial workshops were held in Cabo Delgado and Zambézia provinces. The aim of the workshops was to undertake a joint assessment of potential socioeconomic and environmental impacts of REDD+ and preliminary identifications of mitigation measures and strategies. The workshops also explored broader issues relating to forest governance and institutional arrangements and its implications for REDD+. These workshops involved representatives of institutions relevant for REDD+ such as government, private sector, civil society organizations, and academic institutions.

The workshops combined an integrated approach by using discussion groups and plenary sessions. The discussion groups were established based on the institutions each participant represented and these included government institutions, civil society, and private sector and academic institutions. Whilst the working groups explored sector knowledge of the issues under discussion, the plenary discussion served as the platform to broaden the discussion, compare and contrast views across groups' interests in the forest sector. The total number participants of the provincial workshops were 61, of which 20 in Cabo Delgado and 41 in Zambézia. The consultations at provincial levels were carried out between 4th and 15th May 2015.

Annexure A contains a list of participants for both the community engagement as well as provincial workshops undertaken in May 2015.

2.2.2.3 Interviews with key informants

To supplement findings from community consultations and provincial workshops, interviews were conducted with key informants at district, provincial and national level. At district and provincial level, the interviews targeted institutions such as District Administration; Courts; Police; District Services for Economic Activities (SDAE); Environmental Provincial Directorate; Forest Provincial Directorate; Private sector (Anadarko, ENI and Forest Operators) and Forest and Environmental NGOs. The

interviews explored specific forest matters to the institutions in order to identify its implication for the future of REDD+ in Mozambique.

2.3 Constraints and limitations of the SESA

At the time of writing this SESA, the Government of Mozambique was in the process of restructuring its ministries after the October 2014 general elections. Although this restructuring process was captured in the SESA, new policies and legislation that that were just starting to be developed at the time of writing the SESA will affect the implementation of the national strategy for REDD+ have not been captured. The changes to institutional structures and development of REDD scenarios in late 2015 (October), after the SESA had been underway for 6 months, creates a challenge because there no concrete scenarios in place during much of the earliest phases of the evaluation and consultations, and the institutional changes that will affect how the national strategy for REDD+ is implemented should be undertaken in an update to this SESA, or at minimum captured in the national strategy for REDD+. Additionally, at the time of undertaking this SESA the strategy was in draft form and had not yet identified potential REDD+ projects or scenarios. The scenarios were received in October, after the community and stakeholder process was complete. The Scott Wilson team had to interpolate community and stakeholder sentiments, regarding the potential environmental and social impacts of the scenarios retroactively, based on general information received during consultation.

This sets a challenge for undertaking the SESA in that there was nothing concrete in place to provide a clear focus for assessment, and the institutional structures and mechanisms for implementing the REDD+ strategy are not yet in place.

3 The Roadmap to the REDD+ National Strategy

3.1 Introduction

This chapter provides background information to understanding REDD+ from both global and national perspective and to link global to local development within the context of REDD+.

3.2 The History of REDD+

Worldwide, deforestation accounts for up to 18% of greenhouse gas emissions, equivalent to roughly 5.8 billion tons of CO_2 released into the atmosphere. The CO_2 emissions resulting from deforestation surpasses emissions from global transportation and aviation combined (Carbon Planet Paper, 2009). Because of this, in early 1990's the United Nations Framework on Climate Change (UNFCCC) initiated a debate to seek ways in which forest protection should be incorporated in the global mechanism to halt greenhouse concentrations in the atmosphere and this is how the concept of REDD (Reducing Emissions from Deforestation and Degradation) came into being. The figure below presents the timeline of global policy events that shaped today's concept of REDD+.

Though characterization in detail of the timeline is beyond the scope of this study, it is worth noting that the first intent of REDD was to deal with emissions from deforestation and forest degradation only. This changed in 2007 when the Bali Action Plan formulated at the 13th Conference of Parties (COP13), deemed relevant to extend the scope of REDD to include "the role of conservation, sustainable management of forests and enhancement of carbon stock in developing countries". During the COP 16(15), at Cancun, the REDD became REDD+ to reflect new components in its definition and scope, namely: (a) reducing emissions from deforestation; (b) reducing emissions from forest degradation; (c) conservation of forest stock; (d) sustainable management of forests; and (e) enhancement of forest carbon stocks.

Today, the proponents of REDD+ believe it has the potential to contribute significantly to climate change mitigation and poverty alleviation, whilst promoting biodiversity conservation and sustaining ecosystem services.

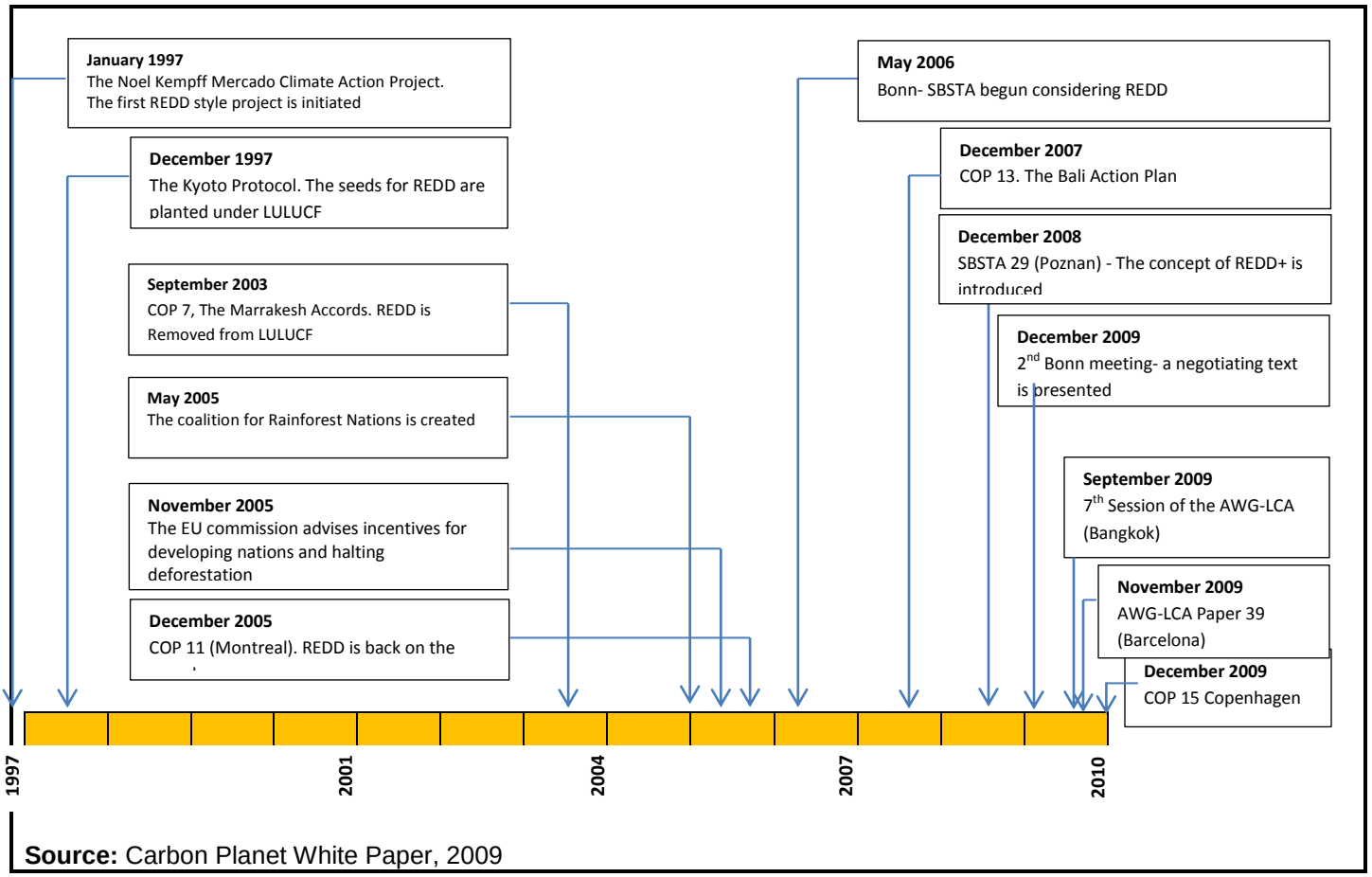


Figure 3 The timeline of global policy events shaping REDD+

3.3 REDD+ in Mozambique

The government of Mozambique began the preparation of REDD project idea note (R-PIN) in late 2008 with the financial support from the Norwegian Embassy and technical inputs from Indufor. The R-PIN was submitted to the Forest Carbon Partnership Facility (FCPF) in May 2009 and approved in the same month. The approval of the R-PIN led to the process of formulation of the Readiness Preparation Proposal (R-PP), whose first draft was submitted to the FCPF in December 2010 and endorsed by the FCPF participants committee in March 2012. The revised R-PP was submitted to FCPF in January 2013. A preparation grant agreement of US$ 3.3 million was signed early July 2013 and disbursement of funds initiated in February 2014.

The R-PP has been implemented since March 2013 and it is expected to phase out in December 2015. It defined important components for implementation, namely, the institutional arrangements for REDD+ implementation; the preparation of the REDD+ national strategy; the reference levels; the Measurement, Reporting and Verification (MRV) system and the Monitoring and Evaluation system for R-PP.

The 2014 REDD+ readiness progress fact sheet provides the following important information on the status of R-PP implementation as of May 2014.

- The Decree establishing the UT-REDD+, (REDD+ Technical Unit) and clarifying the institutional responsibilities among relevant ministries was approved by the Council of Ministries on August 2013, together with a Decree governing the REDD+ projects' approval which was enacted on December 2013;
- Qualified staff was hired to assist technical and administratively the REDD+ process;
- An inter-ministerial group relevant for REDD+ was established;
- A technical group made of relevant government institutions, civil society organizations, private sector and academy was established to provide relevant technical input to the REDD+ process.

As part of the REDD+ readiness, the REDD+ national strategy is under development alongside other complementary studies including "The causes of deforestation and degradation", "The definition of forestry", "The legal and institutional framework", "The Mopane ecosystem for MRV development design" and the "Strategic Environmental and Social Assessment- SESA".

Equally, the GoM has initiated an investment planning process under the Forest Investment Program (FIP) of the Climate Investment Fund. The planning process falls within the ongoing national REDD+ readiness process supported by the FCPF and other development partners including the Government of Japan, the Embassy of Sweden and the World Wide Fund for Nature (WWF). FIP support countries' efforts to reduce CO_2 emissions from deforestation and forest degradation whilst promoting sustainable forest management and enhancement of forest carbon stocks.

3.4 Deforestation Versus Forest Degradation

The concepts of deforestation and forest degradation are widely used within the debate about REDD+ in Mozambique. However, their definition and application often raise serious debate as to a clear demarcation of the boundaries between the two. There are presently two studies underway that will contribute to the REDD+ national strategy currently being drafted. These are the "causes of deforestation and forest degradation" and "the definition of forest" which will provide more insights into what has been one of the major challenges in framing the debate on deforestation and forest degradation. This section seeks conceptual clarification of the two without necessarily entering into the specific context of deforestation and forest degradation in Mozambique. The Food and Agriculture Organization of the United Nations (FAO) defines deforestation as the permanent destruction of forests in order to make the land available for other uses (FAO, 2015). WWF indicates the other uses may include the conversion of natural forest to tree plantations, agriculture, pasture, water reservoir and urbanization but excludes timber production areas managed to ensure the forest regenerates after logging.

Forest degradation on the other hand, takes place when changes within the forest affects the function of the site and ultimately decreases the capacity to supply products and/or ecosystem services. In addition, degradation creates less capacity to recover and less productive forest; it is the beginning of deforestation: "large canopy gaps can dry out rainforests leaving them vulnerable to fire; abandoned logging roads provide access to settlers; and authorities are often more willing to grant conversion permits in heavily logged forest " (wwf.panda.org).

Key drivers of deforestation and forest degradation include:

(i) subsistence farming (itinerant farming);
(ii) urban and infrastructure expansion;
(iii) wood and forest products exploitation;
(iv) firewood and charcoal production;
(v) commercial agriculture;
(vi) livestock and
(vii) mining activities.

The table below summarizes the key effects that deforestation and forest degradation have on the biophysical and socio-economic environment.

Table 4 Generic effects of deforestation and forest degradation

Factors affected by deforestation and forest degradation	Description of factors affected by deforestation and forest degradation
1. Reduced biodiversity	Deforestation and forest degradation can cause decline of wildlife. When forest cover is removed, wildlife is deprived of habitat and becomes more vulnerable to hunting. Assuming about 80% of the world's documented species is found in tropical rainforests, deforestation poses serious threat to world's diversity.
2. Release of greenhouse gas emissions	Forests are the largest terrestrial store of carbon and deforestation is the third-largest source of greenhouse gas emissions after coal and oil. Deforestation causes 15% of global greenhouse gas emissions. Of these, CO_2 emissions represent up to one-third of total CO_2 emissions released because of human causes.
3. Disrupted water cycles	As a result of deforestation, trees no longer evaporate groundwater, which can cause the local climate to be much drier.
4. Increased soil erosion	Deforestation accelerates rates of soil erosion, by increasing runoff and reducing the protection of the soil from tree litter.
5. Disrupted livelihood	Millions of people rely on directly on forests, through shifting cultivation, hunting and gathering, and by harvesting forest products such as rubber. Deforestation continues to create severe social problems, sometimes leading to violent conflict

Source: wwf.panda.org

A study by Sitoe (2013) recognizes the complexity and multiplicity of the causes of deforestation in Mozambique. The study identifies the agriculture practice, biomass and charcoal production and urbanization as the key factors responsible for forest cover loss. The study goes on to identify commercial timber exploitation and selective cuts of trees. The study further identifies the energy and agricultural sectors as the areas driving deforestation. This situation is exacerbated by the weak forest governance, high demand for unprocessed timber for construction, uncontrolled bushfires, traditional farming and hunting.

3.5 The proposed REDD+ Strategy Options for Mozambique

The REDD+ national strategy identifies a range of land use related and natural resource exploitation practices as the direct causes of deforestation and forest degradation. Despite these practices contributing to deforestation and forest degradation, they are also central to the rural economy and significantly contribute to the national economy. These practices are greatly influenced by limited technology, social and economic factors but also, and perhaps most significantly, by the weak institutional governance in sectors with direct or indirect impact on forest cover in Mozambique.

Because of this, the strategy recognizes the need for combined and coordinated interventions that aim to:

A. Improve natural resource governance system**;**

B. Ensure economic and financial feasibility of the production process, transformation and utilization of goods and services in strategic sectors;

C. Provide and facilitate access to alternative technologies to prevent deforestation and forest degradation;

D. Integration of social and cultural interventions to reduce deforestation and forest degradation.

The national strategy identifies 6 strategic actions which address the factors outlined in A-D above, as illustrated in Table 7.

Table 5 Proposed REDD+ strategy options in Mozambique

Priority actions (priority sector or strategic actions)	Pillars (barriers)			
	Governance	**Economic**	**Technology**	**Socio-cultural**
Agriculture	• Implementation of ZEAN • Implementation of agrarian policies	• Commercialization system • Access to agriculture inputs	• Alternatives to itinerant agriculture	• Improve technology and access to markets
Energy	• Implement new and renewable energy policies	• Support low income communities' access to alternative clean energy • Support forest plantations for energy	• Increase access to alternative energy to biomass	• Capacity and promotion to support the use of alternative energy in urban areas
Conservation areas	• Enhance the management system of conservation areas	• Develop income generating activities within conservation areas	• Improve infrastructure and conservation areas management	• Community land use compatible with conservation
Sustainable forest management	• Apply sustainable forest management principles	• Reduce the impact of illegal logging and enhance the concession	• Support access technology that add value to forest products	• Capacity building of forest workers and improve the relationship between concessionaries and

		system		communities
Forest plantation	• Improve business environment for forest plantations		• Provide support for plantations that are adequate with correct species, site and market	• Expand tree plantations
Cross-cutting issues	• Land use planning • Adequate use of legislation and institutions to reduce deforestation and forest degradation	• Set up an incentive and taxation system that promote good practices of exploitation and use of natural resources	• Capacity building on the use of alternative technologies to deforestation and forest degradation	• Conduct awareness campaigns on forest conservation, tree plantation and alternative energy

For the purpose of this SESA the cross-cutting option is not evaluated because of the level of unknowns related to legislation and policy and economic reform issues; the remaining five (5) options are evaluated (Table 8).

Table 6 Proposed REDD+ strategic objectives summarized for SESA analysis

Strategic options	Strategic actions
Agriculture: Promote alternative practices to itinerant agriculture whilst ensuring increase in productivity of both subsistence and cash crops	**1.** Promote the adoption of sustainable agriculture practice using annual and perennial crops (cashew, coconut and macadamia); **2.** Intensify and promote agriculture; **3.** Divert commercial agriculture to non-forest areas; **4.** Promote agroforest systems that are appropriate for individual regions (agriculture or livestock with trees); **5.** Promote good practices of natural livestock grazing management and production of fodder
Energy: Increase access to alternative sources of biomass in urban areas and efficiency in the production and utilization of biomass energy	**1.** Promote sustainable production of biomass from natural forest (forest management for charcoal and firewood); **2.** Promote the setup of forest plantation for energy purposes; **3.** Promote sustainable use of biomass energy through the use of improved stoves; **4.** Expand the measure to promote other sources of renewable energy- wind, solar and biogas energy.
Conservation: Enhance the conservation system and adopt effective ways to generate income	**1.** Improve the management regime and protection of conservation in natural forest (parks, reserves and hunting concessions).
Sustainable forest management: Promote forest concession system with added value	**1.** Enhance sustainable forest management (forest concession of native forest) including community management of native forest; **2.** Promote and develop value chain of non-forest products

for forest products	
Forest plantations: Improve business environment for forest plantations and the relationship between companies and communities	**1.** promote the establishment of forest plantations in deforested or degraded areas or of a different cover than forest

4 Legal and Institutional Framework

4.1 Objectives

The aims of this chapter are to:

i) provide a summary of relevant national laws and legislation that guide environmental and socio-economic assessments (ESAs) in Mozambique;
ii) summarize relevant policies and identifies the primary regulatory bodies responsible for governing environmental and social management of the country;
iii) summarize international standards and guidelines, and conventions to which Mozambique is a signatory party;
iv) identify which national laws and legislation help Mozambique meet the intention of the specific standard, guideline, or convention;
v) provide a discussion of how each law or legislation meets or fails to meet the goals and objectives of the international standards, guidelines and conventions to which the GoM is a signatory party based on previous analyses of laws and legislation in Mozambique, and is not based on an independent analysis for this SESA study.

4.2 National laws and legislation

National laws and legislation to manage and protect or preserve the biophysical, socioeconomic and socio-cultural environment are summarized in this section. Laws and legislation selected for summary and analysis relative to international conventions and treaties to which GoM is a party or signatory to, and relative to international best practices, are based on guidance from the World Bank Information Center (Donaldson and Lichtenstein, 2011 and BIC, 2013). Donaldson and Lichtenstein (2011) identify the following categories for summary and analysis in SESA for REDD+:

- Agriculture & Cattle
- Cultural Heritage
- Environmental Law
- Forest Law
- Infrastructure
- Land Law
- Mining Law

- Tourism
- Transportation

Accordingly, SWMOZ has identified relevant national legislation and laws on for each of the above categories, with an emphasis on identifying how each article or law addresses issues that may affect implementation of REDD+ in Mozambique:

- Biodiversity Management and Practices including Migratory species;
- Climate Change Management and Practices;
- Coal production and trade;
- Endangered or rare and threatened species in Mozambique;
- Forestry Management and Practices;
- Illegal logging trade;
- Land use Management and Practices;
- Mining Law and Oil and Gas Development laws as they pertain to environmental and social legislation they must adhere to in the development of their mines or oil and gas leases;
- Protection of Cultural Heritage (sites, sacred places and practice of ceremonies in traditional landscapes);
- Protection of National Parks, Conservation areas, and Wildlife Preserves;
- Resettlement legislation;
- Rights of Legal Landowners;
- Rights of Traditional Land users; and
- Rights of vulnerable groups: women, children and the elderly.

4.2.1 Constitution of the Republic of Mozambique (1990)

The 1990 Constitution of the Republic of Mozambique (Articles 37 and 72) stipulates that:

- The State promotes initiatives to guarantee the ecological balance, conservation and preservation of the environment, aimed at improving the quality of life of its citizens; and
- All the citizens have the right to live in a balanced environment and are obliged to protect it.
- These postulates are the result of the understanding that the GoM recognizes that the country's socio-economic development relies on the integration of environmental aspects in economic development. Furthermore, the capacity for sustainable management of the

country's resources requires a multi-sectoral approach and alignment of plans and programmes in order to achieve effective environmental management policies.

4.2.2 Law on the Protection of Cultural Heritage (Law No. 10/88 of December 22, 1988)

The objective of the present law is to ensure the legal protection of the tangible and intangible assets forming part of the cultural heritage of Mozambique. This Law stipulates that:

- It shall apply to assets forming part of Mozambique's cultural heritage in the possession of the State, public bodies or natural or legal persons, without prejudice to the property rights of the relevant holders;
- It shall extend to any cultural assets that may be discovered on Mozambican territory, in particular in the soil, subsoil, beds of inland bodies of water or continental shelf; and
- On the condition that there is reciprocity, cultural assets present in Mozambique belonging to other countries shall enjoy the protection afforded by the present Law.

The State shall have special responsibility for ensuring the protection of intangible cultural heritage assets, in particular by means of the following:

- The promotion of the study and revival of popular cultural traditions, rites and folklore; and
- The promotion of the collection and the recording – graphically, photographically, on film or phonographically – of intangible cultural heritage assets.

Intangible cultural assets: means assets that are essential elements of the collective memory of the people, such as history and oral literature, popular traditions, rites and folklore, the various national languages, as well as works of the human mind, together with all forms of artistic and literary creation, irrespective of the médium or vehicle through which they are expressed.

Immovable cultural assets: includes the following categories: monuments, complexes, locations or sites and natural features.

Natural features: means physical or biological formations of particular interest from an aesthetic or scientific point of view, such as those located on Inhaca Island and in the Bazaruto Archipelago.

Natural features shall also include the following:- geological and physiographical formations and areas that constitute the habitat of endangered species of animals and plants of outstanding value from the point of view of science or nature conservation; defined areas recognized as

being of value from the point of view of science or nature conservation, in particular parks and reserves.

In addition to laws and legislation designed specifically to protect Mozambique's unique cultural heritage, other legislation also protects these resources. These include:

- The Forest and Wildlife Law, Article on Protection Zones and Cultural Heritage, and Article 13 on Cultural Heritage;
- The Land Law, and Customary Use Rights (pertains to traditional knowledge and practices; and
- Burial Decree, on removal of burials from cemeteries and traditional burial grounds).

4.2.3 Burial Regulations (Decree No. 42/90 of 29 December)

Legislation covering the exhumation and reburial of corpses is contained in the Burial Regulations (Decree No. 42/90 of 29 December). The Regulations state that, in urban areas, the competence for organizing or authorizing the exhumation, transferable and reburial of corpses rests with the Funeral Services attached to the executive council administering the urban area (Article 15e).

Apart from stating that the burial of corpses in rural areas may be performed in cemeteries or other places authorized by the relevant authorities (Article 1, No. 2), the Regulations do not mention anything about the exhumation and reburial of corpses in rural areas that may be necessitated by development projects.

The Regulations do not define specifically who those relevant authorities are but, in common practice; it is assumed that traditional leaders are to be consulted to define appropriate burial places.

4.2.4 Forest Law and Wildlife Law (Law No. 10/99 of 7 of July; as amended)

The objectives to be pursued under this Act are to protect, conserve, develop and rationally use sustainable forest and wildlife resources for the economic, social and ecological benefit of current and future generations of Mozambicans. This law applies to protection activities, storage, use, exploitation and production of forest and wildlife resources, and covers the marketing, transportation, storage and primary processing, trade or industrial applications of these resources. The Act stipulates that:

Forest resources and existing natural wildlife in the national territory are owned by the State.

When forest degradation is caused by deforestation, fire or any other voluntary acts, the offender is required to help rehabilitate the degraded area in the terms and conditions to be defined by regulation itself, independent of other relevant civil and criminal procedures.

Under Article 31 (Participatory Management), local councils will be set up consisting of representatives of local communities, the private sector, associations and local state authorities for the protection, conservation and promotion of sustainable use of forest and wildlife resources.

Under Article 35 - percentage values shall be determined from forestry and wildlife exploitation rates, for the benefit of local communities living in their farming areas.

Under Article 40 – Anyone who voluntarily sets a fire and thereby destroys in whole or in part harvest, forest, woods or trees shall be sentenced to imprisonment for up to one year and receive a corresponding fine.

It is considered an offense to import and export forest or wildlife resources without a license.

Economic and social development and preservation policies and biodiversity conservation should involve local communities, the private sector and civil society in general.

The State shall promote the establishment of processing industries for forest and wildlife products, to gradually increase manufactured exports through specific regulatory measures.

Protection Zones are defined territorial areas, representing the national natural heritage, for the conservation of biodiversity and fragile ecosystems or animal or plant species. These include national parks; national reserves; zones of use and places of cultural and historical value. Protection zones are managed through a Management plan which was developed through community participation.

National parks are areas of full protection, bounded for the propagation, protection, conservation and management of vegetation and wild animals, as well as the protection of cultural and historical sites, as well as landscapes or geological formations of particular scientific value. In National parks, the following activities are strictly prohibited: hunting within the park boundaries, forestry, agricultural activities, livestock, mining or prospecting, drilling or completion of a landfill. All works capable of altering the appearance of the terrain or vegetation characteristics or cause water pollution, or any act which by its nature can disturb flora and fauna, are prohibited.

Further, the introduction of zoological or botanical species, whether indigenous or imported, wild or domestic, is prohibited.

Under Article 12, regarding the export of logs, stipulates that wood from first class species is permitted only and after processing, and only other class species are allowed to be exported as logs.

Local communities may at any time of year, extract forest resources necessary for their own consumption, exempt from payment of logging rate. Forest products extracted for own consumption of local communities may circulate only within the administrative post in which the community is located.

Regarding Firewood and Charcoal, the Law stipulates that it is not permitted to use precious forest species, 1st, 2nd and 3rd classes, for the production of firewood and charcoal, or use rare forest species, protected species or species of historical or socio-cultural value.

Article 13 discusses zones of cultural historical use and value in national parks, including protection of forest areas of religious interest and other sites of historical and cultural use or value. Protection includes rural cemeteries located in forests, places of worship, forest vegetation used by the local community for the extraction of traditional medicines, and wildlife species that live in forests which are used for traditional purposes.

There are two regimes for the legal exploitation of a national forest, including simple license or forest concession contract. Article 18 stipulates that “Forest and wildlife exploitation for commercial, industrial or energy purposes must safeguard all existing rights of third parties within the operating area and the free access of local communities within the same, including the rights to use the natural resources they need for their livelihoods”.

Regarding Stakeholder Consultation, the Forest Law provides the following. Under Article 6, the preparation of management plans for protected areas must be made with the involvement of stakeholders, including local communities.

Local communities must be consulted by forest concession applicants, or by his representative bodies of local government of the State.

The body of the local government in which the requested forest concession is located, shall provide a notice of the convening of the public consultation meeting at least 15 days prior to the meeting, and provide a clear indication of the meeting's objectives.

Participants in the community meeting, by consensus of the community members present (men and women), and the resolution shall be read, and signed by at least ten members.

When the area covered by the application of forest concession or simple license is wholly or partly in an area where local communities have the right to use and benefit from the land, there will be fair negotiation of the terms and operating conditions between local communities, the applicant and the State.

Local councils shall be convened to provide local forest and wildlife resource management advice. The council shall consist of an equal number of members from the following sectors: local communities, natural or legal persons with activities linked to forestry and wildlife resources, associations or non-governmental organizations linked to forest and wildlife resources, or local community development and the state.

The council may propose to the rightful cancellation or revocation of a project, when it finds that it does not meet the real purposes of rural development and sustainable use of forest and wildlife resources.

Twenty percent of any rate of forest or wildlife exploitation is intended to benefit local communities in the area where the resources are extracted.

Article 106 defines rules for the authorized use of bush fires, demarcation by means of fire breaks, safeguarding of species, establishment of a fire fighting team with the involvement of local communities to prevent its spread.

4.2.5 Environmental Law (Law nº 20/97 from October 1st)

Mozambique's Constitution confers on every citizen the right to live in a balanced environment as well as the duty to defend this right. The law defines public rights, namely the right to information, education, and access to justice.

The Environmental Law defines the legal basis for the proper use and management of the environment and its elements, in order to establish a system of sustainable development in the country. The legislation prohibits pollution of all environmental components (air, soil and water), as well as practices of activities which accelerate erosion, desertification, deforestation.

The law established the National Council for Sustainable Development, and among other powers this Council has the authority to:

- pronounce upon sectoral policies related to the management of natural resources; and

- to formulate recommendations to the ministers responsible for the management of natural resources in different sectors on matters relevant to the sector.

Article 8 of the Environmental Law stipulates that it is the government's duty to create appropriate mechanisms to involve the different sectors in the preparation of policies and legislation related to the management of the nation´s natural resources.

Chapter IV of the law defines special measures for environmental protection (protection of environmental assets, biodiversity, environmental protection zones, building infrastructure).

To prevent environmental damage, the law requires environmental licensing for private and public developments through the Environmental Impact Assessment (EIA) process, and requires environmental auditing. The law further defines liability for environmental damage, wherein any person who causes material damage to the environment shall be obligated to indemnify the injured parties. The law also addresses how environmental crimes and infractions shall be dealt with.

4.2.6 Land Law (No. 19/97 - 1 October)

As a universal means of wealth creation and social welfare, the use and enjoyment of land is the right of all Mozambicans. This Act established the terms for the establishment, exercise, modification, transfer and termination of rights of use and benefits of land. The Land Law confirms the Constitutional Principle of State ownership of all land and both ratifies and simplifies the processes of government allocations of State land.

The Land Law establishes some areas as areas of total and partial protection zones which are part of the public domain (Article 6). Article 8 g) defines the areas of partial protection as the land occupied by motorways and four lane highways (including a bordering strip of 30 meters for primary roads and 15 meters for secondary and tertiary roads); areal, surface underground and underwater installations and conduits for electricity, telecommunications, petroleum, gas and water, and rivers (including a bordering of strip of 50 meters on each side of the waterway).

The Land Law seeks to define the relationship between the Concession program and the customary systems of land tenure prevailing in Mozambique. As such, the law embodies some critical policy as follows:

- The Law establishes a new land use property right wherein land is inheritable and, subject to certain restrictions, is transferable. Article 12 of the Law allows such use rights or Direito do Uso e Aproveitamento da Terra (DUATs) to be created not only by a Government grant,

but also by prescription. Namely, a person can acquire land rights through good faith settlement and use of the land for ten years, or by settlement and use according to customary norms and practices. Land use rights acquired by settlement and use, either by prescription or by customary practices, are not conditioned upon exploitation plans. The Law thus recognizes and protects property rights of rural Mozambicans, providing them the same rights as those granted to people of influence.

- Articles 12 - 15 recognize local communities as well as individuals as holders of land use rights, and also as the means of acquiring a land use right through occupancy and approval of an application. Article 13 of the Land Law provides local families and communities with additional protection as it defines the absence of official title shall not affect rights acquired by occupation of land, which can be proven by the testimony of family members or community (Land Law, Articles 14 and 15).
- Article 16 sub-article (1) provides for inheritance of the DUAT, and sub-article (2) provides titleholders the right of land use, and the benefits associated with infrastructure, structures and improvements existing on the land by means of a public notary deed, preceded by authorization from the competent State authority, may transfer inter-vivos.
- If Local Communities hold the right of use and exploitation of land by occupation, it is unlimited by time (Land Law, Article 17). Both the Land Law (Article 1) and the Spatial Planning Law (Article 1) define "Local Community" as "A grouping of families and individuals living in a land area that is at the locality level or lower, which aims to safeguard their common interests by protecting areas for housing or agriculture, whether cultivated or fallow, forests, sites cultural importance, pasture, water sources and areas of expansion."
- Article 18 stipulates that the revocation of a land use title in the public interest must follow expropriation procedures and may only occur after payment of fair compensation.
- Article 19 stipulates that the termination of a land title has to be declared by the same entity that has issued the title or recognized the right of occupancy in terms of customary norms and practices.
- Article 24 pertains to local communities and stipulates that rural communities shall participate in the management of natural resources, and conflict resolution among others.

National legislation concerning situations involving land acquisition, planning and implementation of resettlement in Mozambique, under Decree 31/2012 addresses: the expropriation of land and the loss of land rights by individuals and communities; responsibility for the preparation of resettlement plans; and necessary compensation measures in accordance with law. The law also defines the consultation procedures required when acquiring land titles

especially in relation to new resettlement area, and exhumation and repatriation of corpses in graves that have to be relocated. This is corroborated by the Territorial Planning Law (Law No. 17/2007 of 18 July).

Article 70 (Nos. 1 – 3) of the Territorial Planning Regulations also establishes that fair compensation has to be paid before the transfer or expropriation of property and assets, which should not only cover the real value of expropriated assets, but also damage and loss of profit.

4.2.7 Tourism Law (Law No. 4/2004 17 June 2004)

This Law establishes the legal framework for promoting and carrying out tourism activities, while respecting the forest, faunal, mineral, archaeological and artistic heritage, which should be preserved and passed on to future generations. The tourism law promotes preservation of historical and cultural values, promotes national pride, and contributes to the harmonious and balanced development of the country. The law was established to promote the conservation of biodiversity and marine and land ecosystems. The law stipulates that:

- The development of tourism should respect the environment and aim to achieve sustainable economic growth.
- Public authorities at central and local level and at the level of autarchic authorities shall give preference to and encourage tourism development with low environmental impact, so as to preserve, among other things, forest, faunal, water and energy resources and protected zones.
- Urban planning, architectural design and the operation of tourist undertakings shall be done in a way that seeks to improve their integration into the local economic and social environment.

In conservation areas the following shall apply:

- Eco-tourism, synergetic tourism, recreational diving and other specified activities may be carried out in conservation areas, in accordance with management plans and other legal provisions.
- Tourism in conservation areas shall participate in the conservation of ecosystems, habitats and species in the areas in question.

Criminal offences involving child sex tourism are as follows:

The practice of child sex tourism, whether as a supplier of tourism products and services or as a consumer or tourist, with the involvement of minors, is considered to be a criminal offence punishable under the criminal law. The following acts are considered sex crimes:

- Living off a prostitute's earnings;
- Aggravated crime of living off a prostitute's earnings; and
- Corruption of minors.

4.2.8 Law on Spatial Planning and its Regulation (Law No. 17/2007 of 18 July / Decree 23/2008 of 1 July)

According to the Law of Spatial Planning and its Regulation, when necessary, the State can request and expropriate land under public interest - as in the case of economic development and construction of infrastructure. However, expropriation must be preceded by a statement of need of public interest in relation to the area to be expropriated, including the respective justifications. Right's holders of land to be expropriated shall receive a letter of notification that contains a copy of the declaration of the expropriation, or describe the goods to be expropriated. The letter shall contain:

- The proposed terms of compensation;
- Procedures and deadlines for the payment of compensation;
- Identify the deadline for the acquisition of property to be expropriated; and
- Identify the deadline for Right's holder to respond to the terms of compensation, and the delivery of the goods in case of dispute.

Expropriation for the public interest will rise to the payment of a fair compensates for loss of assets and intangible production goods, as well as the breakdown of social cohesion.

Expropriation for the purposes of regional planning is regarded as public interest when the final objective is to safeguard the common interests of the community through the installation of economic or social infrastructure with high social positive impact.

The compensation must be paid before the transference of the asset or goods, which will cover not only the real value of the expropriated property, but also damages and lost profits.

The compensation can be in cash or in the case of building it can be in equivalents. A coefficient ("y") up to 20% may be applied to compensate for disruptions in "social cohesion which will be determined in each case (however, it has not yet been defined how the "y" will be determined).

The amount of offsets is calculated at the date of declaration of public utility but, as required, shall be revised at the final payment.

The compensation for structures shall take into account whether the structures are for habitation, or if the structures serve commercial or industrial or second residence purposes.

The calculation of the compensation for structures shall take into consideration the type, location, duration of existence of the proposed development, value of the construction, and the current value of the property. The value of the construction is regarded as the "market price" per square meter by "type" of construction. The rates used for the calculation are those presented in the existing legislation or may be determined by requesting evaluation by MITADER. Depreciation will be taken into account in the calculation of the compensation value.

The compensation for crops should take into account the time of life, age, production method, annual yield ratio, as well as a coefficient "k" (between 0 and 1) that must be subjectively applied according to aspects like, the crop conditions, soil treatment, space and other factors that may affect the performance of the crops (however, no guidance is provided on how "k" must be determined).

People affected by expropriation may argue the terms of compensation and delivery of the goods, in case they disagree with the proposal of the expropriating authority.

4.2.9 Territorial Planning Law (17/2007 of 18 July)

The Territorial Planning Law stipulates that expropriation for public interest gives rise to the payment of fairly calculated compensation in order to compensate for the loss of tangible and intangible goods and productive assets as well as the disruption of social cohesion. This is supported by Article 86 of the New Constitution of Mozambique on The Right of Eminent Domain, which states that individuals and entities have the right to equitable compensation for expropriated assets and the right to a new and equal plot of land.

Article 68 (No. 2a) of the Territorial Planning Law Regulations (Decree No. 23/2008 of 1 June) further specifies that expropriation for purposes of territorial planning is considered to be carried out in the public interest, when the final objective is the safeguard of the common interest of a community through the installation of economic or social infrastructure with large positive social impacts.

4.2.10 New Labour Law (2007)

Mozambique has a comprehensive Labour Law (2007), which addresses the following key elements:

- Protection of maternity and paternity: rights of parents to spend time with newborn children;
- Special rights of female employees: employers shall not request pregnant women to do heavy lifting, difficult work, and they have special rights for one year after birth to protect the health and welfare of them and their baby;
- Employment of minors: only persons 15 years and older may be employed, and a 15 year old can only be employed with permission from their legal representatives;
- The Ministers of Labour, Health and Education shall issue a legal diploma establishing the nature and the conditions of work that may be performed, in exceptional circumstances, by minors of between 12 and 15 years of age;
- Limits on normal working hours: labour shall not exceed 48 hours per week and 8 hours per day. May work 9 hours per day, provided that the employee is given an extra half day of rest per week, beyond the one day prescribed above;
- Hygiene and safety regulations: business associations and trade union organisations shall, to the extent possible, establish codes of good conduct regarding matters of hygiene and safety at work in the respective field, and shall work to ensure the safety and health of their employees;
- Medical assistance at the workplace: large companies and smaller companies where the work is difficult or dangerous, shall provide first aid in cases of accident, sudden illness, poisoning or indisposition;
- Right of association: employees and employers are guaranteed the right, without any discrimination and without prior authorisation, to form and belong to organisations of their choice including international organisations, for the defence and promotion of their socio-professional and business rights and interests;
- Structures representing workers: trade union or workers' organisations may form trade union delegates, trade union committees, workplace committees, trade unions, unions, federations and general confederations; and
- Social security system: all workers shall be entitled to social security, according to the financial conditions and resources of the development of the national economy.

4.2.11 Transportation Legislation: Road traffic code (1/2011 of 23 March)

The provisions of this Code are applicable to transport on roads which are within the public ownership of the State, and on roads which are privately owned, when these are open for public transport, as regards everything which has not been specially regulated by agreement concluded with the respective owners.

4.2.12 New Mining Law (14/2002 of 26 June, mining law, as amended 20/2014 of 18 August)

The Mining Law establishes the general principles for the use and exploitation of mineral resources, access to and the exercise of prospecting and research activities, development and production, processing and sale of mining products, including mineral water (and excluding hydrocarbons, which are subject to their own law).

Mining operations have preferential use of the land, even if the land has been previously granted to a third party. However, a compensation scheme might be imposed if the use of the land for mining purposes imposes an economical limitation on the land. Should such compensation be settled, the holder of the mining rights cannot be stopped from carrying out any mining activity.

Fair compensation under the new mining law is as follows:

- When the available area covers, totally or partially, spaces where families or communities are established, implying their replacement, the company must pay them a fair and transparent compensation, under terms to be regulated.
- The fair compensation value must be fixed in an understanding memorandum between the Government, the company and the community, and such an act may be witnessed by a community-based organization, if requested by one of the parties.
- The above mentioned understanding memorandum is one of the requirements for the allocation of mining exploration rights.
- The Government is responsible for assuring the best terms and conditions in favour of the community, including the payment of fair compensation.
- Involvement of communities in mining is as follows:
- Previous information concerned with the beginning of the prospecting and research activities must be provided to communities as well as the necessity of their temporary resettlement for this purpose.
- Communities must be previously consulted before the granting of an authorization for the beginning of mining exploration.

- The Government shall create mechanisms in order to allow the engagement of communities in the mining projects located where they are settled.
- The Government is responsible for assuring the organization of the communities in order to promote their engagement as mentioned above.
- Any mining title holder or person affected may claim about any situation regarding the granting process of a mining title in area under previous mining title or occupied, following issuing of edicts in the press or in the Government Gazette.
- The Government re-evaluates the regime applicable to mining operations and sought, through the new Mining Law, to make the regime overall more favorable to Mozambique and Mozambicans.

The new Mining Law which come into force on 1 January 2015. Introduces changes that focus on the following three issues:

- Promoting local development and participation in the mining sector;
- Imposing more stringent requirements on undertakings involved in mining operations; and
- Expanding the scope of activities regulated under Mozambican mining legislation.

The main focus of the new Mining Law is increasing local participation in mining operations, both in the public and private sector.

Mining rights can only be granted for areas which have been previously marked and zoned for mining activities. In addition, a pre-analysis of the impact of the mining activity (which will have to conclude in changing the zoning of a certain location) will need to be assessed.

The new Mining Law sets out local content requirements for the procurement of goods and services for mining activities which are designed to promote the development of Mozambican businesses and know-how.

These include a requirement for foreign persons to associate themselves with Mozambican persons to supply goods and/or services to the mining sector in Mozambique (Article 53(2)) and for operators in the mining sector to give preference to Mozambican goods and services to the extent that they are of comparable quality and available in the time frames and quantities required Art 22(4).

The Mining sector is required to provide employment and technical training for Mozambican nationals, with a preference for the population residing in the immediate vicinity of the concession area.

The new Mining Law also imposes significantly more stringent obligations on any operators requiring to resettle people within an area affected by mining operations, including with respect to the compensation payable to people affected by resettlement (see Arts 29-32)

Mozambican Mining law is more strictly policed under the new Mining Law as it specifically contemplates criminal liability for breaches of mining laws.

4.2.13 Protection, Conservation and Sustainable use of Biological Diversity (Law no. 16/2014 of 20 of June)

This law has as its main objective the establishment of the basic principles and norms for the protection, conservation, restoration and sustainable use of biological diversity in the conservation areas. The law is applicable for all groups of natural resources existing in the national territories and waters under national jurisdiction.

Under this law, the mechanisms of compensation for conservation efforts are as follows:

- Public or private entity exploring natural resources in a conservation area or buffer zone must contribute financially for the protection of biodiversity on the respective conservation area.
- Public or private entity exploring natural resources in a conservation area or buffer zone must compensate from their impacts in order to ensure that are not biodiversity net losses.
- The right of use and benefit of carbon stocks existing in the conservation areas and respective buffer zone are owned by the entity which manages the area.

The protected zones are classified in two groups (full conservation areas and conservation areas of sustainable use), under the full conservation areas we have natural reserves, national parks and cultural and natural monuments.

When the degradation of an ecosystem is provoked by deforestation, fire, or other voluntary actions, the offender is obliged to recovery the area on the terms and conditions being defined by specific regulation independent of other civil or criminal procedures.

Under this law, population resettlement is directed as follows:

- The state can perform a resettlement of population from conservation area, if their presence is not compatible with the juridical status of the conservation area or hinder a proper management.
- The one affected must be guaranteed life conditions that are equal or better than the one there do have in the area where they live, through a fair compensation followed by measures which promotes ways of living, in a consultative process where they participate, together with the representatives of affected parties, administration of the conservation area and local authorities.

Any person is subject to prison (8-10 years) who:

- Starts a fire and by this mean destroy total or partial a forest, woodland wood.
- Cuts without license any element considered a protected species.

4.3 Stakeholder engagement under Mozambique's laws and legislations

Both the Mozambican Constitution and Environment Law establish the rights of citizens to have information about and to participate in decision-making about activities which may affect them and the environment. A Public Participation Process identifies and consults with interested and affected parties (Partes Interessadas e Affectadas – PI&As), and is a compulsory activity for all Category A projects. A Stakeholder Engagement Process must also be carried out whenever the proposed activity implies the permanent or temporary relocation of people or communities, and the relocation of goods or assets or restrictions on the use of or access to natural resources. Article 14 of the ESIA Regulations defines the Public Participation Process as an activity that involves public hearings and consultation. For a detailed treatment of the requirements and contents of a Public Participation process the reader should refer to MITADER's Directive for the Public Participation Process published as Ministerial Diploma 130/2006 of 19 July. The Public Participation Process implies:

- delivery of information regarding projects to all directly and indirectly affected and interested parties;
- responding to public requests for explanations on the project; and
- the formulation of suggestions for the project.

The process of public participation includes public consultation and a public enquiry which must be carried out in compliance with directives issued by MICOA (now MITADER). In Mozambique

the PPP is divided into two phases, the first one running between the application for pre-assessment of the activity and the submission of the EIA report to MITADER, and the second running between the review of the EIA by MITADER and the issuing of the environmental license. The first phase is the responsibility of the applicant and the second is MITADER's responsibility. However, to comply with international requirements the ESIR will be disclosed for public review for one month (30 days).

Public participation provides the opportunity for stakeholders to learn more about the proposed project and provide their opinions. These need to be incorporated into the ESIA process and should be used to guide further phases and help mitigate potential conflict situations early on in the planning process.

4.4 Mozambique's Existing Environmental Policies

Apart from MITADER as an institutional tool to promote and enforce environmental protection, Mozambique has the following Environmental Policies:

The 1995 National Environment Policy recognises that many key natural resources were under pressure, poverty being one of the factors resulting in environmental degradation.

The 1995 National Policy on Water has a primary objective to promote the integrated and sustainable management of water resources in Mozambique in order to meet the water needs of the people now and in the future.

The 1995 Energy Policy aims to increase the feasibility of development of and access to a low cost supply of several forms of energy, and also aims to develop conservation technologies and environmentally beneficial methods of using of energy. The policy also stipulates the reduction in the consumption of fuels derived from wood.

The National Land Policy and its Implementation Strategies (approved in 1996) and the Land Law, ensure that the population has access to natural resources and participate in the management of such resources, for their sustainability and socially equitable use;

The National Policy on Forest and Wild Life (adopted in 1997) aims at the management of forest and wild life resources, underlining the need for their sustainable use;

The 1997 Environmental Law provides a tool that guides the integration of environmental aspects into development.

The Action Plan for the Reduction of Extreme Poverty for 2001/2005 (known as PARPA) – represents the GoM's strategic vision for reduction of poverty. This document, which also serves as the Mozambique's Poverty Reduction Strategy Paper (PRSP), is based on the Government Program for the 2000-2004, and the plans, policies and sectoral strategies developed by the government. It targets an overall reduction in absolute poverty levels from 70% in 1997 to 60% in 2005 or less by 2010. The Plan comprises a national multi-sectoral vision of important policies from basically all sectors, inter alia, environment, agriculture, mining, industry, fisheries, tourism and disaster vulnerability reduction.

The 1996 National Environment Programme, which defines the national environment priorities, establishes policies and environmental strategies for environmental management; promotes sector co-ordination; elaboration of a global sustainability concept; and the development of an environmental conscience and culture in Mozambique.

The 1997 Environment Frame Law is a tool that guides national progress by systematically integrating environmental aspects into development. It is also targeted at defining the legal basis for the use and correct management of the environment and for obtaining sustainable development in Mozambique. Within the framework of this law, the National Sustainable Development Council (CNDS) was established as the consultative body on environmental issues in the country at the level of the Council of Ministers.

Legislation on investments in Mozambique regulates aspects linked to investments in the country and stipulates that investment proposals should be followed by evaluation studies on environmental impacts.

Capacity building to help ensure better environmental management and sustainable development is part of a number of sectoral policies.

Although the existing environmental laws in Mozambique have some gaps, a legal reform programme has been introduced in Mozambique to reduce these gaps, and its environmental benefits are being supported by UNEP. MITADER is currently leading the process of elaborating the country's Environmental Strategy for Sustainable Development through a consultative process. The Strategy builds on a discussion of scenarios and links issues to action at local, regional and international level; the National Directorate of Water Affairs is drafting the National Strategy for Water Resource Management, which will consider all aspects for conservation and use.

4.5 Mozambique's National Strategies

This section provides a summary of current national strategies to manage the bio-physical and social environment, to help ensure a sustainable future for Mozambique. These strategies are important for developing a framework for action that builds on current and developing national strategies.

4.5.1 The Strategy and its Action Plan for the Conservation of Biological Diversity (2003-2010)

The Strategy and its Action Plan for the Conservation of Biological Diversity in Mozambique 2003-2010, was designed in order to define implementation mechanisms of the Convention. The strategy continues to be implemented, and the implementation of this strategy is essential to the achievement of REDD + goals. This strategy identifies the challenges and priorities to reduce deforestation and the degradation of flora and fauna and the increase of carbon by introducing constant and flexible monitoring of ecosystem components and systems of the species; diversification of species exploited for production of wood to reduce the pressure in less than a dozen species of a set of more than one hundred; monitoring the use of firewood and charcoal; limitation of uncontrolled fires; promoting the replacement of native and exotic species commercially exploited in order to ensure the maintenance of currently reforested areas and prevent the spread of these; identification of multiple use zones of forest resources and design of integrated management plans, including non-timber forest products; creation of community systems to regulate and control the extraction of forest products timber and non-timber; facilitate the acquisition of inputs (through credit) for family farming; promote the link between the commercial and household sectors in land allocation; promote the development of agro-industries and export of cash crops; improving knowledge about genetically modified organisms and eradicate invasive species and ultimately strengthen the supervision and monitoring of the use of natural resources.

According to the strategy paper, erosion occurs at various locations along the coast of Mozambique particularly affecting the Bay of Maputo, Macaneta, Sofala (Beira) and the Zambezi Delta (Chinde). The main causes identified are associated with inadequate practices of land use including deforestation along the banks of rivers and agricultural practice on the slopes and deficit of sediment in rivers due to the resulting obstruction of the operation of dams.

The Conservation Policy promotes the conservation of biological diversity in at least 16% of the country. However, in general there is competition between socio-economic objectives of the communities living in and around these areas and the maintenance of ecosystems, habitats and species of flora and fauna.

4.5.2 Agriculture and Natural Resources Strategy (2010)

4.5.2.1 Green Revolution Strategy in Mozambique

The Mozambican agricultural sector has the potential for rapid growth, by tapping into the positive experiences of the Green Revolution elsewhere in the world. Mozambique has about 36 million hectares of arable land, of which 3.3 million is irrigated, associated with high agro-ecological potential for a diversity of crops and vast areas of pastureland that are currently under-utilized. After independence, Mozambique began to implement elements of the Green Revolution elsewhere, as reflected in the implementation of the Green Revolution In the period after independence, the country invested in the intensification and modernization of farming and forest production with the use of fertilizers, pesticides, improved seed, artificial insemination and machinery. This intensification was carried through the following actions:

1. Creation of state-owned companies for agricultural and livestock production including CAIA, CAIL, CAPEL, Avícola E.E., Gado de Corte e Leite (Beef of Cattle of meat and Milk), IFLOMA and Mecanagro.);
2. Creation of specialized companies for marketing (Agricom, Gapecom, Hortofrutícola, etc.). A critical element in the future success of the Green Revolution will be the incorporation of the Green Revolution in Government Policy.

The GoM undertook concrete measures to support the agricultural sector. The GoM focused on the country's existing agricultural potential, in order to transform it into a source of wealth, improve the welfare of the population and enhance the socio-economic development of the country.

The Quinquenal Program of the Government (PQG) for period 2005-2009 stimulated the population to increase production and productivity of basic food commodities and also encouraged the introduction of cash crops, to help guarantee food security, as well as production surpluses for exportation. In the scope of the implementation of this Program (PQG), the Cabinet in its 19th session, which included other experts, whose main theme was "Work and Food", took a set of decisions to strengthen the capacity of the producers for production and productivity increases (land, labour force, water for irrigation and other factors), through:

a) Greater focus on the familiar sector, with the involvement of other actors, in the development of the agricultural sector;
b) Promotion of associations;
c) Development of markets for inputs and agricultural commodities;
d) Conservation and sustainable use of natural resources.

In order to help conserve the country's natural resources, the GoM implemented the following:

- Zoning of the potential use of resources – for better management of areas and uses;
- Plantations for energy and conservation uses – protection of dunes and fragile ecosystems;
- Improved technologies for the use of firewood – to improve the use of coal with the production of improved ovens and stoves;
- Development of small- and medium-scale forestry product companies – to reduce exportations and to stimulate reforestation initiatives;
- Control of wildfires – to reduce the extent of uncontrolled wildfires and to improve soils ;
- Mitigation of the conflict man/animal – to develop community farms for wildlife, thus contributing to the reduction in man/animal conflict.

4.5.3 National Adaptation Strategy and Climate Change Mitigation (NASCCM, 2012)

In 2012, the GoM prepared a National Adaptation Strategy and Climate Change Mitigation (NASCCM) for the period 2013-2025. The document was prepared by the Interagency Group on Climate Change (IGCC), which is comprised of different ministries, the private sector and civil society, coordinated by the MITADER. The NASCCM was prepared through stakeholder consultation, community engagement, and extensive research. The document was presented, discussed and reviewed in a joint session of the Councils of the National Technical Council for Sustainable Development (CT-CONDES) and Disaster Management (CTGC) and the Advisory Councils of the Ministries of Public Works and Housing, Planning and Development, Mineral Resources and Agriculture, as well as the sessions of the Provincial Governments.

The NASCCM includes an action plan for 2013-2014, and strategic and priority lines to adopt and implement for 2013-2025. Climate Change (CC), defined as changes in climate (in temperature and precipitation patterns) directly or indirectly attributed to human activities (which alter the overall composition of the atmosphere and increase the greenhouse effect) and that are in addition to the natural variability of climate observed over comparable time periods, are a key factor in the development process and are recognized as the greatest risk to the achievement of development targets, especially for least developed countries. CC manifestations are evident in the increased frequency and intensity of extreme weather events such as droughts, floods, tropical cyclones, changes in temperature and precipitation patterns and other associated phenomena such as rising sea level, salt water intrusion and spread of forest fires. In Mozambique, during the period spanning 2000-2012, these types of phenomena resulted in the loss of thousands of human lives and the destruction of public and private

infrastructure including schools, hospitals, access roads, homes and tourist resorts. These losses resulted in a reduction in the growth of Gross Domestic Product (GDP) and drove the GoM's objectives on reducing poverty and creating national wealth, including those made internationally in the Millennium Development Goals (MDGs).

Since CC can no longer be avoided, and projections indicate that its impact in Mozambique will increase both in frequency and intensity, the NASCCM was prepared to:

- identify key action areas and activities that can be carried out to reduce the severity of impacts through adaptation measures and reduce climate risks; and
- increase opportunities for mitigation and low carbon development to contribute to the reduction of greenhouse gas (GHG) emissions.

The primary objective of the NASCCM is to establish guidelines for action to build resilience, including reducing climate risk, communities and the national economy and promote the development of low carbon and green economy by their integration into the sector planning and local process.

The strategic goals outlined in the NASCCM include:

- Mozambique to become resilient to the impacts of CC, while minimizing climate risks to people and property, restoring and ensuring the rational use and protection of natural capital and built environment.
- Identifying and implementing opportunities to reduce GHG emissions that contribute to the sustainable use of natural resources, access to financial resources and technological resources at affordable prices, and the reduction of pollution and environmental degradation, promoting low-carbon development.
- Building institutional and human capacity, and exploring opportunities for access to technological and financial resources to implement the NASMCC.

The NASCCM identifies several actions to help reduce Mozambique's CC risks, while promoting sustainable environmental practices. Strategic objectives of these actions parallel with the objectives of REDD +, include:

- Increase adaptive capacity of vulnerable people;
- Ensure protection of biodiversity;
- Promote tree planting mechanisms and establishment of forests for local use;
- Mitigation and low carbon development;

- Improve access to renewable energy;
- Increase energy efficiency;
- Develop low-carbon agricultural practices;
- Reduce the rate of deforestation and wildfires; and
- Plan and manage biodiversity and coastal ecosystems

4.5.4 National Strategy for REDD + (2014)

The National Strategy for REDD + postulates that REDD + can be sustained because REDD+ aims to boost the efforts of Mozambique to adhere to the principles of sustainable development of forest resources. The REDD+ National Strategy for Mozambique sets out the following principles:

- Additionality - REDD + activities are in addition to ongoing activities. The compensation due to REDD + activities is complementary to development activities.
- Permanence - Reducing emissions and the increase in carbon stocks due to REDD + activities is long-term.
- Leak control - REDD + activities performed in a region should not result in increased carbon emissions outside this region.
- Monitoring, Reporting and Verification: the measurements of carbon content and emissions should be carried out with precision and accuracy and should be comparable, consistent and complementary to the routine measurements of forest resource assessment.
- Universality of access to goods and services of ecosystems - Ecosystem services, particularly carbon, are a public good. Its use must be in accordance with the rules socially established through the Constitution and national laws.
- Equity in carbon ownership - The right to use the Carbon and compensation from REDD + activities is for all Mozambican citizens, regardless of their origin, gender, religion provided they contribute to the maintenance of environmental services.
- Equitable sharing of costs and benefits - Climate change affecting society without borders. However, the mitigation of this global problem requires a local intervention. The costs incurred by the community due to changing land use practices should be compensated fairly. The identification of beneficiaries and active participants in emissions reduction actions becomes crucial to prevent leakage and encourage participation.

- Participation - All actors as facilitators and beneficiaries are entitled to access the information on the various aspects of reducing deforestation and to be part in the decision-making processes on strategic and practical issues of implementation of REDD +.
- Transparency - The carbon accounting including determining the monetary value must comply with public procedures including the dissemination of reports and openness to external inspection of the entire process.
- The 3E +: the Effectiveness in dealing with the causes of deforestation, degradation and leakage, ensure the increase of carbon and its permanence. The efficiency by prioritizing activities that reduce emissions with low transaction costs. Fairness demonstrated by the fair allocation of funding and benefit sharing, plus the ability to contribute to the achievement of other benefits such as reducing poverty, developing alternative way of life, biodiversity conservation and adaptation to climate change in general.
- Responsibility and accountability - On the one hand, the main users of forest resources and the land and the main consumers of those products should have access to information on the impacts of the use and change of land use in global emissions and on existing alternatives. Armed with this information users and consumers should share responsibility for their actions. The beneficiary communities must demonstrate the relative performance Carbon sequestration to benefit from the credits.
- Mainstreaming and multisectoral - Greenhouse gas emissions from the use and change of land use, particularly deforestation, resulting from agricultural and livestock activities, mining, development of social and economic infrastructure including the establishment of settlements, urbanization, transport lines of electricity and natural gas, among others. Thus the multi-sectoral coordination is conditional upon the success and impact of the strategy to reduce emissions associated with land conversion.

4.5.5 National Rhino and Ivory Action Plan (2014, for implementation 2015-2016)

Standing Committee of CITES (SC) met in Geneva in July 2014, and assessed the implementation status of CITES decisions taken at CoP 16, (Bangkok, 2013) on the rhino and elephant. The SC identified Mozambique as one of eight countries of concern in relation to illegal trade of Rhino and Elephant products, and recommended Mozambique undertake the following actions:

Regarding Elephants: prepare a detailed National Ivory Action Plan and submit it to the CITES Secretariat by 31 October 2014, for review and consideration. The Plan should include key

performance indicators for evaluating the program (e.g., number of poached elephant tusks seized; and penalties applied, among other measures)

Regarding Rhinos: prepare a detailed Rhino National Action Planned and submit it to CITES Secretariat by 31 October 2014, for review and consideration. Mozambique is required to take urgent measures to implement the action plan as soon as it is in place.

In response of these recommendations Mozambique developed a single document that includes the two action plans, called National Rhino and Ivory Action Plan (NIRAP). This document was developed with the assistance of consultants appointed by the CITES Secretariat and with the participation of all Mozambican Government Agencies that are part of the National Task Force for the protection of natural resources.

The key objective of the NIRAP is to step up the existing efforts to control the illegal rhino horn and ivory trade as well as elephant poaching in Mozambique though enhanced cooperation between different Government Agencies, increased cooperation with neighbouring countries and with the support of conservation partners.

4.6 International Guidelines and Performance Standards

This section of this GAP Analysis report is dedicated to a summary of international standards and guidelines for environmental and social best practices, and conventions to which Mozambique is a signatory party.

4.6.1 The Equator Principles

The Equator Principles are based on the International Finance Corporation (IFC) Performance Standards on social and environmental sustainability, and on the World Bank Group's Environmental, Health and Safety general guidelines. The Equator Principles recognize that the Social and Environmental Assessment process provides the opportunity to determine the social and environmental impacts and risks of a proposed project in its area of influence. Aspects considered include labour, health, safety, and environmental, social and cultural impacts. The Equator Principles stipulate that compliance will be an adequate, accurate and objective evaluation and presentation of the issues, whether prepared by the borrower, consultants or external experts. Further, depending on the nature and scale of the project, the assessment document may comprise a full-scale social and environmental impact assessment, a limited or focused environmental or social assessment (e.g. audit), or straight-forward application of environmental siting, pollution standards, design criteria, or construction standards. One or more specialised studies may also need to be undertaken.

4.6.2 World Bank Performance Standards 1-8

The World Bank's environmental and social safeguard policies are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects.

World Bank Performance Standards for conducting environmental, social impact assessments provide guidelines that help protect the natural, social, and cultural environment as well as help ensure the health and safety of workers and members of the community. World Bank Performance Standards on Social and Environmental Sustainability include:

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS 2: Labour and Working Conditions

PS 3: Resource Efficiency and Pollution Prevention

PS 4: Community Health, Safety, and Security

PS 5: Land Acquisition and Involuntary Resettlement

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

PS 7: Indigenous Peoples

PS 8: Cultural Heritage

Performance Standard 1 establishes the importance of: (i) integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of social and environmental performance throughout the life of the project.

Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. The goals of this performance standard are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labour.

Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. The goals of this performance standard are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. The goals of this performance standard are:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land

use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail. The goals of this performance standard are:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
- To improve, or restore, the livelihoods and standards of living of displaced persons.
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.”

Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services. Ecosystem services valued by humans are often underpinned by biodiversity. Impacts on biodiversity can therefore often adversely affect the delivery of ecosystem services. This Performance Standard addresses how clients can

sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle. The goals of this performance standard are:

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices which integrate conservation needs and development priorities.

Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases. The goals of this performance standard are:

- To ensure that the development process fosters full respect for human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity. The goals of this performance standard are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

4.7 International Conventions and Treaties

Mozambique is party or signatory to several international conventions and treaties. As party or signatory to these international treaties and conventions, the GoM has made a commitment to strive to achieve the goals and objectives of the international community to:

- protect the bio-physical and socio-cultural environment;
- achieve sustainable development; and
- protect human health and welfare.

The conventions and treaties signed by the GoM which are most applicable to the SESA as they pertain to the protection of the biophysical and social environment are summarized below.

4.7.1 Ramsar Convention on Wetlands, 1971

The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Negotiated through the 1960s by countries and non-governmental organizations that were concerned at the increasing loss and degradation of wetland habitat for migratory waterbirds, the treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. It is the only global environmental treaty that deals with a particular ecosystem, and the Convention's member countries cover all geographic regions of the planet.

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". The Convention uses a broad definition of the types of wetlands covered in its mission, including lakes and rivers, swamps and marshes, wet

grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans. Mozambique only recently joined this convention, but in so doing has made a commitment to attempt to implement best practices management of its wetlands.

Mozambique became a party to the convention on 3 December 2009.

4.7.2 World Heritage Convention concerning the Protection of the World Cultural and Natural Heritage, 1972

The World Heritage Convention (WHC) sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. By signing the Convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. Mozambique ratified the WHC on 27 November 1982. Mozambique has one listed World Heritage site, the fortified city of Mozambique, and four sites on the tentative list. Information on Mozambique's listed and tentative World Heritage Sites is provided in the Social baseline section of this report.

4.7.3 International Convention on International Trade in Endangered Species (CITES, 1979)

The International Convention on International Trade in Endangered Species (CITES) is a multilateral treaty to protect endangered plants and animals. It was drafted as a result of a resolution adopted in 1963 at a meeting of members of the International Union for Conservation of Nature (IUCN). The convention was opened for signature in 1973, and CITES entered into force on 1 July 1975. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 34,000 species of animals and plants.

Species of plants and animals found in Mozambique that are listed in Appendix I, II or III of the Convention shall be identified in the baseline biodiversity study conducted for the Environmental Assessment conducted for the REDD+ Project.

4.7.4 The Bonn Convention on Migratory Species of Wild Animals, 1983

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, aquatic and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown

steadily to include 119 (as of 1 April 2013) Parties from Africa, Central and South America, Asia, Europe and Oceania.

Mozambique became a party to the convention in 2009.

4.7.5 Agreement on the Action Plan for the Environmentally Sound Management of the Common Zambezi River System, 1987

The Governments of the Republic of Botswana, the People's Republic of Mozambique, the United Republic of Tanzania, the Republic of Zambia, and the Republic of Zimbabwe, are Parties to this Agreement. This Agreement stems from the United Nations Conference on the Human Environment, the Mar del Plata Action Plan on Water Development and Administration, and the Resolution 1/1 of the first session of the African Ministerial Conference on the Environment. A key objective of the Agreement is to develop regional co-operation in the spirit of the Lagos Plan of Action and the Southern African Development Co-ordination Conference (SADCC), on environmentally sound water resources management of the common Zambezi river system and to strengthen their regional co-operation for sustainable development. As a member country of the agreement, Mozambique has made a commitment to environmentally sound management of the Zambezi River, its tributaries and the aquifers that flow to the Zambezi River.

4.7.6 United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, 1992 (amended 1997)

The Kyoto Protocol (1997) is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC, 1992), and binds countries that have ratified the protocol to reduce and ultimately cap their greenhouse gas emissions (GHGs). The major distinction between the Protocol and the Convention is that while the Convention encouraged industrialised countries to stabilize GHG emissions, the Protocol commits them to do so. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of “common but differentiated responsibilities.” The Convention was opened for signature in 1992 and the Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. The detailed rules for the implementation of the Kyoto Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the “Marrakesh Accords.”

In 2009, the Conference of Parties (COP) met to review and agree to the Copenhagen Accord, which presses the urgency of combating climate change to help ensure global temperatures do

not rise beyond 2 degrees Celsius. The ultimate objective of the Convention is to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, and on the basis of equity and in the context of sustainable development, enhance long-term cooperative action to combat climate change. The Convention stipulates a need to cooperate in achieving the peaking of global and national emissions as soon as possible, recognizing that the time frame for peaking will be longer in developing countries and bearing in mind that social and economic development and poverty eradication are the first and overriding priorities of developing countries and that a low-emission development strategy is indispensable to sustainable development.

Mozambique signed the UNFCCC on 3 November 1992, and ratified the Kyoto Protocol on 18 January 2005, and entered the protocol into force on 18 April 2005. Mozambique agreed to the Copenhagen Accord on 10 April 2010, and on 13 April 2010 agreed to Decision 23/CP 18, which Promotes gender balance and improves the participation of women in UNFCCC negotiations and in the representation of Parties in bodies established pursuant to the Convention or the Kyoto Protocol. Mozambique's was the first national strategy to pull together aspects of various climate change plans and programs, and provide an opportunity for cross-sectoral engagement on gender and climate change.

Although Mozambique has signed the UNFCCC, ratified the Kyoto Protocol and agreed to the Copenhagen Convention, as a developing country no binding targets to reduce GHGs have been established. However, the country has indicated its commitment to reducing GHGs.

4.7.7 International Convention on Biological Diversity, 1993

The Convention on Biological Diversity (CBD), entered into force on 29 December 1993, has 3 main objectives:

- The conservation of biological diversity;
- The sustainable use of the components of biological diversity; and
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

At present, the Convention has 42 Articles and 3 Annexes, and although all of these direct the actions of Contracting Parties, Article 6 has the most direct relevance to the SESA, and is summarised. Under Article 6 of the Convention each Contracting Party shall, in accordance with its particular conditions and capabilities:

Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned; and

Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

Mozambique signed the CBD on 12 June 1992 and ratified the convention on 25 August 1995.

4.7.8 United Nations Convention to Combat Desertification (UNCCD), 1994

The United Nations Convention to Combat Desertification (UNCCD) was adopted in June 1994 and entered into force on 26 December 1996. The objective of this Convention is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas. Achieving this objective will involve long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level. The primary goals of the UNCCD are to reduce the impact of drought and desertification on human quality of life, reduction of biodiversity, and climate change feedback mechanisms.

Mozambique ratified the UNCCD on 13 March 1997.

4.7.9 The Convention for the Safeguarding of the Intangible Cultural Heritage, 2003

The Convention for the Safeguarding of the Intangible Cultural Heritage is a UNESCO treaty adopted by the UNESCO General Conference on 17 October 2003. Intangible cultural heritage refers to "traditions or living expressions inherited from our ancestors and passed on to our descendants, such as oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts" At the national level, State Parties are supposed to ‘take necessary measures to ensure the safeguarding of the intangible cultural heritage present in its territory.” These measures include identification of the intangible cultural heritage that exists in its territory, adoption of appropriate policies, promotion of education, etcetera. Each state party must also “endeavor to ensure the widest possible participation of communities, groups, and, where

appropriate, individuals that create, maintain and transmit such heritage, and to involve them actively in its management".

Mozambique ratified the convention on 18 October 2007.

4.8 GAPS in Mozambique's National Laws and Legislation Relative to International Best Practices

This GAP analysis is based on a review of existing laws and legislation in Mozambique relative to international best practices, and conventions to which Mozambique is a signatory party. The table below presents an analysis of how Mozambique's laws and legislation meet the goals of international guidelines and conventions. It is clear on a review of this table, that Mozambique has laws and legislation in place that largely meet the goals and objectives of international guidelines and conventions. However, a review of GoM and World Bank literature suggests that several GAPs exist between existing laws and legislation and their successful implementation. The following section presents a summary of these GAPs, based on existing publications.

4.8.1 Ramsar Convention, BONN convention, SADC Managing Zambezi River – Current Gaps

4.8.1.1 Positive Actions

To address the objectives of the Ramsar Convention, Bonn Convention and SADC plans for managing the Zambezi River, the GoM drafted: 1) the Mozambique National Inventory; 2) the Marromeu Management Plan (a Ramsar Site); and 3) the Lake Niassa Management Plan (a Ramsar Site). Additionally, the GoM is working towards including the Zambezi Delta North Bank in the Ramsar List, and adding the Zambezi Delta South Bank boundary. The GoM is also working towards having more provinces celebrate international wetland day.

4.8.1.2 Current Gaps

There is a lack of funding to conduct systematic surveys of migratory species within the Ramsar site of the Zambezi Delta Wetland, and Lake Niassa, a Mozambique wetland of international importance. There is also a lack of funding to survey some protected areas such as the Bazaruto, Limpopo, Zinave, Banhine and Quirimbas National Parks and Niassa, Marromeu, Maputo, Ponta de Ouro National Reserves. An additional gap is the limited involvement of institutions and private sector stakeholders in Ramsar Convention programs. Further, there is a lack of financing available for advertising activities and holding events, such

as International Wetlands Day. In general, there is limited general knowledge about the Ramsar Convention in Mozambique, and wetlands need more publicity and support.

4.8.1.3 Recommendations

The first recommendation is to have the National Strategy Plan and Policy to enhance protection of wetlands approved, and the second is to find financial support to disseminate and implement the Marromeu and Lake Niassa management plans, including stakeholder/government coordination and joint forces to implement the recommendations from the plans. Additional recommendations include: 1) involving communities and private sector in wetlands management; 2) seeking international funding to undertake wildlife surveys on waterfowl and migratory species, and to continue monitoring waterfowl species and their habitat for protection and conservation; 3) disseminate the convention among the Government, Non-Government and other stakeholders who are interested in the implementation of wetland convention program; and 4) elaborate on the Wetland National Policy and Strategic Plan.

4.8.2 CITES - Current Gaps

4.8.2.1 Positive Actions

In order to address the objectives of CITES, the GoM drafted the national rhino and elephant action plan (2015-2025).

4.8.2.2 Current Gaps

In July 2014, the South African Department of Environmental Affairs announced that 514 rhinos had been illegally killed in the first half of the year in South Africa. The majority of these incidents (321) occurred in Kruger National Park, which is adjacent to Mozambique and are believed to involve Mozambican nationals. Meanwhile, figures in Mozambique indicate that the country lost more than 2 500 elephants between 2009 and 2012, most of them poached inside the protected areas of Niassa and Cabo Delgado. Recent data indicate that about three elephants are killed every day in these two provinces. High poaching activity is also being reported in Limpopo National Park and Tchuma Tchato area in Tete Province.

4.8.2.3 Recommendations

To avoid CITES trade sanctions, Mozambique must amend its legislation and make the illegal killing of elephants and rhino and possession of ivory and rhino horn criminal offences with significant judicial penalties. The country also needs stronger law enforcement actions to control the illicit movement of wildlife products in the country and at its borders.

It is further recommended that Mozambique urgently implement the national rhino and elephant action plan.

4.8.3 Convention on Biological Diversity - Current Gaps

4.8.3.1 Positive Actions

In order to address the objectives of **t**he Convention on Biological Diversity, the GoM developed the Strategy and its Action Plan for the Conservation of Biological Diversity in Mozambique (2003-2010). The strategy introduced several measures aimed at preservation in-situ and ex-situ of species, habitats and ecosystems and was designed to define implementation mechanisms of the Convention. The Conservation Policy promotes the conservation of biological diversity in at least 16% of the country. To further protect natural resources and biodiversity, the GoM also developed the Agriculture and Natural Resources Strategy (2010).

4.8.3.2 Current Gaps

In general there is competition between the socio-economic objectives of communities living in and around forest, coastal and wetland areas and the management and preservation of ecosystems, habitats and species of flora and fauna.

4.8.3.3 Recommendations

In order to maintain biological diversity in Mozambique, viable and sustainable economic opportunities need to be identified and developed for communities that currently rely on forest, coastal or wetland resources that are designated for preservation.

4.8.4 UNFCCC and UNCCD – Current Gaps

4.8.4.1 Positive Actions

In order to address the objectives of the UNFCCC and UNCCD the GoM drafted the National Strategy on Climate Change Adaptation and Mitigation (2012) and the National Strategy for REDD+ (2014). In addition to these strategies, the GoM previously developed the Agriculture and Natural Resources Strategy (2010) to reduce issues of deforestation and desertification in the country.

4.8.4.2 Current Gaps and Recommendations

Monitoring and reporting mechanisms are needed to determine whether the Agriculture and Natural Resources Strategy (2010) and National Strategy on Climate Change Adaptation and Mitigation (2012) have begun to be successfully implemented. The National Strategy for REDD+ (2014) is so new there has not been any opportunities to yet evaluate the success of this program.

4.8.5 Summary of Observed Gaps in Mozambique Laws and Legislation

As noted, Mozambique has passed laws and legislation and developed comprehensive strategies to protect and enhance the country's bio-physical and socio-economic environment. The table below illustrates (with an x) that one or more of Mozambique's laws, legislation or strategies address the objectives of the international guidelines, standards and conventions summarised in this report. The results of the review of Mozambique's laws, legislation and strategies relative to international guidelines, standards and conventions indicates that successful implementation is limited by lack of funding and capacity. Further, the successful management and preservation of ecosystems and species is closely tied to providing communities who rely on these systems/species for procurement of subsistence resources, or for commercial sales, with an alternative means of economic and food security. While financing from international institutions may contribute to the development of alternative systems of economic and food security, these systems must be developed in close collaboration with the communities in order to ensure they are socially and culturally acceptable, and are thus sustainable.

Strategies and programs designed to reduce deforestation and desertification and to enhance Mozambique's international role mitigating the impact of climate change are relatively new and it is difficult to determine whether these programs have thus far been successful. Monitoring programs that are currently in place and actively being developed will help determine the success of these programs in coming years.

Table 7 Mozambique Laws and Legislation Relative to International Guidelines and Conventions

Mozambique Legislation	International Conventions.									WB and IFC Performance Standards							
	Ramsar Convention, 1971	CITES, 1979	Bonn Convention	Convention on Biodiversity	UNFCCC	UNCCD	World Heritage Convention, 1972	UNESCO IHC, 2003	SADC Managing Zambezi River	1	2	3	4	5	6	7	8
Mozambique's Constitution (1990)	x		x	x	x	x			x	x		x	x		x		x
Protection of Cultural Heritage (Law No. 10/88)							x	x		x							x
Burial Regulations (Decree No. 42/90)							x	x		x				x			x
Land Law (No. 19/97)							x	x		x				x			x
Environment Law (1997)	x		x	x	x	x			x	x		x	x		x		
Forest Law and Wildlife Law (Law No. 10/99)				x	x	x	x	x	x	x		x		x	x		x
Tourism Law (Law nr. 4/2004)							x	x		x	x				x		
Territorial Planning Law (17/2007)										x				x			
Law on Spatial Planning (2007)										x				x			
New Labour Law (2007)										x	x						
Biodiversity Cons. Strategy (2003-2010)	x	x	x	x	x	x			x	x		x		x	x		
Agriculture & Natural Resources Strategy (2010)				x		x				x					x		
Transportation Legislation (2011)										x							
New Mining Law (14/2002, and 20/2014)										x		x		x	x		
National Adap. Strat. CC Mitigation (2013-2025)	x		x	x	x	x				x		x			x		
National Rhino & Elephant Action Plan (2015-2016)		x		x					x	x					x		

National Strategy for REDD+ (2014)				x	x	x				x					x		
Protection, Conservation and Sustainable use of Biological Diversity (Law no. 16/2014)		x		x	x	x			x	x					x		

Acronyms:

RC- Ramsey Convention, 1972; **CT**- CITES 1979; **BC**- Bonn Convention; **CB**- Convention on Biodiversity; **UNFCCC**- Kyoto Protocol; UNFCCD- UN Convention to Combat Desertification; C1972- **1**- Assessment and Management of Environmental and Social Risks and Impacts; **2**- Labor and Working Conditions; **3**- Resource Efficiency and Pollution Prevention; **4**- Community Health, Safety, and Security; **5**- Land Acquisition and Involuntary Resettlement; **6**- Biodiversity Conservation and Sustainable Management of Living Natural Resources; **7**- Indigenous Peoples; **8**: Cultural Heritage. IFC Performance Standards

4.9 Institutional Framework

This section presents relevant institutions for implementation of REDD+ in Mozambique. Much of the information provided under this section derives from the study report on "Análise do Quadro Legal e Institucional para a Implementação do REDD+" or "The Institutional and Legal Framework for the implementation of REDD+". This study is an integral part of REDD+ strategy development. For the case of this SESA report we limit the description of relevant institutional framework based on the REDD+ strategy options.

4.9.1 Government institutions relevant for REDD+

4.9.1.1 Mozambique's Environmental Regulatory Body: Ministry of Land, Environment and Rural Development (MITADER) formerly Ministry For Coordination Of Environmental Affairs (MICOA)

Recognition of the importance of the environment to Mozambique officially commenced with the establishment of the Environmental Management Unit in 1982, at the Physical Planning Institute. In 1991, the Unit was transformed into the Environment Division, which on July 3rd 1992 became the National Environment Commission (CNA). CNA exhibited Mozambique's interest in the environment at the UN Conference on Environment and Development in July 1992 in Rio de Janeiro, Brazil. CNA established the basis for the Republic of Mozambique's Constitution in December 1994. They also established the Ministry for the Co-ordination of Environment (MICOA), the body responsible for the implementation of the UN Convention on Climate Change in Mozambique. MICOA emerged as a way of promoting a larger and more efficient co-ordination of all activity sectors as well as encouraging appropriate planning and use of the country's natural resources. MICOA also served as a tool to facilitate the postulates in Articles 37 and 72 of the Republic's Constitution. MICOA was also a product of the Constitution for a Multiparty State, coming into being after the 1994 democratic elections. The basis for MICOA was founded on the development policy enshrined in sustainability principles.

In 1995, Mozambique adopted a National Environmental Management Programme (NEMP) comprised of a National Environmental Policy, an Environmental Framework Law, and an Environmental Strategy. MITADER has the mandate to co-ordinate, supervise and monitor environmental management. The Environmental Law gives more precision on the role and powers of this government institution, with a little more emphasis on the management of natural resources.

In terms of natural resources management, MITADER has two directorates, namely the National Directorate for Natural Resources Management and the Directorate of Territorial Planning, with the latter also being linked to integrated land use planning. The National Directorate for Natural Resources Management oversees environmental impact assessment studies and monitors environmental sustainability. The Directorate of Planning manages the coastal strip and urban zones, sets standards for planning at district levels and promotes integrated development plans for regional, provincial and district levels. The responsibility could well overlap with other institutions, such as the Regional Planning Directorate of the Institute of Rural Development (INDER) and the National Institute of Physical Planning (INPF).

Table 8 MITADER responsibilities

Areas of responsibility relevant for REDD	Description of tasks
Land management	• Ensuring the development, implementation and supervision of territorial planning instruments • Establish and implement policies and procedures for administration, supervision and monitoring the use and enjoyment of land • Regular and coordinate engineering activities geomatics and related fields • Develop, manage, update and disseminate geo-cartographic information and standards • Develop policies, legislation and standards for the actions of land, geomatics and land use planning • Develop a sustainable national land registration and information system • on land including the rights of occupation in good faith and communal lands
Forest management	• Propose the approval of legislation, policies and development strategies in the area of forests • Establish standards for licensing, management, protection, conservation, supervision and monitoring of sustainable use of forest resources • Develop and implement policies and procedures on the use and sustainable management of forest resources • Assess quantitative and qualitative forest resources and the reduction of • emissions from deforestation and forest degradation • Establish measures of prevention and control of uncontrolled fires; Ensuring sustainable use of woody biomass • To promote the rational use of secondary forest species and non timber forest products • To promote the processing of forest resources and ensuring the use of • appropriate technologies • Promoting community participation in sustainable management of forest resources
Environment	• Propose policies and legislation and standards for preservation actions of environmental quality • Establish and implement policies and procedures for environmental licensing of development projects • Participate in establishing standards and procedures for the management, protection, conservation, supervision and monitoring of

	the use of natural resources • Promote the adoption of integration policies of the green economy, biodiversity and of climate change in sectoral programs • Establish degradation prevention and control measures of environmental quality • Define and implement education strategies, awareness and environmental disclosure • Promote appropriate management initiatives of solid waste and effluents • To promote the integrated and sustainable management of the rural environment, urban and marine-coastal • Promote initiatives for prevention, control and recovery of degraded soils Ensure participation of local communities in co-management of natural resources and ecosystems • Ensure the effective implementation of bilateral and multilateral agreements to respond to industry challenges
Rural development	• Propose policies and rural development strategies that are integrated and sustainable • Ensure inter-sectoral coordination and sustainable use of resources • Promote community participation and empowerment of associations in local economic development processes • Strengthen the local economic actors to contribute in the sustainable exploitation of natural resources and in boosting the local economy • Develop actions for the expansion of financial services to rural areas • Set priorities for the implementation of economic and social infrastructure in rural areas • Projecting the establishment of economic and social infrastructure in rural areas • Promote and manage the implementation of socio-economic development of centrality in rural areas • Implement strategic actions knowledge management and disseminate good • practices in rural development
Conservation and wildlife management	• Develop or update policies and procedures on the sustainable management of wildlife resources • Ensure the licensing, management, protection, conservation, supervision and monitoring of the use of wildlife resources • To assess quantitatively and qualitatively the wildlife resources • To propose the establishment of conservation areas • Establish and implement policies and procedures for licensing, management and operation of the national protected areas network • Develop actions to combat illegal exploitation and marketing resources • wildlife • To administer the national parks and reserves and conservancies and other conservation areas • Establish slaughter shares, capture and collect eggs of species of wildlife • To approve management plans of protected areas • Ensure the protection, conservation and wildlife recovery of endangered species and endangered species and fragile ecosystems • Ensure the management of the human-wildlife conflict • Promote local industry processing wildlife products

Source: Beta Nemus study “The Institutional and Legal Framework for the implementation of REDD+”, 2015; Decree n.º 13/2015, 16 March

4.9.1.2 Ministry of Agriculture and Food Security- MASA

The responsibilities under the MASA are outlined in the Presidential Decree 15/2015 of 25th March. These responsibilities include formulation, implementation, monitoring and evaluation of projects, programs and policies in the field of hydraulic agricultural, agriculture, livestock, agroforestry plantations and food security. Except the first one, the remaining areas of responsibility of MASA appear to be important for the REDD+ program. The table below summarizes specific tasks of MASA under each area of important responsibility for REDD+.

Table 9 MASA responsibilities for REDD+

Relevant areas of performance for REDD+	Specific task
Agro-forest plantations	• Propose legal and institutional framework appropriate for development of agro-forest plantations; • Implement sector policies, plans, programs and strategies; • Propose and establish operational norms for agro-forest projects; • Ensure development of agro-forest planation for conservation, energetic, commercial and industrial purposes; • Promote research activities and ensure dissemination of results • Promote local/internal processing of agro-forest products.
Agriculture	• Propose policy framework for agrarian development in Mozambique; • Establishing norms for sector licensing, monitoring of activities; • Ensure quality and phytosanitary measures in the sector; • Promote research activities and ensure dissemination of results • Promote extension services and ensure these services are rendered to farmers; • Provide capacity building to farmers; • Promote development of infrastructures relevant for the sector; • Manage sector related information.
Food security	• Promote food security related legal framework, strategies, policies and plans; • Promote cooking best-practices to ensure food security; • Manage food security related information; • Promote information access on food conservation and processing; • Promote food security education of communities to ensure nutrition; • Ensure inter-institutional coordination in food security policy formulation, implementation, monitoring and evaluation.

Source: Beta Nemus study "The Institutional and Legal Framework for the implementation of REDD+", 2015

4.9.1.3 Ministry of Economy and Finance

The Ministry of Economy and Finance (MEF) is responsible for the planning of all activities related to rural development in the country. The recently created National Directorate for Rural Development Promotion (DNPDR) responds for the implementation of Mozambique's Rural Development Strategy (EDR). Thus, MEF has the mandate to implement integral rural development projects including activities within irrigated agriculture domain. The MEF also coordinates the National Institute of Statistics (INE), the Investment Promotion Centre (CPI) and the Cabinet of Accelerated Economic Development Areas (GAZEDA) 3, which contributes for the planning process and interventions for the rural development, including the agricultural sector. Recently, the Cabinet for Development of the Zambezi Valley (GPZ) was officially closed and a new entity was created, the Zambezi Valley Development Agency (Zambezi Agency). This Agency aims to promote the development of the Zambezi valley through integrated and horizontal planning approach, directing the implementation process involving local government by providing technical and financial assistance to initiatives of economic and social development.

The participation of the MEF in the REDD+ program is associated with its role and responsibilities in budgeting and making available public funds for overall development in the country. MITADER, under which the REDD+ program is administered, has a close relationship with MEF on matters of planning and financial resources allocation. Therefore, MEF is expected to play a leading role in the implementation of the REDD+ program.

4.9.1.4 Environment Fund (FUNAB)

The responsibility of FUNAB includes among others:

(i) financial assistance to companies involved in the production, dissemination and distribution of different forms of energy conservation;
(ii) funding of equipment acquisition used in the renewable energy sector;
(iii) promote development and forest plantation for production of biomass;
(iv) finance studies and inventories relating to energy resources and its utilization.

4.9.1.5 Local governments

Districts are the main organizational and functional unit of local government and the foundation for economic, social and cultural development and planning in Mozambique. Its weight on the country's development has been strongly reinforced in the last years through the Decentralized Finance and Planning Program (PPFD) and financial boost for interventions conferred by the enforcement of the Local Initiative Investment Budget (OIIL). Through the enforcement of adequate mechanisms for the use of resources directly allocated to districts, agricultural activity in general and irrigation in particular is gaining more support.

4.9.1.6 The role of communities

Since late 1990s the GoM embarked on a process of policy reform aimed to decentralize the management of forest resources. The Community Based-Natural Resource Management (CBNRM) became the new paradigm within the debate of natural resources and beyond. The community participation and rights in natural resources management were recognized and enacted as laws. The policy and legal instruments relevant for community participation in forest management include - Policy and Strategy for Development of Forestry and Wildlife (1997); Environmental Law (1997); Land Law (1997); Forestry and Wildlife Program (1998); Land Law Regulations (1998); Forestry and Wildlife Law (1999); Technical Appendix to the Law (1999); Decree 15/2000 on articulation between local government and local communities (2000); and Forestry and Wildlife Regulations (2002).

The rationale behind this legal framework is that CBNRM has the potential not only to promote community participation in resource management but also generate community livelihood and promote rural development under the broader umbrella of poverty alleviation. However, CBNRM remains questionable and has not delivered on most of its promises. Communities do not effectively take part in natural resource management. Local governments continue to exert power on the communities over the course and future of natural resources management at local level. Many believe progress on policy framework improvement alone is insufficient to impel communities in natural resource management. Aspects of community capacity building support, education programs, awareness raising and confidence building around issues of natural resource management is seen as a central and complementary part to effective promotion of CBNRM (Salomão, 2006).

A review of a range of projects undertaken in the late 1990s and the following decade suggest most natural resource projects based on community approach have not delivered on desired outcomes. Incomplete process of consultation and exchange with communities are seen as the central issues leading to unsuccessful outcomes. Moreover, contracts between communities forest operators (government or private operator) are not enforced and in most instances are breached and do not create the necessary incentive for either party to fully engage.

4.9.1.7 Private sector and NGO involvement

The extent of NGO and private sector involvement is currently not fully known in Mozambique, however the Institute of Environment and Development (IIED) is currently engaged in a study to document various private sector initiatives in Tanzania, Democratic Republic of Congo and Mozambique (IIED website). Aside from the Envirotrade and MICAIA initiatives mentioned previously, the IIED Testing REDD program also has been testing various aspects of REDD+ around Mozambique and so supporting some REDD+ initiatives.

4.10 Summary of Institutional Gaps

The main observation is that at present REDD+ is primarily confined to the national level, which will constrain the feasibility of implementing REDD on the ground. Aside from absence of proper implementation structures, there is a lack of human capacity and resources at local level to successfully implement REDD+. Positions need to be developed at the provincial level for staff trained in REDD+. At the time of this study, the structure is an inverted pyramid with skilled contractors and government employees at the national level but no REDD+ trained employees at the provincial or local level.

The institutional framework study conducted for the SESA identified coordination, training, legal requirements, private sector and community participation as major challenges facing REDD+ implementation in Mozambique. Regarding coordination, there are structures that can be used for the coordination of REDD+ activities from the district level (District Advisory Board) to the Council of Ministers through the Provincial Councils, CONDES, etc., but there are currently no procedures in place for effectively directing the flow of information from national to local level and vice versa. Procedures need to be put in place to direct the flow of information within and between levels of government and the councils responsible for REDD+ implementation so that issues that need to be addressed at different levels of government can be achieved

appropriately. Additionally, in order to help ensure consistency in REDD+ program implementation, consistent use of technicians to cover both forest related and environmental issues at the provincial level should be considered.

With the recent changes in government ministries, mapping by responsible agencies in the country including CENACARTA will now be under the same ministry responsible for land use data, as well as land use planning, environmental impact assessment and resettlement (MITADER). It would be helpful to initiate a review of these sectors and begin to assimilate data to produce a common data base which is more comprehensive than the existing database. As REDD+ data (including collected from the Monitoring, Reporting, Validation (MRV) process) is collected it should be undertaken with consideration of consistency in recording and collection procedures, database structure and management, and to the integration of a new, more comprehensive system of cartography.

At the time of writing this SESA, MITADER is actively undergoing restructuring in the areas related to REDD+. The program was formerly overseen by the two ministries of environment and agriculture, and at present there is a tremendous need to define responsibilities within MITADER to:

- Better ensure adequate dissemination of information pertaining to REDD+ within and between all levels of MITADER;
- Help reduce the potential for redundancy in the work performed by different staff; and
- Ensure that staff is adequately trained to implement approved REDD+ procedures.

Similar actions are needed at the provincial level to avoid duplication of resources and personnel. There is also a need to identify the sectors that will routinely monitor REDD+ activities, and to strengthen existing structures where similar activities were already taking place. At present, mandatory training of the provincial and local level technical staff that work with the national officers is not required. A training plan should be developed and implemented to ensure adequate transfer of knowledge to these technicians as they will ultimately be responsible for REDD+ activities at the provincial and local level.

It is necessary to prepare a Directive, based on an approved REDD+ strategy that defines the structure and functioning of UT-REDD for the national, provincial and local levels and fits within the framework of the newly defined organizational structure of MITADER.

There is also an issue of poor governance. In many instances, when politicians have a vested interest in an illegal activity that may harm the bio-physical or social environment the law is not applied as it is designed because he/she can manipulate the system. An anti-corruption campaign and adherence to anti-corruption are needed for successful implementation of REDD+ as law enforcement is found weak

It was observed that private sector involvement in REDD+ initiatives, especially at the national level, is poor. We equally observed very limited knowledge among community members about the REDD+ program. This lack of early engagement has the potential to affect the design and implementation of REDD+ in Mozambique especially on matters such as rights of communities and incentives (fiscal or non-fiscal) for private sector participation.

5 Environmental Baseline

5.1 Physiography

The Republic of Mozambique is situated between 10° 27' and 27° 00'S latitude and 30° 12' and 40° 51'E longitude as shown in Figure 4 below. It is bounded on one side by the Channel of Mozambique for a length of 1,965 km and on the land side by six countries, from south to north: South Africa, Swaziland, Zimbabwe, Zambia, Malawi and Tanzania. The greatest width is about 1,130 km and the total area is 799,380 km^2.

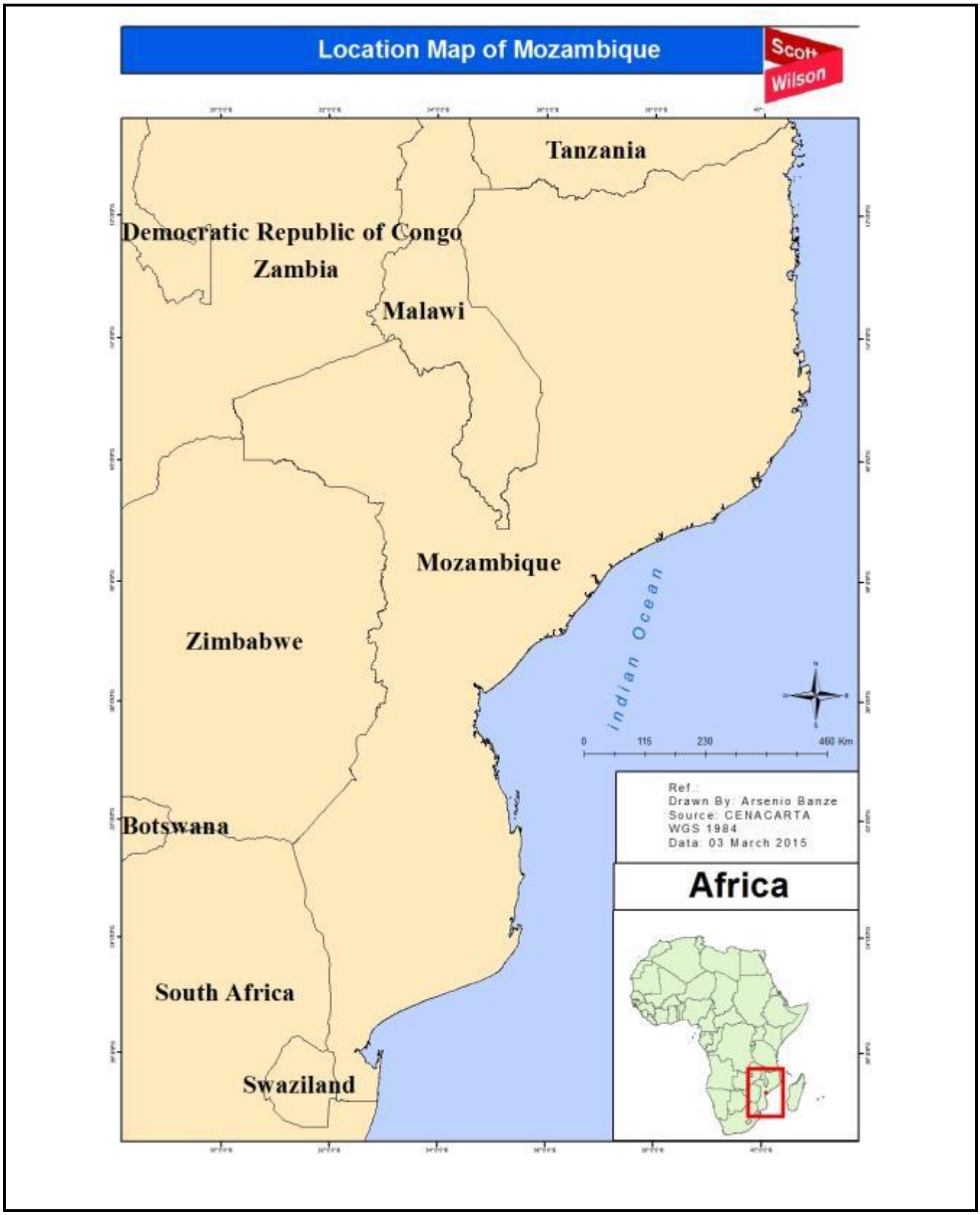


Figure 4 Location of Mozambique within Southern Africa

Although the northern area of Mozambique has undulating terrain ranging from 500 to 2,701 m, about 94% of the country is below 1000 m altitude, and south of the Save River, roughly 90% of the terrain is below 200 m as shown in Figure 5. Approximately 40% of the area in Cabo Delgado and Zambézia Provinces and 60% of the area in Manica and Sofala Provinces are also below 200 m altitude. The zone of 200-500 m altitude, which is more or less undulating, occurs mainly over northern parts of the country. Altitudes of 500-1000 m occupy only 25% of the country with the largest proportion occurring in the north.

A mountain chain forms the eastern escarpment of the continental plateau, and in Mozambique it descends abruptly to the plains in some locations, and in others, as in the lower Zambezi district, slopes gradually to the coast. The Lebombo Mountains, behind Delagoa Bay, nowhere exceed 631 m in height; the Manica Plateau, farther north, is higher. Mt Doe rises to 2,400 m and Mt Panga to 2,320 m. The Gorongoza massif with Mt Miranga 1,996 m, Enhatete, 1,844 m, and Gogogo,1,798 m lies north-east of the Manica plateau, and is, like it, of granitic formation.

The chief mountain range lies north of the Zambezi, and east of Lake Chilwa, namely, the Namuli Mountains, in which Namuli Peak rises to 2,701 m, and Molisani, Mruli and Mresi attain altitudes of 1,981 to 2,438 m. These mountains are covered with magnificent forests. Farther north the river basins are divided by well-marked ranges with heights of 914 m and over. Near the south-east shore of Lake Malawi there is a high range (1,524 to 1,829 m) with an abrupt descent to the lake - 914 m in 9.7 km. The plateau lands west of the escarpment are of moderate elevation - averaging 610 to 762 m. It is only along the Zambezi and north of that river that Mozambique's territory reaches to the continental plateau. This northern plain has been categorized by the WWF as part of the Eastern Miombo woodlands ecoregion (see section 5.6).

Source: http://www.mapsofworld.com/mozambique/maps/mozambique-physical-map.jpg

Figure 5 Physiography of Mozambique

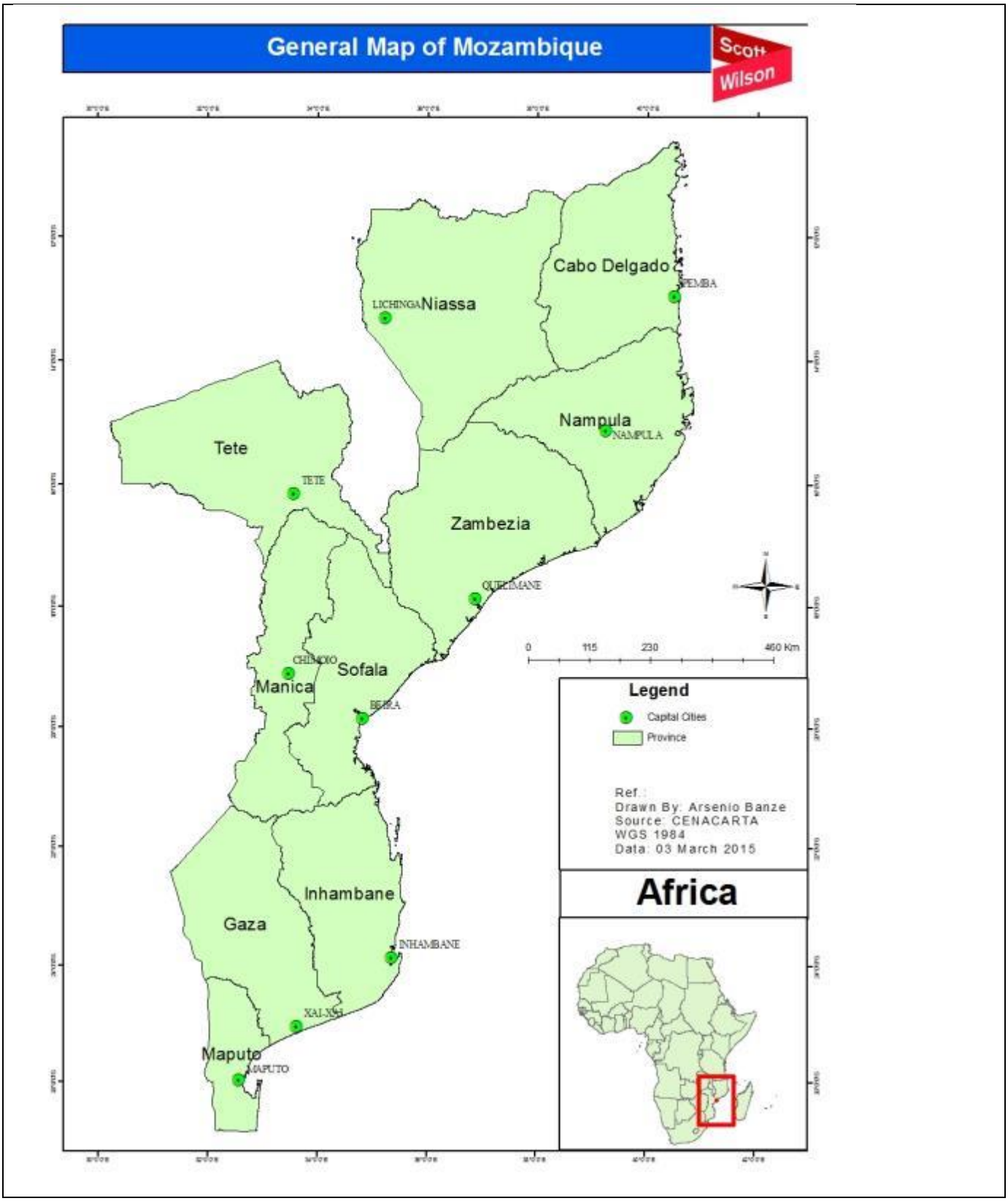


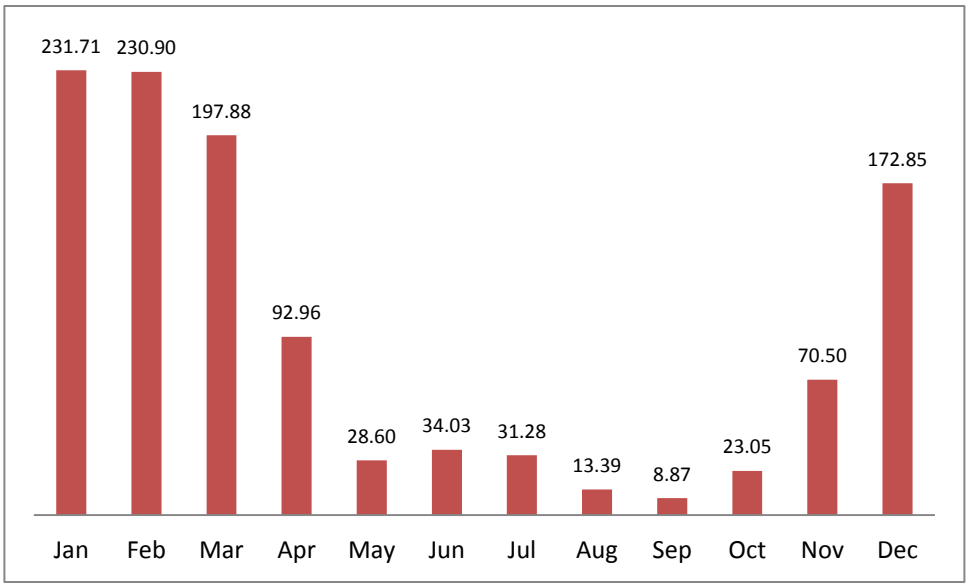
Figure 6 General Map of Mozambique

5.2 Climate

Mozambique has a tropical climate with two seasons, a wet season from October to March and a dry season from April to September. Climatic conditions vary depending on altitude. Rainfall is heavy along the coast and high lands and decreases in the south. Precipitation varies from 350 to 1,400mm depending on the region, with an average of 800 mm (Mafalacusser, 2013).

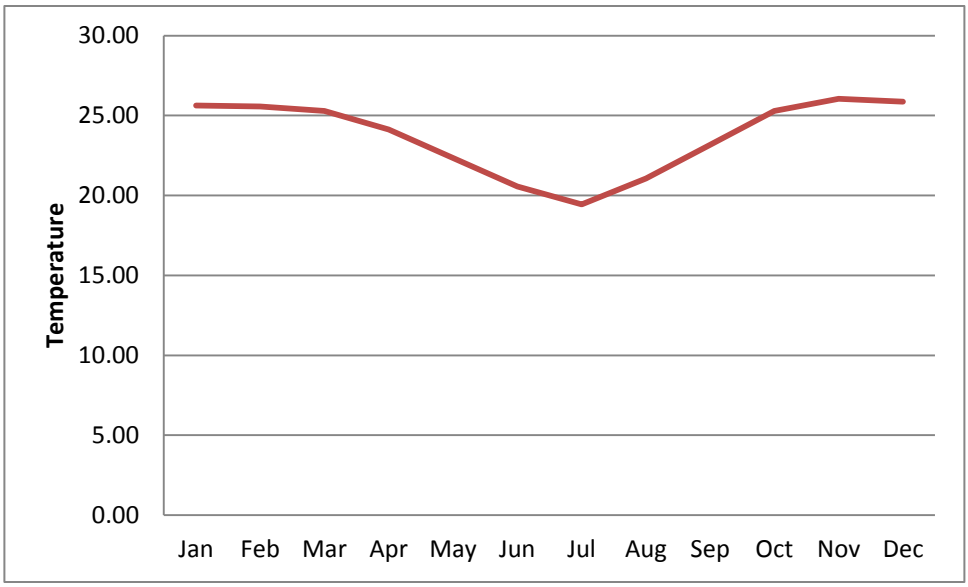
Seasonal variations in temperature are around 5˚ Celsius (C) between the coolest months (June, July and August) and the warmest months (December, January and February). Geographically, temperatures are warmer near the coast, and in the southern lowland regions compared with the inland regions of higher elevation. Average temperatures in the lowland areas are around 25-27˚C in the summer and 20-25˚C in winter. Average temperatures in the highlands range from 20-25˚C in the summer and 15-20˚C in winter.

Annual temperature and precipitation averages for the country for the period spanning 1900 to 2009 are shown in the Figures 7 and 8 below:



Source: Data generated from www.worldbank.org/climateportal

Figure 7 Mozambique average precipitation rates, 1990-2012



Source: Data generated from www.worldbank.org/climateportal

Figure 8 Mozambique average temperature rates in °C, 1990-2012

There is fairly significant climate variation between the provinces that are the focus of the SESA for REDD+, and these are summarised below:

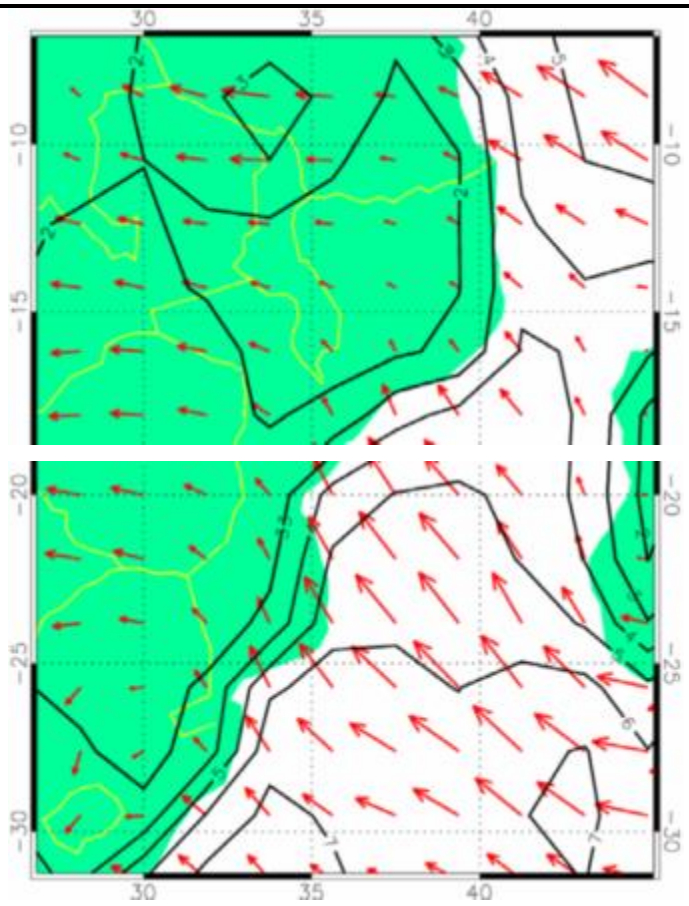
- **Cabo Delgado** has a tropical climate with much less rain falling in winter than in summer. The climate here is classified as Tropical savanna (Aw) by the Köppen-Geiger system. Namaua is the wettest region of Cabo Delgado province, with an average of 1,148 mm rain per year, and an average temperature of 23.1°C. Chefe Bacar's is the driest region of Cabo Delgado, with less than 815 mm of rain per year, and an average temperature of 25.6°C.

- **Zambézia** has a tropical climate with much less rain falling in winter than in summer. The climate here is classified as Tropical savanna (Aw) by the Köppen-Geiger system. Gurue is the wettest region of Zambézia province, with an average of 1,857 mm rain per year, and an average temperature of 22.2 °C. Biyar is the driest region of Zambézia, with less than 955 mm of rain per year, and an average temperature of 24.7 °C.

- According to the Köppen-Geiger system, **Gaza** province has three different climate zones, but is dominated Tropical savanna (Aw). Gaza province also has a hot summer Mediterranean climate (Csa), and a hot semi-arid climate (BSh). Praia de Bilene is the wettest region of Gaza

province, with an average of 916 mm rain per year, and an average temperature of 22.6 ^{o}C. Praia de Bilene is classified as Tropical savanna. In contrast, the prevailing climate in Makandezulo A is known as a local steppe climate (Bsh). There is little rainfall throughout the year, with an average of only 448 mm. The temperature here averages 22.7 ^{o}C.

Wind studies conducted by the Ministry of Energy, Mozambique in 2008, to determine the feasibility of developing wind farms in the country, utilized 30 years of data from the United States National Weather Service's (NWS) National Center for Environmental Prediction (NCEP) and National Centre for Atmospheric Research (NCAR). Figures below show annual and seasonal variations in wind direction and speed, and indicate prevailing winds are always from the easterly directions. The island of Madagascar clearly breaks up the wind blowing from across the Indian Ocean to the continent, and effects the direction and strength of the winds that reach the coast of Mozambique. As such, the coast of Mozambique lies in the rain shadow of Madagascar. Prevailing summer winds (DJF) are from the northeast, whereas winds in all other seasons are predominately from the southeast (MAM and JJA) and east (SON) as shown in Figures 9 and 10. This shift in wind directions reflects the movement of the Intertropical Convergence Zone (ITCZ), which brings tropical rains to the region during the summer. Destructive cyclones also occur during the summer season.



Source: Mean wind speed contours lines and mean wind Vectors at 10 m a.g.l. at 200×200 km grid points covering Mozambique based on 30 years data (1976-2005) from NCEP/NCAR reanalysis database

Figure 9 Mean wind speed contours lines and mean wind

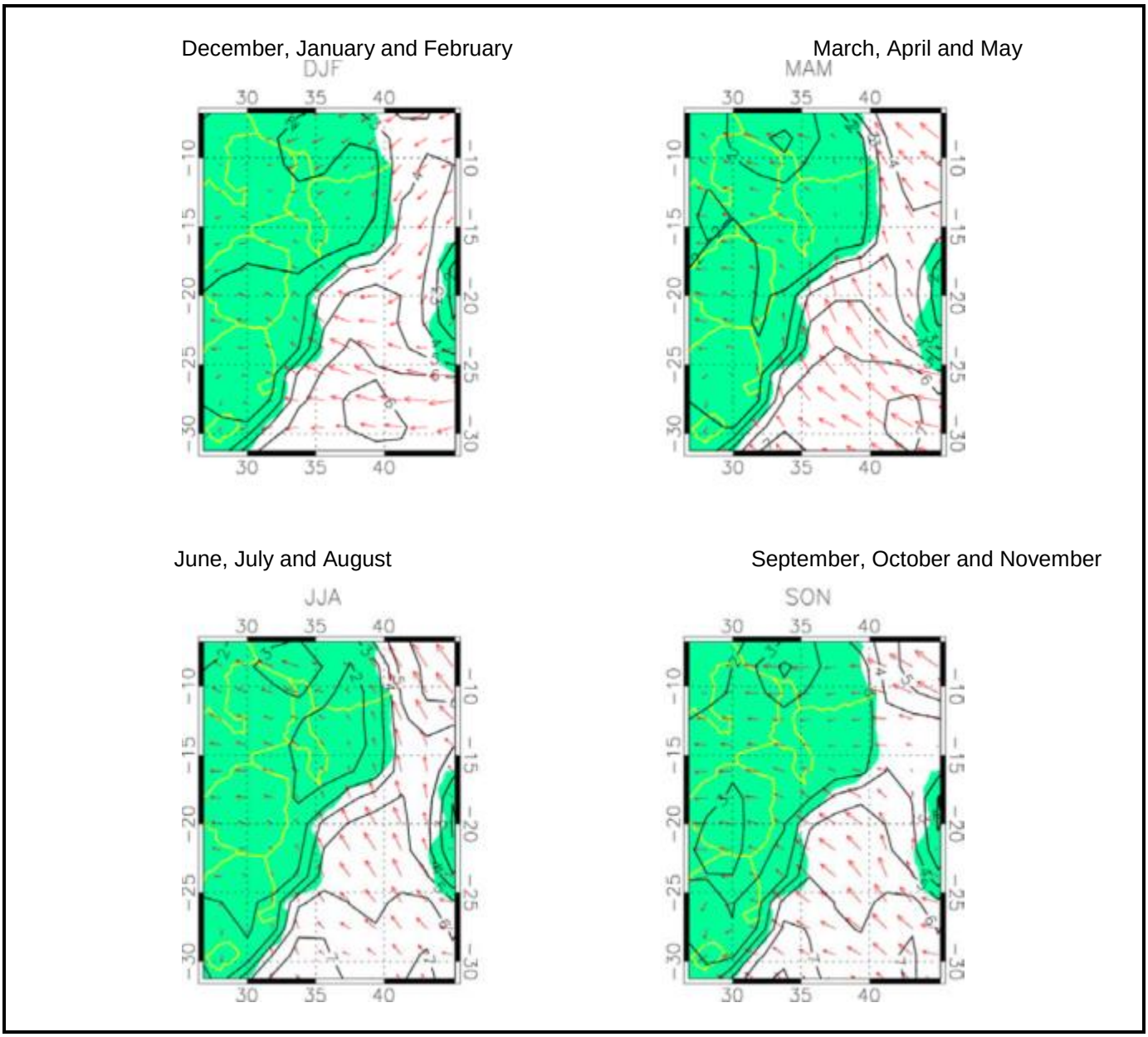


Figure 10 the seasonal variations of the wind speed in previous figure

5.3 Geology and soils

The geology of Mozambique is comprised mainly of ancient crystalline rocks in the north and young, Tertiary and Quaternary sediments and volcanic rocks in the south (see Figure 11 below). The southern limit of the East African Rift Valley extends down through neighboring Malawi. Crystalline Precambrian basement covers almost the whole area north of the Zambezi River, over approximately 500,000 km^2. The basement rocks consist mainly of gneiss, schist, quartzite and limestone. Intrusions of Precambrian granite also occur, mainly in Tete Province and western Zambézia. Younger dykes of

mafic composition cross-cut the crystalline rocks, particularly around the town of Tete and along the western Zimbabwean border (Dias and Wilson, 2000). Parts of the crystalline basement contain mineral veins and associated alluvial gold deposits have been found in the valleys of the Cocone, Metuisse and Namarroi Rivers (Dias and Wilson, 2000).

The basement rocks are covered by a surface weathered ('overburden') layer of variable thickness. Sediments and volcanic rocks of Karroo age (180– 300 million years) crop out in a narrow band along the western border. Karroo formations consist largely of conglomerate, sandstone, schist and coal seams with some basalt (UN, 1989). Jurassic sediments (135–180 million years) include sandstones, conglomerates and limestones. These are minor but are found in Lupata, Nampula and Cabo Delgado Provinces. Cretaceous sediments (65–135 million years) form the westerly limits of the lowland areas. These sediments consist of sandstones, some being calcareous, as well as clays and carbonates with occasional conglomerate that outcrops to the south-east of the town of Tete, along the southwestern border and in a narrow elongate strip along the north-east coast of Mozambique. Tertiary sediments (2–65 million years) mainly consist of marine carbonates and sandstones and are found in the coastal region of Cabo Delgado and in large parts of southern Mozambique (UN, 1989). Quaternary sediments consist mainly of unconsolidated sand, clay and limestones and are found in coastal dunes, river alluvium and lacustrine deposits.

Africa's ancient basement complex of granitic rock underlies most of northern and west-central Mozambique, whereas the soils of the southern and east-central regions are sedimentary. Mozambique's soils are diverse in quality and type, but the northern and central provinces have generally more fertile, water-retentive soils than does the south, where sandy, infertile soils prevail. The northern soils, whose qualities allow agricultural potential to extend beyond the river valleys, have a higher content of red clay, with varying ranges of fertility; in contrast, the central region has a broad expanse of rich alluvial soils along the Zambezi delta. South of Beira, fertility is largely limited to alluvial soils in the valleys of the Save, Limpopo, Incomáti, Umbelúzi, and Maputo rivers, although several pockets of fertile but heavy soil occur southwest of Inhambane.

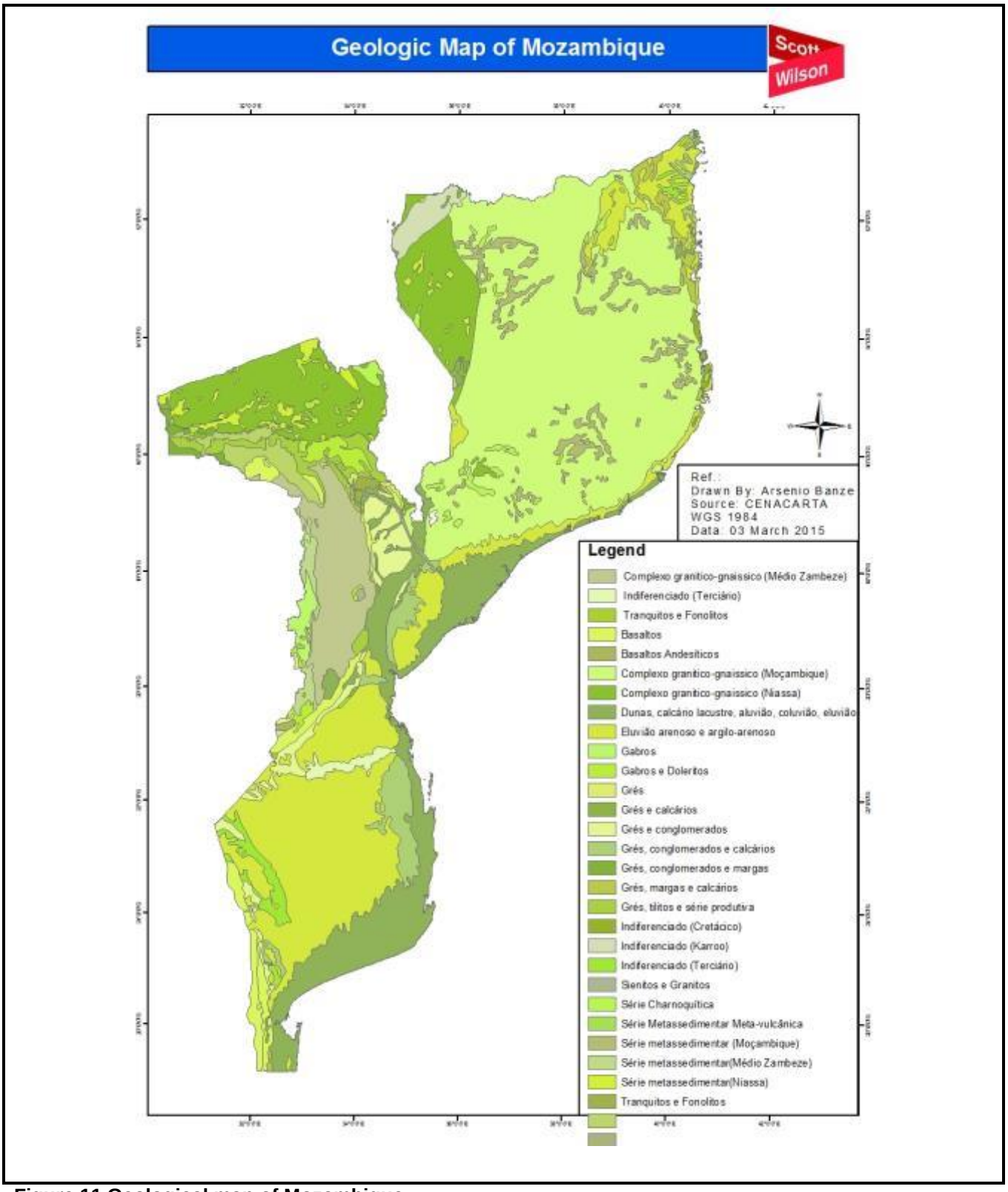


Figure 11 Geological map of Mozambique

5.4 Surface Hydrology

Most of the rivers in Mozambique flow in a W-E direction, draining the water of the central African high plateau into the Indian Ocean. Mozambique has 104 identified rivers basins, considering only catchments of rivers that flow into the Indian Ocean. The coastal zone is considered as one catchment (Tauacale, 2002). With the exception of the small rivers draining the coastal zones, the majority of the rivers have a torrential regime, with high waters during 3-4 months and low flows for the remainder of the year corresponding to the marked wet and dry seasons.

The Rovuma (Ruvuma) River defines most of Mozambique's northern border with Tanzania. The Zambezi River and its tributaries dominate the central region, and the Maputo River forms part of the southernmost boundary with Swaziland and South Africa. Rivers—including the Lúrio, Ligonha, Save (Sabi), Changane, and Incomáti (Komati)—also define many of the country's local political boundaries. Other important drainage systems include the Messalo River in the north, the Púngoè (Púnguè), Revuè, and Búzi rivers, which enter the Mozambique Channel together just south of the port of Beira, and the Limpopo River in the south.

The Zambezi (140,000 km^2) and Rovuma (101,200 km^2) river basins each occupy over 100,000 km^2 of Mozambique. Eleven other river basins cover more than 10,000 km2, including the: Limpopo (79,600 km2) Lúrio (60,800 km^2) Púnguè (28,000 km^2) Licungo (27,700 km^2) Búzi (25,600 km^2) Messalo (24,000 km^2) Ligonha (16,300 km^2) Incomáti (14,900 km^2) Gorongoza (13,200 km^2), Inharrime (11,900 km^2), Govuro (11,200 km^2) (Tauacala, 2002). River basins of less than 10,000 km^2, but important to the country include: Maputo, Umbelúzi, Save, Monapo and the Montepuez basin. In total, these 18 river basins cover approximately 572,500 km^2 (75%) of the total area of Mozambique.

The Zambezi is the longest river in Mozambique (850 km), followed by the Limpopo (560 km), Save (330 km), Búzi (320 km), Púnguè (320 km), Licungo (336 km) Molócuè (325 km), Lúrio (605 km) Montepuez (315 km), Messalo (530 km) and Rovuma (650 km) (Tauacale, 2002). Of the 18 main river basins, 9 are shared with other countries:

- Maputo: Republic of South Africa (RSA) and Swaziland
- Umbelúzi: RSA and Swaziland
- Incomáti: RSA and Swaziland
- Limpopo: RSA, Botswana and Zimbabwe.
- Save: Zimbabwe
- Púnguè: Zimbabwe
- Zambezi: Angola, Namibia, Botswana, Zambia, Zimbabwe, Malawi and Tanzania

- Rovuma: Tanzania

Surface water is the country's main water resource. Mean annual runoff is estimate at 216,000 million cubic meters (Mm^3), of which only 100,000 Mm^3 originates in rainfall inside Mozambique. The remainder originates in countries upstream, and is reliant on joint agreements on water management practices to ensure a safe, secure water supply.

Tauacale (2002) noted that the management of the shared river basins and reaching agreements with other countries on integrated water resources management must be a priority for Mozambique. At the time of the preparation of his article, inter-boundary water resources management faced the following issues:

- Floods and droughts routinely occur during the rainy season on the rivers of the region.
- In a vast area of the interior of south-central Mozambique (Incomáti, Umbelúzi, Limpopo and Púnguè) there has been a loss of land caused by salt-water intrusion, resulting from increasingly lower river discharges
- There has been a loss of bio-diversity in the river basins, resulting from increasingly lower river discharges

There are four lakes in Mozambique -- Lake Niassa, Lake Chiuta, Lake Cahora Bassa and Lake Chirwa, all in the north. The country shares the borders of Lakes Nyasa, Chiuta, and Chilwa with Malawi. The Chora Bassa Lake is created by the country's hydroelectric dam network —particularly the extensive system created by the Cahora Bassa Dam at Songo on the Zambezi River.

Several chemical that occur in nature, as well as those created by human activities, are monitored in drinking water. Human activities that contribute to pollutants in surface water include percolation and accidental release of contaminated water from agricultural runoff, sewage treatment facilities, operation of processing plants and pipelines, oil and gas leaks from vehicles, as well as un-lined trash dumps, poorly managed mine pits and waste rock piles. Various studies conducted in Mozambique for Environmental Social Impact Assessments (ESIAs), as well as theses and dissertations have identified surface water pollutants associated with agriculture (pesticides and fertilizers), industry (oils, lubricants, heavy metals and chemicals), and trans boundary pollution of the Munene River from a dumpsite in Zimbabwe. Additionally, increased siltation and sediment loading occurs in areas affected by deforestation, degradation and erosion and saltwater intrusion occurs near the coast. Understanding current vulnerabilities of the surface water supply to contaminants and sediment loading can be

addressed in future project specific ESIAs, as well as land use management plans and waste management plans.

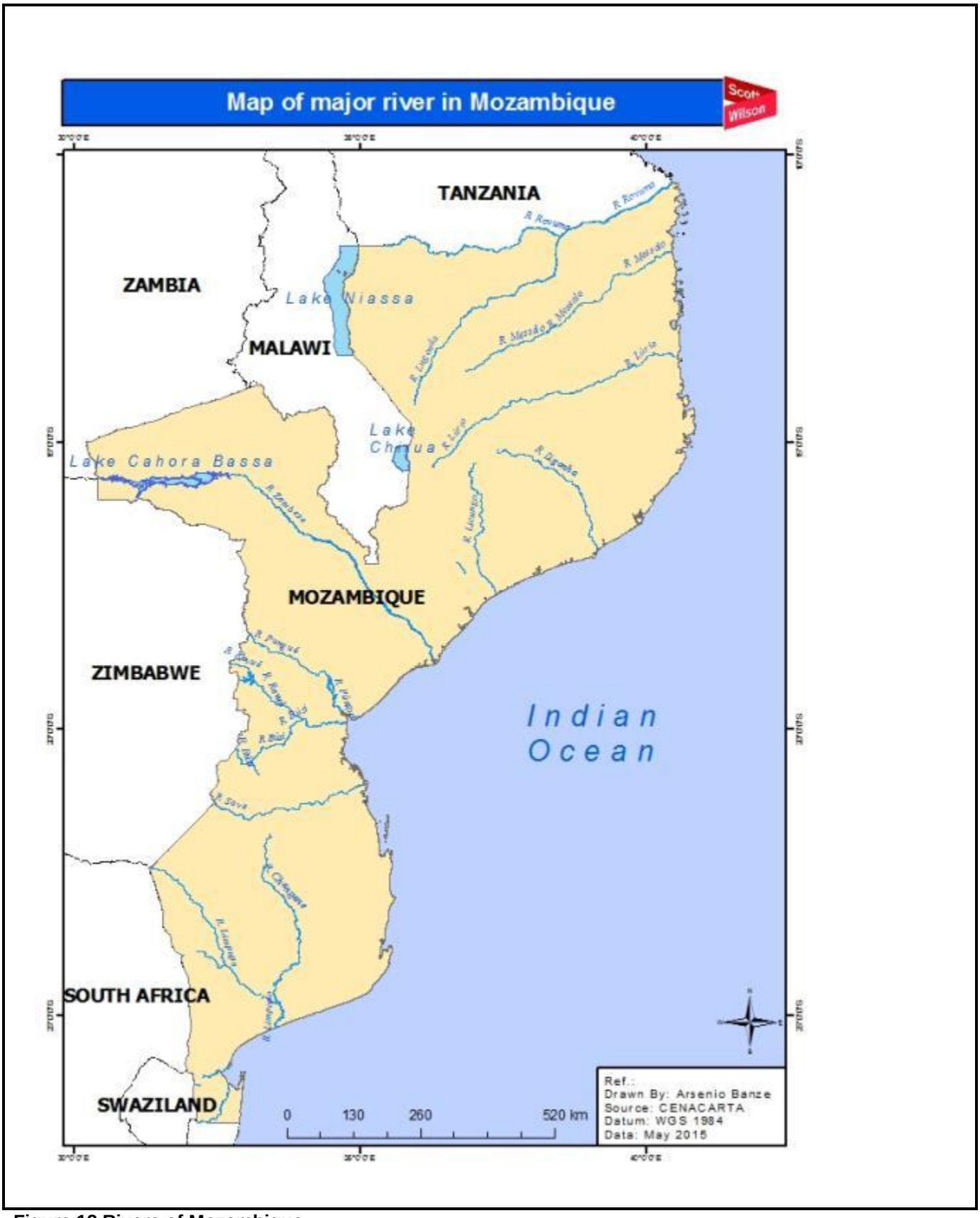


Figure 12 Rivers of Mozambique

5.5 Groundwater Hydrogeology

Cenozoic sediments form by far the most productive aquifers in Mozambique. In the south, these form an extensive unconfined aquifer which is well replenished as a result of high rainfall and is easily exploited. Miocene carbonates also form good aquifers where they are karstic. These cover around 25,000 km^2 south of the Save River. The water table in this aquifer occurs at around 50 m depth (UN, 1989). Quaternary alluvium has in places been exploited for urban supplies in the coastal areas. Much lower yields are found in the crystalline basement rocks, volcanic formations and indurated sediments, except where weathered overlying layers are well-developed. Groundwater yields in the crystalline basement rarely exceed two liters per second and groundwater storage is restricted to fractures. Boreholes in northern Mozambique are often deep as a result of poor groundwater yields. A number of boreholes in Cretaceous and Cenozoic formations in Cabo Delgado Province exceed 100 m depth as a result of poor yields (UN, 1989).

As with surface water, groundwater quality is typically monitored by the WHO especially if the water contributes to the drinking water supply. In Mozambique, little information is available on the quality of groundwater in the aquifers. That which is available, suggests that groundwater is for the most part fresh, although significant salinity problems are experienced in some parts of the Tertiary aquifers in the south as a result of seawater intrusion. In addition, potential for pollution exists in the vicinity of industrial and urban developments (including that from sewage effluent and from centers of petroleum and chemicals manufacture and ports) as well as from agricultural activity. Pollutants associated with industry and agriculture is likely to be greatest in the coastal lowlands.

Other elements in drinking water supplies that are monitored by the World Health Organization (WHO) that occur naturally in rocks and can be released to aquifers through weathering, or anthropogenic activities (i.e., mining), include arsenic (As), nitrates (NO_3), fluoride (F), iron (Fe), manganese (Mn) and iodine (I). Not including the effects of anthropogenic activities that result in breaking up and weathering of rock, the distribution of these naturally occurring elements in groundwater is directly linked to regional geology and groundwater flows and levels. Understanding current vulnerabilities of ground water to contaminants can be addressed in future project specific ESIAs. The potential within Mozambique for each of these elements to occur in groundwater is summarized below.

Of the aquifers in Mozambique, those most vulnerable to contamination by arsenic are likely to be areas of mineralization associated with gold, including alluvial gold deposits. Areas of young alluvium,

particularly along the river valleys, the Zambezi delta and the coastal marshes may also be at increased risk.

Ground waters from fractured crystalline rocks and from the unconfined Cenozoic aquifer of southern Mozambique are likely to be aerobic such that any nitrate derived from pollution sources can be maintained in solution in the groundwater rather than being removed by chemical and microbiological processes. Concentrations of NO_3-N may be expected to exceed the WHO guideline value for drinking water of 11.3 mg/l in some groundwater supplies.

The geology of Mozambique is such that minerals and rocks containing high fluoride concentrations are likely to exist in the northern upland areas. These include the granitic outcrops in particular. The southern limit of the East African Rift Valley also extends along the border area with Malawi. Since this is a well-known high-fluoride province, there is clearly potential in northern Mozambique for ground waters to contain high fluoride concentrations, in excess of the WHO guideline value for drinking water of 1.5 mg F/l. However, high rainfall and hence high infiltration rates in northern Mozambique are likely to reduce the risk of high fluoride concentrations significantly.

No reports of groundwater water quality are known to have identified high concentrations of iron and manganese as a problem in Mozambique. High concentrations of these elements are only expected in anaerobic or in strongly acidic ground waters, neither of which have been reported in the country. Some areas of young (Quaternary) alluvium and coastal marshes may contain anaerobic ground waters, but these are of limited lateral extent and the degree to which they are exploited is not known. Salinity is likely to be a prime factor limiting potability in ground waters from the coastal lowlands.

No iodine data could be found for the groundwaters. Given the maritime location, abnormally low (and potentially detrimental) concentrations are not expected. Highest concentrations (several tens of µg/l or higher) are expected to be present in the saline groundwaters of the south.

5.6 Biodiversity

Mozambique has five phytogeographical areas with Miombo, Mopane, undifferentiated woodland and vast coastal mosaic. The most important biodiversity areas include the Gorongoza Mountains, Great Isenberg Archipelago of Quirimbas and the Chimanimani Massif. There are three biodiversity hotspots-Coastal Forests of Eastern Africa, the Maputaland-Pondolannd-Albany and the Eastern Afrontomane. Additionally, there is the Zambezian Coastal Flooded Savannah, which is an eco-region unique to Mozambique.

The 2,470 km of coastline contains several marine and costal habitats; the coral reefs, mangrove and sea grass meadows are very important to Mozambique. Coral reefs cover an area of 1,860 km^2; while mangrove covers approximately 400,000 hectares.

Although there are a variety of ecotones in Mozambique, ranging from bushland, grassland and savannah to forest (see Figure 11), the below discussion emphasizes forests for the SESA for REDD+. This is undertaken so that key biodiversity features requiring special consideration can be identified and addressed in future project specific environmental assessments to help protect these key biodiversity features. There are coastal, inland and upland forests in Mozambique (see Figure 14). The structure of the forests are effected by the proximity to the ocean, geology and soils, elevation, humidity, temperature, precipitation and these variables in turn effect the type of wildlife found in the forest, as well as human uses of the forests.

The country has a rich and variety of ecological systems and endemic species, which are protected under the conservation areas. These areas are made of parks, national reserves and hunting reserves. These areas are clearly demarcated under state jurisdiction and representative of the natural national heritage. The conservation areas aim to preserve the biodiversity and fragile ecosystems or certain species of fauna and flora. Decree 10/99 7th of July establishes the Forestry and Wildlife Department to secure a participative management of forestry and wildlife resources while promoting community sustainable development. Presently the conservation system covers approximately 15% of the surface of the country, consisting of 6 parks, 6 reserves and 12 official hunting reserves. Table 12 below lists protected areas in Mozambique.

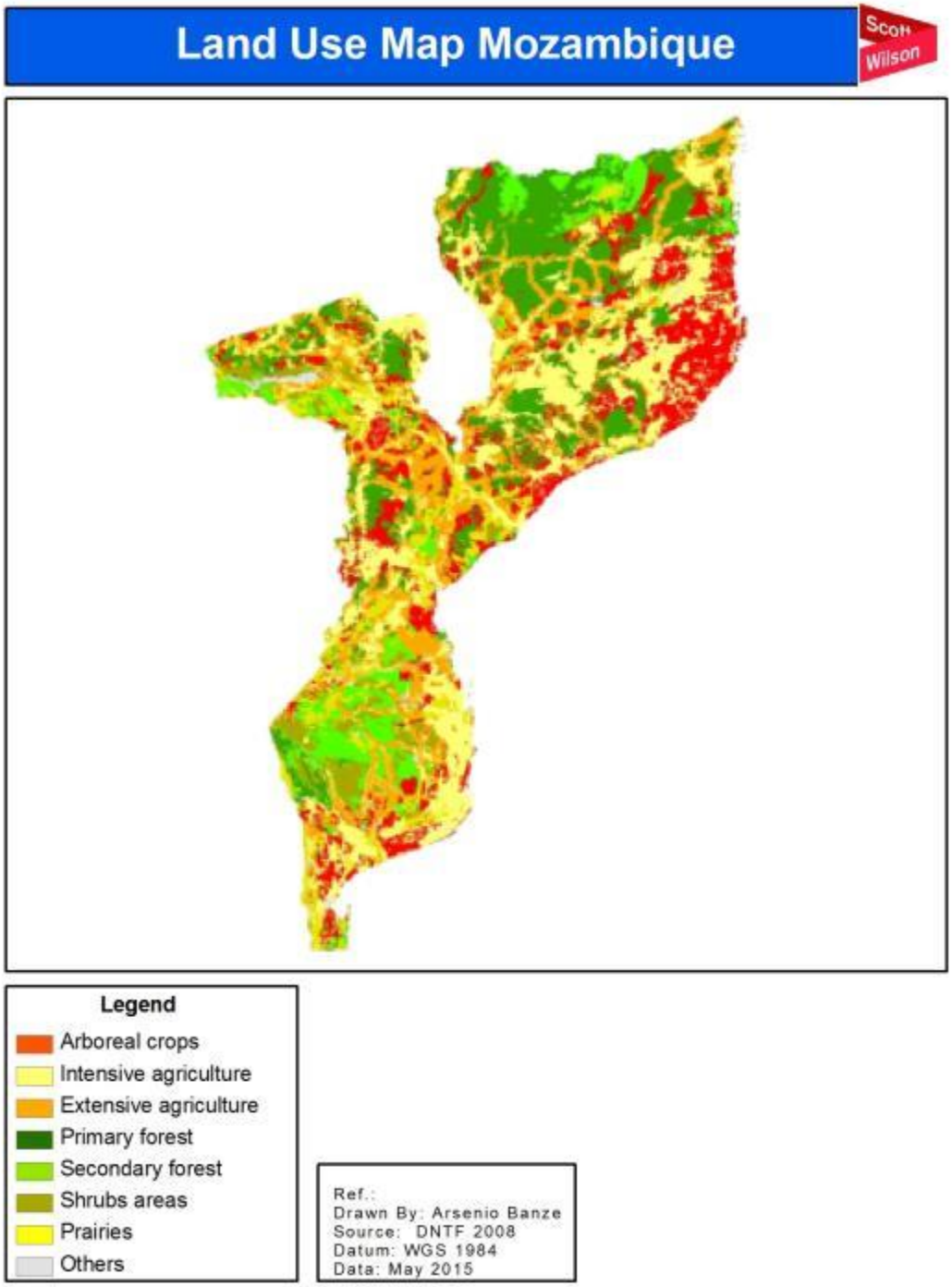


Figure 13 Land use map of Mozambique

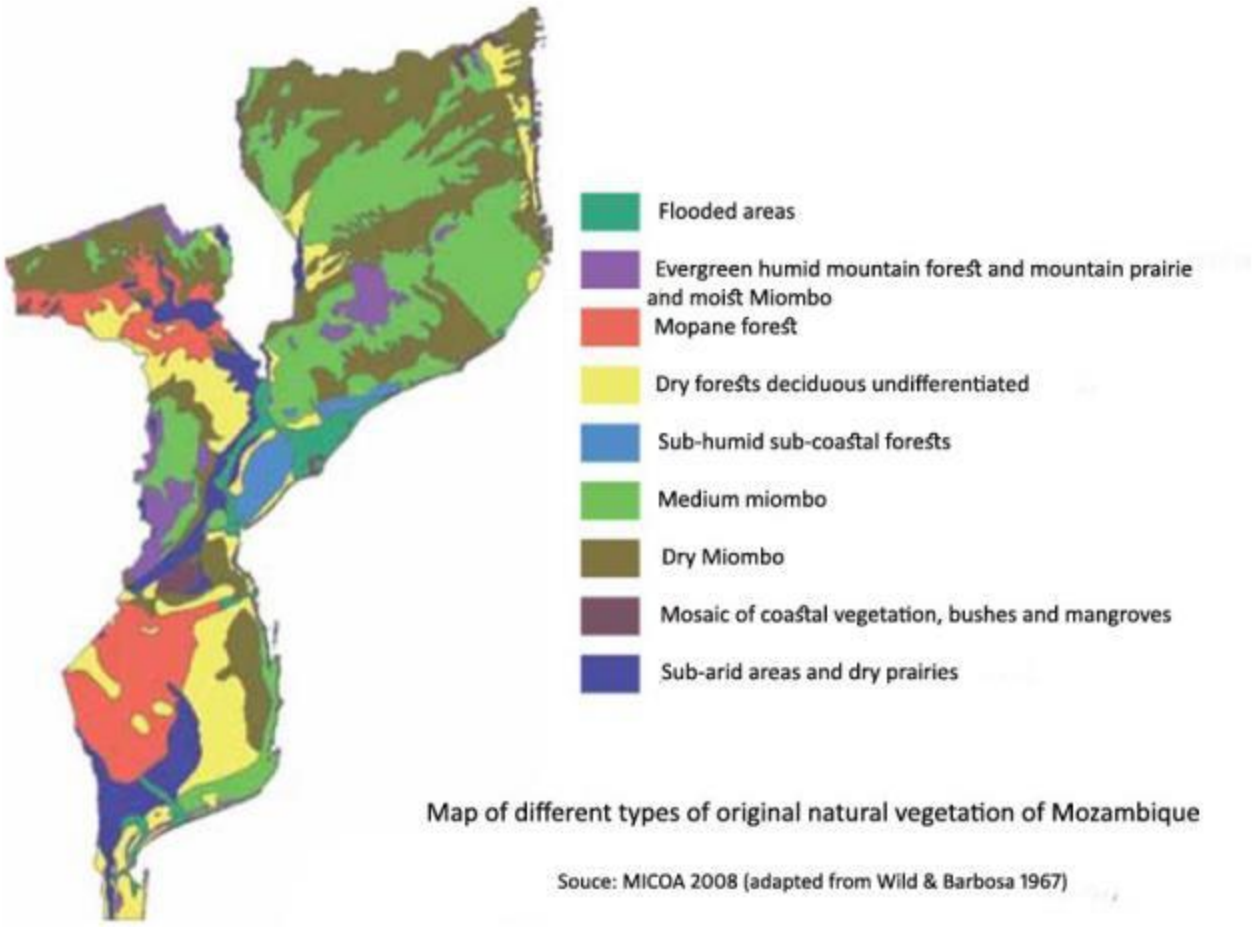


Figure 14 Forests of Mozambique Source: Sitoe et al, 2012

Table 10 National Parks and Reserves of Mozambique

Category	Protected area	Area (km^2)	Location	Year
National Parks	Banhine National Park	7,000	Gaza province	1973
	Bazaruto National Park	1,600	Inhambane province	1971
	Gorongoza National Park	4,067	Sofala province	1960
	Limpopo National park	10,000	Gaza province	2001
	Quirimbas National Park	7,500	Cabo Delgado	2002
	Zinave National park	4,000	Inhambane province	1973
National Reserves	Chimanimani National Reserve	640	Manica province	1999
	Gilé National Reserve	2,100	Zambézia province	1932
	Niassa National Reserve	42,000	Niassa province	1960
	Maputo Special reserve	778	Maputo province	1994
	Marromeu Buffalo reserve	NA	NA	NA
	Pomene Reserve	126	Inhambane province	1964

Source: www.visitemozambique.net

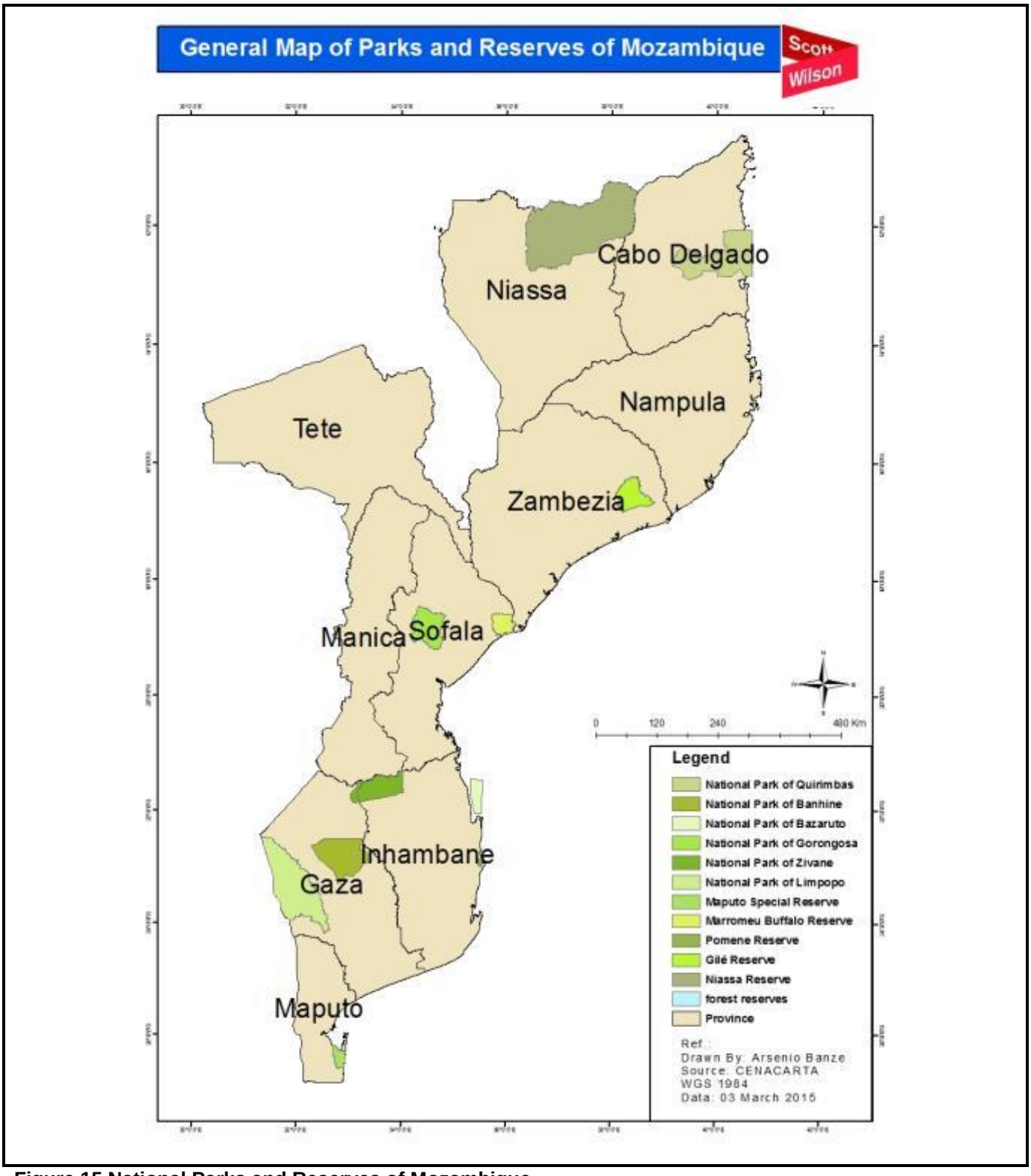


Figure 15 National Parks and Reserves of Mozambique

The Gorongoza Mountain- Rift Valley Complex is one of the most important conservation areas in the country. The complex covers an enormous diversity of habitats from mountain forest and grasslands to mangrove (Tinley, 1977), not found in such proximity elsewhere on the continent. The complex encompasses the isolated Gorongoza Mountain which rises to 1,863 m and the southern-most, Mozambican sector, of the African Rift Valley. It is an isolated montane block 160 km inland from the sea. The mountain supports tropical to montane rainforest on its summits with heath grasslands. Endemic and near-endemic plants and animals occur within the mountain's habitats. Examples include the Greenheaded Oriole *(Oriolus chlorocephalus)* sub-species *O.c. speculifer,* characterized by a white wing patch, the Dappled-mountain Robin *(Modulatrix orostruthus),* the Chirinda Apalis *(Apalis chirindensis)* a restricted range species, Swynnerton's Forest Robin *(Swynnertonia swynnertoni)* and separate subspecies of the Whitebreasted Alethe *(Alethe fuelleborni).*

The mountain is also the origin of streams and rivers that feed the Urema Lake and the floodplains of the Gorongoza National Park (GNP). Gorongosa mountain is in a unique and precarious situation and recently the mountain above 700 m of altitude was decreed part of the GNP in an effort of the GoM to revert the degradation of the Mountain and floodplains. Consequently, further agricultural development should consider this environmental issue and the ongoing conservation/rehabilitation efforts.

The Cheringoma Plateau, clothed in miombo woodland and dry forest containing many unusual species, rises up on the other side and then gently descends to the extensive grasslands of the Marromeu Complex, coastal dunes and mangrove swamps. Over this large area not only can viable populations of a multitude species survive, but the ecological processes that sustain such a landscape can continue to operate. A variety of wetland habitats occur in the Marromeu Complex including rivers, lakes, temporary pans, reed swamps, floodplain grassland and palm savanna. The diversity of habitats in this area makes it one of the finest wildlife grazing ecosystems in Africa as reflected by the spectacular wildlife that inhabited the Valley prior to the armed conflict in Mozambique. The complex presents a cluster of conservation areas comprising several categories protected areas, see table below.

Table 11 Protected areas within Gorongoza Mountain - Rift Valley Complex

Protected area	Current area (km^2)
Wildlife Hunting areas (Coutadas 10,11,12 and 14)	6,438
Gorongosa National Park	7,850*
Marromeu Special Reserve	1,538
Nhampacue Forest Reserve	26
Inhamitanga Forest Reserve	19
Total protected area	**15,871**

In December 2004 the GoM designated the 688,000 ha Marromeu Complex a RAMSAR site (Mozambique ratified the International Convention for Conservation on Wetlands in 2004), which includes 80% of the Marromeu District. Only 20% of the district's area is allowed for community development and private investment. The Zambezi Delta supports 3-4% of the global population of wattled crane *Grus carunculatus* and may provide a critical refuge for this species during extreme regional droughts, when more than 30% of the global population may temporarily occur there. It is internationally important for white- and pink-backed pelicans *Pelecanus onocrotalus and Prufescens* and for the African open bill *Anastomus lamelligerus*, as well as supporting a great variety of other water birds, including some globally threatened species. The population of around 10,000 Cape buffalo *Syncerus caffer* represents the largest concentration of this species in Africa. The mangrove crab *Scylla serrata* and other crustaceans (portunids, etc.) are present and are exploited by the local people, while prawns spawning in the delta mangroves are of great economic importance as a source of foreign revenue.

The Chimanimani Massif forms part of the Great Eastern escarpment along the Mozambique-Zimbabwe frontier. The Massif, although relatively small in area, has an exceptionally high diversity of habitats and species. Nearly 1,000 vascular plant species have been recorded for the area, of which 45 are endemic (Dutton and Dutton, 1975). Five *Aloe* species are endemic to the Chimanimani Mountains and three species of *Erica* and two species of Protea are considered endemic. Large mammals are well represented although populations are depleted. Two amphibians and one reptile species are considered endemic. Over 160 bird species have been recorded for the Chimanimani (Dutton & Dutton,

1975), some of which are considered endemic to the Afro-montane regions of eastern Africa. The massif includes the Chimanimani National Park in Sussundenga District. It also comprises four forest reserves: Tsetsera, Moribane, Nhahezi and Mahate, which are embraced by the project of Trans Frontier Conservation Area (TFCA).

5.7 Forest Resources

Mozambique has a total forest area of approximately 40.6 million hectares and 14.7 million hectares of other wooded areas (DNTF, 2007). Productive forests (forest areas demarcated for the production and exploitation of wood) cover about 26.9 million hectares, while 13 million hectares have been defined as areas not suitable for the production of wood, where most of the National Parks and Forest Reserves are situated. The forests that have some sort of legal protection or conservation status cover some 22% of the total forest cover of Mozambique.

Miombo Forests are the most extensive forest type, occupying approximately two thirds of the country. Miombo Forests cover vast areas of the central and northern regions of Mozambique, and is characterized by a dense vegetation cover, with deciduous and semi-deciduous trees, often reaching between 10 and 20 meters. Fire is an important ecological component in these forests, allowing seed germination and soil nitrification. Thunderstorms at the start of the rainy season can easily set the vegetation alight; however, the green vegetation and moist soils prevent the fires from spreading. The soils of Miombo forests are suitable for agriculture, and hence many areas are subject to traditional slash and burn agriculture, and more recently to modern agricultural techniques (Reddy 1986).

Mopane Forests are the second most extensive forest type found in the country, occurring especially in the Limpopo--Save area and upper Zambezi Valley. Mopane Forests are characterized by a mix of trees and bushes. The unsuitability of the soils of Mopane forests for agriculture and the occurrence of large numbers of fauna in the Mopane forests resulted in the conservation of large areas, such as those forming the Banhine, Zinave and Gorongosa Parks in Mozambique.

The Forest Reserve Network of Mozambique was established during the late fifties. Apart from a few of the reserves that were established for protection of water catchments, most of them were established as timber production areas. Forest reserves are one of the categories of conservation areas, together with National Parks and Game Reserves, covering an area of about 73,000 Km^2 (approximately 11.5% of the country's surface). The Forest Reserve Network was abandoned during the armed conflict, turning some of the forest reserves as refuge for local communities or hideaways for the guerrilla fighters. As a consequence, the population pressure within the forest reserves increased in most of the

cases. However, it is important to note that there are some of the reserves that did not experience any human settlement, therefore, maintaining their conservation status.

In Mozambique, there are thirteen Forest Reserves, which are administered by the National Directorate of Forest and Wildlife (DNFFB) within the Ministry of Agriculture. Other protected areas, including National Parks and Trans Frontier Conservation Areas, are the responsibility of the Ministry of Tourism. The Forest Reserves were essentially 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. However the DNFFB itself has expressed interest in maintaining an appropriate and effective management of these areas. There is limited information about the state of the vegetation and ecosystem condition within these Reserves. The survey conducted by Mueller et al. (2005) was designed to characterize the condition of forest reserves that they visited, and these are summarized below in addition to forest summaries provided by others (WRM Bulletin, 2008; Timberlake et al. 2011, Kanj et al. nd,). The two tables below summarize the existing forest reserves in Mozambique.

Table 12 Inland Forest Reserves of Mozambique

Forest reserves	Description
Niassa Reserve	The **Niassa Reserve** in northern Mozambique, is the largest reserve in the country, and has the greatest concentration of wildlife in the Mozambique. The reserve covers parts of the Cabo Delgado Province and nearly one third of Niassa province. Niassa Reserve is bordered by Rovuma River in the north (Tanzania border), and incorporates the magical Lugenda River (flowing some 200kms through the reserve). The Luatize River lies in the southwest and the Lussanhando River in the west. Divided into zones for management purposes, the total area is twice the size of Kruger National Park in South Africa. The recent development of a wildlife corridor between the **Niassa Reserve** and the Selous Game Reserve in southern Tanzania make these reserves arguably one of Africa's largest trans frontier parks. The Niassa Reserve is one of the largest protected miombo forest ecosystems in the world, and it has an incredible biodiversity. Half of its area is covered in low productivity woodland known as Brachystegia/miombo woodland, which occurs in poor soils. Amazingly, 95% of the biomass in these areas is herbaceous vegetation. The rest of the area is covered in 40% open savannah, 5% wetlands, 3% isolated forest communities in the mountains and the balance is forest along the rivers that run through the reserve. There are 21 different vegetation types, and an estimated 191 species of trees and shrubs. In terms of wildlife, the reserve has plenty of mammals, and these are truly wild. The most impressive thing about the wildlife is the population of Wild Dog, an extremely endangered African predator – this exceeds 200, making it one of the best reserves for the mammals in Africa. Other animals that are specialised to this area are the three endemic species, the Niassa wildebeest (*Connochaetes taurinus johnstoni*), Boehms zebra (*Equus burchelli boehmi*) and Johnstons impala

	(*Aepyceros melampus johnstoni*). Better known animals, however, include sable antelope (9000), several thousand Cape buffalo, impala, wildebeest, zebra, elephant (12,000) and leopard. For bird enthusiasts, it has over 400 species of birds which include the rare Angola pitta (*Pitta angolensis*), Pel's fishing owl (*Scotopelia peli*) and abundant raptors.
Gorongoza National Park	Gorongoza National Park has a wide diversity of species and ecological features found nowhere else. Situated at the southern end of the Great East African Rift Valley the park is 4000 km^2 with the 1862m Mount Gorongosa as the dominant feature. A range of distinct ecosystems including grasslands dotted with acacia trees, savannah, and dry forest on sands, water pans and termite hill thickets. Miombo and montane forests spread across the plateaus and a magnificent rain forest is found in the limestone gorges. Over 500 bird species and one of the densest populations of wildlife used to inhabit this wonderful area but large mammal numbers were reduced by up to 95% during Mozambique's Civil War. WWF cleared the park of mines in the 1990's and set-up successful anti-poaching units. In January 2008 the Carr Foundation signed a 20 year lease with the Mozambique government and today the park enjoys the protection and funding of the Gorongosa National Park Trust. Since 2006 large numbers of zebra/wildebeest/buffalo have been introduced to the park. A permanent biological research center is well underway and several tourist lodge/camp licenses have been issued. Much of the information presented in this section was extracted from the *Assessment of the Forest Reserve Network in Mozambique* (Muller et al, 2005), prepared with financial assistance and support of the World Wildlife Fund Mozambique Coordination Office, DNFFB. Although Mozambique retains some dense forests in the north-central interior and on the Chimoio Plateau, most of the northern and east-central areas are open forest. In the south the open forest of the east becomes brush and, to the west, savanna grassland. The largest forest reserves are on the Chimoio Plateau west and southwest of Beira and in the northern interior south of the Lúrio River. Mozambique maintains four national parks in the central and southern areas—Gorongosa, Zinave, Bazaruto, and Banhine. A transnational park combines Kruger National Park in South Africa, Gonarezhou National Park in Zimbabwe, and Limpopo National Park in Mozambique to form the Great Limpopo Trans frontier Park.
Mucheve Forest Reserve	The Mucheve forest reserve is located in the district of Chibabava, southern Sofala. The topography is flat to very slightly undulating, with an eastward flowing watercourse in the southernmost part of the reserve. The soils are mainly sands. The reconnaissance survey performed by Muller et al (2005) found that the remaining woodland in the reserve consist of patches of dry forest with sparsely distributed small to medium size trees. The dominant tree species were *Kirkia acuminata* and *Combretum zeyheri*, other typical trees were *Afzelia quanzensis, Albizia forbesii, Albizia hervei, Albizia versicolor, Amblygonocarpus andongensis, Cleistanthus schlechteri, Combretum molle, Commiphora neglecta, Diplorhynchus condylocarpon, Ekebergia capensis, Markhamia obtusifolia, Millettia stuhlmannii, Pseudolachnostylis maprouneifolia, Pterocarpus angolensis, Pterocarpus lucens* subsp. *antunesii, Schrebera trichoclada, Sclerocarya birrea, Strychnos madacascariensis, Strychnos potatorum, Tabernaemontana elegans, Vitex payos* and *Xeroderris stuhlmannii*. Over half of what was once a large area covered with dry forest, now consists of

	agricultural land. From the literature, and from Muller et als. (2005) personal communication with the local chief, it could be inferred that the sides of the stream in the south of the reserve, were once occupied with gallery forest consisting of trees such as *Breonadia salicina, Khaya anthotheca* and *Milicia excelsa*. At the time of this investigation there were no trees left but dead standing trees were still visible.

Moribane Forest Reserve	The Moribane forest reserve is located in the district of Sussundenga, in western Mozambique in the Province of Manica. The Moribane forest reserve is among the largest lowland forest in existence in Mozambique, especially on the base of the mountains. The topography consists of hills and valleys with streams. The soils vary from pale brown to reddish brown clayey loams. Extensive damage to some areas of the forest was caused by a devastating fire in the 1990s, subsequent to the very severe drought of 1992. Muller et als. (2005) reconnaissance survey found that natural forest regeneration is taking place, with pioneer species such as *Macaranga capensis, Harungana madagascariensis,* and *Trema orientalis* dominating the area, sometimes in pure stands of even-aged stands. Trees within the Moribane reserve represent both transitional and moist evergreen forests. Typical tree species in the transitional forest were *Bersama abyssimica, Cordia abyssimica, Croton sylvaticus, Ekebergia capensis, Millettia stuhlmannii, Prunus africana, Pteleopsis myrtifolia, Rauvolfia caffra, Tabernaemontana elegans, Voacanga africana* and *Xylopia parviflora*. There was a well-defined shrub layer consisting mainly of *Rothmannia manganjae* and the twining fern *Lygodium kerstenii*. The dominant tree species in the moist evergreen forest was *Newtonia buchananii*, other typical canopy trees were *Blighia unijugata, Celtis gomphophylla, Celtis mildbreadii, Erythrophleum suaveolens, Millettia stuhlmannii, Morus mesozygia, Psydrax parviflora* subsp. *chapmannii, Sysnsepalum brevipes, Trichilia dregeana* and *Trilepsisium madagascariensis. Milicia excelsa* was an occasional large tree and *Khaya anthotheca* was common near water courses. *Aidia micrantha* and *Funtumia africana* were prominent in the sub-canopy. In the well-defined shrub layer *Rothmannia manganjae*, *Tabernaemontana ventricosa* and *Tarenna pavettoides* were prominent with the bamboolike grass, *Olysa latifolia* also common.
Zomba Forest Reserve	The Zomba Forest Reserve is located in the district of Sussundenga, Manica Province, approximately 80 Km northeast of Dombe, close to the base of the Chimanimani Mountains. The topography is mainly flat to slightly undulating. Two main eastwards flowing streams cross the Reserve, the Mucutuco stream in the northern part and the Mevumozi stream in the South. The soils vary from sandy loams to sandy clay loams. The reconnaissance survey of the reserve performed by Muller et al (2005) found that the main vegetation type of the Zomba Forest Reserve was moist evergreen lowland forest. The dominant canopy tree was *Newtonia buchananii.* Other typical tree species were *Albizia glaberrima, Blighia uniugata, Celtis gomphophylla, Milicia excelsa, Millettia stuhlmannii, Khaya anthotheca, Synsepalum breviper* and *Trilapisia madacascariensis.* Characteristic trees of the sub-canopy and sapling layer were *Aidia micrantha, Aporrhiza nitida, Craterospermum schweinfurthii, Funtumia africana, Glenniea africana and Rothmannia mangangae* (also common in the shrub layer). The dominant species in the well-defined shrub layer was *Rinorea ferruginea* with *Coffea salvatrix, Dracaena mannii, Erythroxylum emarginatum, Tabernaemontana ventricosa* and *Tarenna pavettoides* also common.
Maronga Forest Reserve	The Maronga Forest Reserve is located in the foothills of the Chimanimani Mountains, Manica Province, approximately 100 Km South-West of Dombe. The topography is hilly and the soils are quartzitic sands along the Chimanimani Mountains and reddish clayey loams in the hills to the east of them. The Maronga forest reserve is among the least disturbed by human activities. Its vegetation shows high variability, associated with the steep topography and water streams. Muller et als (2005) survey found that the forest was generally very well preserved. The reserve, however, could only be visited on foot, and only a small portion of it was assessed. Mueller et al. (2005) state that the hills of the reserve were essentially covered with *Brachystegia spiciformis*-Woodland. There was also some well-preserved lowland moist evergreen forest along the base of the Chimanimani Mountains.

	The dominant tree species in this woodland was *Brachystegia spiciformis* with *Burkea africana* sometimes dominant. Other common trees were *Diplorhynchus condylocarpon, Maprounea africana, Millettia stuhlmannii, Pterocarpus angolensis* and *Uapaca kirkiana*. Typical shrub species were *Brackenridgea zanguebarica, Canthium ngonii, Flacourtia indica, Hymenocardia acida* var*. mollis, Hymenocardia ulmoides* and *Vernonia muelleri* subsp*. muelleri*. Along drainage lines there were mainly evergreen species such as *Craterospermum schweinfurthii, Erythroxylum emarginatum, Englerophytum magalismontanum, Erythrophleum suaveolens, Garcinia kingaensis* and *Synsepalum brevipes*.
Ribáue Forest Reserves	These two forest reserves are located side by side on the M'palue and Ribaue Mountains, at the base of which lays the village of Ribáuè, in Nampula. Fragments of the forest show dominance of miombo species, particularly *Julbernardia globiflora, Uapaca, Sterculia*, and pure stands of bamboo (*Oxytenanthera* sp). There are a series of streams with springs on both mountains, and the streams are covered with gallery forest comprised of *Milicia excelsa, Xylopia* sp*., Harrungana madagascariensis, Trema orientalis, Breonadia salicina, Syzygium owariense*, among others. On the mountain slopes patches of closed canopy forests are mixed with bamboo.
Mecuburi Forest Reserve	The Mecuburi Forest Reserve is situated in the north of the Nampula Province, near the town of Mecuburi. The topography is gently undulating with a number of drainage lines running towards the Mecuburi River, which crosses the Reserve from the southwest corner towards the middle of the eastern boundary. The soils are mainly sands grading to clayey loams in some places. The reconnaissance survey of the reserve performed by Muller et al (2005) found that the main vegetation type of this reserve was Brachystegia-Woodland. Throughout the Reserve the woodland showed considerable variation in its species composition. Different sub-types occurred in different parts which graded into each other in some places. Over large area *Brachystegia spiciformis* was the dominant tree species, sometimes co-dominant with *Julbernardia globiflora*. In other parts *Brachystegia bussei* was dominant and sometimes *Brachystegia boehmii* or *Brachystegia utilis* were prominent components. Other typical tree species which were fairly frequently encountered were *Afzelia quanzensis, Burkea africana, Combretum molle, Combretum zeyheri, Cordyla africana, Crossopteryx febrifuga, Diplorhynchus candylocarpon, Erythrina livingstoniana, Hyphaena petersiana, Lannea stuhlmannii, Maprounea africana, Millettia stuhlmannii, Olax dissitiflora, Piliostigma thonmingii, Pseudolachnostylis maprouneifolia, Pteleopsis myrtifolia, Pterocarpus angolensis, Schrebera trichoclada, Sclerocarya birrea, Strychnos madagascariensis, Strychnos spinosa, Swartzia madagascariensis, Terminalia sericea, Uapaca kirkiana, Uapaca nitida* and *Xeroderris stuhlmannii*. The bamboo species *Oxytenanthera abyssinica* occurred sporadically throughout. Characteristic shrubs or small trees were *Annona senegalensis, Cleistochlamys kirkii, Dalbergia melanoxylon, Deinbollia* sp., *Dielsiothamnus divaricatus, Flacourtia indica, Grewia* ssp. *Holarrhena pubescens, Hugonia orientalis, Monodora grandidieri, Monodora junodii, Ochna* sp. and *Vangueria infausta*. Towards areas with a high water table *Gardenia ternifolia* subsp. *jovis-tonantis, Parinari curatellifolia, Syzygium guineense* subsp. *guineense* and a large leafed *Combretum* species were typical.

The coastal forests are subdivided into two phytogeographical regions:

- The Zanzibar- Inhambane regional mosaic extending from the mouth of the Limpopo River (latitude 250S) to the Rovuma River (and northwards).
- The Tongaland- Pondoland regional mosaic (TPRM) extending southwards from the Limpopo River.

These two phytochoria differ floristically, but both comprise a complex matrix of forests (Sand Forests (Miombo woodlands, Evergreen forests, Riverine forests, Dune forests, wooded grassland, Secondary grassland, seasonally flooded edaphic grasslands, and Mangroves communities). In northern Mozambique, the width of the coastal belt mosaic varies considerably, as it penetrates further inland along broad river valleys. Mangrove forests are floristically well developed in the northern and central sectors of the coast and less so long the southern part. They are seldom very extensive between their landward and seaward faces (except at the Zambezi River delta) and are semi-continuous along the coast. The mangrove forests are classified separately from other natural wood vegetation. In fact they are distinctive by their location along the coast in the river mouths. Being evergreen are composed of *Avicenia marina, Ceriops tagal, Sonneratia alba, Rhizophara mucronata, Bruguiera gymnorrhiza, Bruguiera cylindrica, Heritiera litoralis, Xylocarpus grannatum, Pemphis acidule* and *Lumnitzera racemosa.* They have a physiognomy between the low woody vegetation to stand of more than 10 m high. Mangroves occur most of the time in small units.

Dune vegetation is the most fragile forest type of Coastal Forest system. Species: *Mimusops caffra*, *Diospyros rotundifolia*, *Sideroxylon inerme*, *Euclea natalensis*, *Eugenia capensis*, *Olax spp*, *Bridellia catharrtica* and *Brexia madagascariensis* among others. Due to the long history of anthropogenic land use along the coast, much of this landscape today comprises a mosaic of agricultural fields, with grassy follow and the orchards of exotic trees species, such as coconut (*Coco nucifera*), cashew nut (*Anacardium occidentale*) and mango (Mangifera *indica*). In general, a more or less continuous cover of dune forest occurs between Ponta do Ouro in the south and Bazaruto in the north. Following the dune forest there are, grasslands, wooded grassland, swamp forests (in the South), and woodland. The parabolic Coastal dune a stretch from Bazaruto to Ponta de Ouro and beyond to Natal, at Malazi River (280 57'S) (850 km long) characterized by high parabolic dunes and north –oriented capes and barrier lakes. These dunes systems attain heights of 120 m and are considered to be the highest vegetal dunes in the world (Massinga & Hatton, 1996). Evergreen forest occur, also along the coast, principally over the Chiringoma hills where *Erythrophloeum suaveolens* (Missanda), *Millettia stuhlmannii* (Panga-panga), *Pterocarpus angolensis* (Umbila), etc. are very frequent, and in some restricted locations, in

Gaza and Inhambane provinces, where it is composed of *Androstschys johnsonii* (Mecrusse) also known as Cimbiri. Most of this forest type falls in the class of High Forest (Productive Forest).

Miombo Woodlands are geographically located in the northern of Limpopo River Coastal area. The Miombo woodlands are composed mainly of deciduous woody vegetation where *Brachystagia spp* and *Strichnos spinosa* are the dominant species in some locations. Sometimes they appear in the pure stands. *Brachystagia* is commonly associated with *Julbernadia globiflora*, *Pterocarpus angolensis* (Umbila), *Burkea africana*, *Bridelia micrantha*, *Cynometra* sp., *Dalbergia melanoxylon*, *Swartizia madagascariensis*, *Millettia stuhlmannii* (Panga-panga, etc. while *Strichnos* is usually associated with *Combretum spp*, *Terminalia spp, Pteleopsis myrtilifolia* etc.

These formations occur in broad extent in the Northern Provinces (Cabo Delgado, Niassa, Nampula and Zambézia) and confined in smaller scattered areas in the Southern Provinces and in the center of the country where the association of *Trichilia emetica* and *Sclerocary birrea* becomes sometimes dominant. The dry deciduous tropical forests that are part of the extensive Miombo woodland vegetation located in Nangade and Mueda districts of Cabo Delgado are composed by *Pterocarpus angolensis* (Umbila), *Bombax rhodognaphalon*, *Sterculia africana*, *Dalbergia melanoxylon*, *Sterculia quinqueloba*, *Millettia stuhlmannii* (Panga-panga, *Julbernadia globiflora, Afzelia quanzensis, Brachystagia spp* and *Syzygium guineense* among others.

Sand Forests have a poorly developed understorey, and is characterized by the presence of the following tree species: *Dialium schlechteri*, *Afzelia quanzensis*, *Balamites maughamii* (precious), *Newtonia hilldebranddtii*, *Pteleopsis myrtifolia*, *Drypetes arguta*, *Hyperacanthus microphyllu*, and *Erythrophleum lasianthum*). These forests have a distinctive boundary (1-2 m) of almost bare soil protecting it from the effects of annual fires. The Sand Forest rarely burns and fires usually stop at the border, creating a unique environment for itself. The more open, mixed woodland forest is characterized by common, woody savanna species such as *Acacia burkei, Albizia veriscolor*, *Afzelia quanzensis*, and *Albizia adianthifolia*. In addition, it has a well-developed grass understory represented by *Aristida*, *Ponarthria* and *Perotis* species. The soils are homogeneous, gray siliceous, aeolian sands, which are highly leached (dystrophic) and relatively acidic (water pH c. 6.1). Matutuine district vegetation has the unique and rare forest types known as Sand Forests or Licuati forest.

Table 13 Summary description of coastal forest reserves in Mozambique

Reserve	Description
Cabo Delgado Province	
Name	***Quirimbas National Park***
Location	12°00'00" S - 12°55'04" S; & 39°10'00" E - 40°39'44" E
Area	Total area: 7,506 sq. km. 5,984 sq. km are terrestrial. 2,122 sq. km are coast line and marine
Description	Miombo woodlands, coastal forests and thickets with smaller areas of wet forest existing at the base of inselbergs. Altitude 0 - 200m asl along the coast, reaching 600 m asl at the interior. Hot and dry coastal plain with annual rainfall of 900 mm. Also areas of mangrove, coral reefs and seagrass beds. Few biological studies have been completed
Conservation	National Directorate of Conservation Areas of the Tourism Ministry; Fishing Department and Forest Department contribute to the management of the Quirimbas National Park. And NGO's including WWF and IUCN.
Nampula Province	
Name	***Matibane Forest Reserve***
Location	14º36' S - 40º48' E
Area	11 109 ha (National Directorate of Forest and Wildlife (DNFFB), 2005 GIS data).
Description	Altitude 0 -120 m asl. The Reserve includes areas of marine sand soil, alluvial soil and coastal dunes, of significant salinity. An area of approximately 4,200 ha is covered by *Androstachys johnsonii.* The diversity of the fauna is low, with 21 species of small mammal, few large mammals and 40 species of birds.
Conservation	The reserve was gazetted in 1957. It is managed by the National Directorate of Land and Forestry. The marine resources are managed by the Fishing Ministry
Zambezia Province	
Name	***Derre Forest Reserve***
Location	17º00' S - 36 º00' E
Area	158 290 ha (National Directorate of Forest and Wildlife (DNFFB), 2005 GIS data).
Description	Predominant species *Brachystegia spiciformis*
Conservation	The reserve was gazetted in 1957. It is managed by the National Directorate of Land and Forestry. The marine resources are managed by the Fishing Ministry
Sofala Province	
Name	***Inhamitanga Forest Reserve***
Location	18˚10' S; 35˚2' E
Area	1 704 ha (National Directorate of Forest and Wildlife (DNFFB), 2005 GIS data)
Description	Areas of evergreen forest commonly host *Celtis mildbraedii* and *Drypetes gerrardii*. Dry deciduous forest areas commonly host *Millettia stuhlmannii.* Soils are mostly sandy, turning to clays in natural grassland areas.
Conservation	The Reserve was gazetted in 1957. It is managed by the National Directorate of Land and Forestry
Name	***Nampacué Forest Reserve***
Location	18˚30' S - 35˚37' E
Area	2 620 ha (National Directorate of Forest and Wildlife (DNFFB), 2005 GIS data)
Description	Predominantly *miombo* woodland dominated by *Brachystegia spiciformis*. The Reserve contains areas of evergreen forest and protects the transition from

	undifferentiated coastal forest to Zambezi inundated grasslands
Conservation	The Reserve was gazetted in 1957. It is managed by the NDLF. There are Game Reserves around the Forest Reserve, in addition to Marromeu National Park. The Game Reserves aim to protect buffalo

5.8 Anthropogenic Uses

The majority of Mozambicans live in rural areas, relying on natural resources for daily livelihoods. Subsistence agriculture is practiced by the majority of the rural poor, and commercialization of products only takes place when there is surplus production. The collection of firewood and the production of charcoal for cooking and heating represent 85% of the total energy consumption in the country. People in rural areas collect various products for subsistence from the forest, including timber and non-timber forest products.

The timber products collected from forests include:

- **Fuel wood and charcoal:** More than 80% of the energy requirements in rural areas in Mozambique are met on fuel wood. The high level of wood biomass requirement in both rural and urban areas means that there is a great pressure on the forest resources to provide the energy needs firewood.

- **Construction material:** Most of the houses in the rural areas and peri-urban areas are of traditional nature made up of poles and laths for the frame, and grass for roofing. The species *Diasporas rotund folia, Catunaregam spinosa, Apodytes dimitiata* are among the most valuable for poles in southern Mozambique due to their resistance to insects and high durability. All these species are found in coastal forests.

- **Wood for carving:** The carving industry can be divided into two parts. First, the commercial carving and the production of household (which involves selected species such as *Dalbergia melanoxylon* and *Spirostachys Africana Trichilia emetica, olaxdissitiflora, Apodites dimitiata*).

Non timber products derived from forests include:

- **Food plants:** Edible fruits -- Wild fruits from coastal forests such as *Strychnos spinosa*, *S. madagascarienses*, *Trichilia emetica*, *Vangueria infausta*, and *Mimusops caffra* are highly valued by local people Tubers -- tubers supplement carbohydrates, vitamins and minerals to rural communities. Species of *Dioscorea* sp. are the most readily available food reported to be eaten by local communities around the coastal forests in northern Mozambique during the

famine periods. Women are known to be the ones who collect edible tubers for the household consumption.

- **Medicinal plants:** About 80% of the people in Mozambique use traditional medicine to treat or cure various ailments. Despite the existence of specialized people involved in the collection and administration of traditional medicine, knowledge about the use of medicinal remedies is widespread. Nowadays, some plant species found in the coastal areas of Matutuine District are being protected due to their perceived scarcity. *Cladestemon kirkii, cardiogyne africana, and acridocarpus natalensis* are the most sought after species due to their perceived value.

- **Game:** Bush meat or game is a source of protein for rural communities. Although hunting of animals for commercial purposes is illegal, the practice is widespread throughout the country. However, hunting of some species for household consumption is granted by the Decree 12/2002 (DNFFB, 2002). These species are found in the coastal forests.

Other products and services derived from forests include**:**

- **Beekeeping:** Beekeeping has been used to improve the livelihood of the community. In most parts of the country honey is collected from two both underground and the beehives. Same communities use traditional hives made with the bark of the trees and in other with same financial support they were provided with some improved hives and explained the need to conserve the forest for the production of honey.

- **Honey:** has been used for both food and medicinal purposes. The production of honey depends on the availability of flowering plants. The flowers provide the substances (e.g. nectar) for production of the honey.

- **Sacred values:** There are several cultural assets along the Coastal Forests. The Chirindezene and Licuati sacred forests in the south are some of the well-protected sacred groves by local custom and used for ceremonies and cerebrations. In Catuane a forest inventory for a local community identified four cultural areas in the forest, normally used for meeting (Banjas) and other community activities. These local cultural assets are equally important compared with sacred groves. Many local cemeteries are also found in the Coastal Forests and communities treat them as cultural and spiritual values.

There are at least two types of sacred coastal forests in southern Mozambique: the “gwendzelo” and “phahlelo”. The Gwendzelo is made on places on sites where the graves of the ancestors (“régulo”) are located. The local communities use these forests for sacrifice ceremonies. The “phahlelo” are the ceremonies made at the household level for the wellbeing of a restricted family. The family headmen or a traditional medicine practitioner performs the ceremonies. The phahlelo can also be undertaken under a sacred tree. The most common sacred trees in the coastal areas pf southern Mozambique includes *Sclerocarya birrea*, *Garcinia livingstonei* and *Manilkara discolor*. In northern Mozambique, local communities use baobab (*Adansonia digitata*) tree for the ceremonies.

Tourism: The utilization of forests for tourism purposes is taking shape in Mozambique. Communities are establishing an ecotouristic center in Madjadjane area as a livelihood strategy. This initiative is based on the conservation of coastal forest for enhancing better life for the local communities. The initiative is being funded by IUCN. Similar initiative is emerging in the Quirimbas National Park. The overall idea is to use the conservation of coastal forests as the means to earn income for improvement of standards of living of the local communities. WWF-Mozambique and other counterparties are funding the idea.

Many tree species of the miombo woodlands have multiple uses, see table below. Some of them are protected by local communities because of their importance as the basis of traditional beliefs. These trees are normally left in the agriculture fields ("machambas") or simply not cut for firewood because they produce fruits or medicines. Some trees are protected as it is believed that they "produce water" because they grow in the river streams and "because if you cut them the water source will dry out" (Soto and Sitoe, 1994 in Muller et al., 2005). Woody species (dbh _10cm) identified inside the miombo woodland sample plots at the Bárue study site, Manica, Mozambique. Shaded species are the ten most frequent and the number in parenthesis after is the average number of stems per ha (Adapted from Muller et al., 2005).

Table 14 Anthropogenic uses of Miombo Forest Products (summarized in text)

Scientific name	Local name	Family	Uses					Life form
Albizia brevifolia		Fabaceae	2					D
Albizia versicolor	Tanga-tanga	Fabaceae	2					D
Annona senegalensis	Muronro	Annonaceae		F	M			U
Antidesma venosum	Muchongue	Euphorbiaceae	4					I
Bauhinia galpini (7)		Fabaceae		F		O		U/L
Bauhinia thonningii (18)	Mussequesse	Fabaceae	3	F	M		E	D

Burkea africana (5)	Mucimbi	Fabaceae	2			O		D
Cassia abbreviata		Fabaceae			M			D
Combretum imberbe	Mulangane	Combretaceae			M		E	D
Combretum molle	Mugongoni	Combretaceae			M	O		I
Combretum sp.		Combretaceae						I
Combretum zeyheri		Combretaceae			M	O		I
Crossopterix febrifuga (6)	Mucombegoa	Rubiaceae			M	O	E	I
Diplorhynchus condylocarpon (18)	Muntoa	Apocynaceae			M	O		U/I
Entandrophragma caudatum	Mbuti	Meliaceae	p					D
Erythrophleum africanum	Muavi	Fabaceae	3	F		O	E	D
Ficus capensis	Mucuio	Moraceae		F	M	O		D
Friesodielsia obovata	Muchinga	Annonaceae		F				U/L
Grewia flavescens	Galupanda	Tiliaceae						U
Hymenocardia acida		Euphorbiaceae			M	O		I
Kigelia africana		Bignoniaceae	3		M			D
Lannea schimperi		Anacardiaceae	4					I
Lonchocarpus capassa	M'pacassa	Fabaceae			M	O		D
Markhamia obtusifolia	Mufeia	Bignoniaceae						I
Millettia stuhlmannii (41)	Panga-panga	Fabaceae	1					D
Monodora stenopetala		Annonaceae						I
Ozoroa reticulata		Anacardiaceae						D
Parinari curatellifolia	Nongamunyo	Crysobalanaceae	3	F	M			D
Pericopsis angolensis	Muanga	Fabaceae	3		M			D
Pseudolachnostylis maprouneifolia (13)	M'sonzoa	Euphorbiaceae	3		M	O		D
Pteleopsis myrtifolia	Mungorozi	Combretaceae	2					D
Pterocarpus angolensis	Umbila	Fabaceae	1		M	O		D
Pterocarpus rotundifolius (7)	Muganu	Fabaceae						D
Sclerocarya birrea	Mefula	Anacardiaceae	2	F	M	O		D
Sterculia africana		Sterculiaceae						D
Strychnos madagascariensis (5)	Nyacateme	Loganiaceae		F				I
Syzygium cordatum		Myrtaceae	3	F				D

Tabernaemontana elegans		Apocynaceae			M	O		I
Terminalia sambesiaca (9)	Curungu	Combretaceae						D
Terminalia sericea	Mucoudoni	Combretaceae	3		M	O		D
Vangueria infausta	Mambziro	Rubiaceae		F	M			U
Vitex payos		Verbenaceae		F				U
Xeroderris stuhlmannii	Mulonde	Fabaceae	3		M	O		D
Ziziphus mucronata		Rhamnaceae		F	M	O		D

(Source: Muller et al., 2005) Uses: p, 1,2...4 - classification of the timber species according to Mozambique's Forest Regulation[1] (p=precious, 1=1st class; 4=4th class); F=food (fruits, leaves, gums, others); M=medicine (leaves, roots, fruits, flowers, others); O=other uses (building material, ornamental, utensils, traditional ceremonies); E=firewood. **Life form (strata):** D=dominant tree (total height>10m); I=intermediate/Subdominant, medium tree (3<total height<10m); U=understory, small tree (total height < 3m); L = liana. According to their commercial or scientific value, rarity, use, wood resistance and quality, timber species are classified as precious, first class, second class, third class and fourth class, as listed in Annex 1 of this regulation (DNFFB 2002b. *Regulamento da Lei de Florestas e Fauna Bravia. Decreto 12/2002 de 6 de Junho. Maputo, Moçambique.* This is the official reference to the classification system. In practice, the classification system is highly related to the timber market demand so that highly demanded species are classified precious or first class. The classification is used for timber pricing (to set the logging tax) as follows: precious, USD80; first class, USD20; second class, USD12; third class, USD8 and fourth class USD4. Precious and first class species sell in domestic and international markets while the other classes (also called secondary timber species) sell mostly in domestic markets.

Examples of species protected by communities are *Dolichandrone alba* used to make wooden cooking spoons, *Sclerocarya birrea* and *Trichilia emetica* for fruit in the southern region of Mozambique. Medicinal plant species from miombo woodlands include *Brachystegia spiciformis, Markhamia obtusifolia*, *Kigelia africana*, *Annona senegalensis* and others. There also other specific uses of the miombo plant species such as *Ancylobrotus kirkii* for gum, *Albizia versicolor* for soap, *Grewia monticola* for toothbrush and *Rhoicissus reviolli* and *Lannea stuhlmannii*.

The use of a variety of forest products by local communities reduces expenses in the order of billions to the government that might import medicines, energy and other forest-based products. Villagers, in former times, used the forest resources sustainably, but because of the circumstances - population increase and the consequent need for more agricultural areas, the need for more income, etc. - this has led to a modification of traditional resource uses which are less sustainable. Promotion of other income-generating activities, alternative sources of energy and improvement of the agricultural systems may improve the living standards of rural communities at the same time that they preserve the value of the forest ecosystems.

The commercialization of other products has the particularities of each one. Building materials are commercialized in a scheme closer to that of firewood. Other products such as wild foods (including fruits, leaves, meat and honey) are commercialized in local markets in the cities or close to the roads by rural population, generally by women and children. Medicinal plants are generally given by traditional healers to their clients under prescription or sold in suburban and urban markets. Woodcarvings are

another important product from miombo woodlands. Woodcarvers are normally people living in rural areas and some of these crafts are household utensils such as wooden spoons and pestles that are necessary equipment for each rural and suburban (and some urban) households. Other woodcrafts are carvings of different kinds of things used as adornment objects for people in the cities. The most famous woodcrafts of Mozambique are made of *Dalbergia melanoxylon* and *Spirostachys africana,* and are commercialized all over the world.

5.9 Fauna

Mozambique's diverse landscape, riparian habitats, wetlands and coastal areas provides a range of habitat for wildlife. There are a total of 5,500 species of flora and 4,271 of terrestrial wildlife, of which 72 percent are insects, 17 percent birds, 5 percent mammals and 4 percent reptiles. Of these species, many are endemic to Mozambique, including 2 species of mammal, 7 reptiles, 11 freshwater fish and 5 vascular plant species. The IUCN lists 120 Mozambican species as endangered out of 300.

The country's diverse wildlife populations include a variety of mammals: cape buffalo (Syncerus caffer), African elephants (*Loxodonta africana* spp), Black rhinoceros (*Diceros bicornis minor*), White rhinoceros (*Ceratotherium simum*) warthogs (*Phacochoerus africanus*), giraffes (*Giraffa camelopardalis giraffa*), zebra (*Equus quagga crawshaii* and *E. burchellii*), a variety of antelope including bushbuck (*Tragelaphus scriptus*), Nyala (*Tragelaphus angasii*), Common Eland (*Tragelaphus oryx*), Sitatunga (*Tragelaphus spekii*), Greater Kudu (*Tragelaphus strepsiceros*), among many others. Additionally, lions *(Panthera leo*), leopards (*Panthera pardus pardus*), cheetah (*Acinonyx jubatus*), hyenas (*Crocuta sp*., *Hyaena sp*.), wild dogs (*Canis adustus, Canis mesomelas, Lycaon pictus*) and foxes (*Otocyon megalotis*) and a variety of other carnivores living in Mozambique. Hippopotamuses (*Hippopotamus amphibius*) are found in slow-moving waterways and a variety of whales and dolphins (*Cetacea*) live in the Indian Ocean, and venture into Mozambique's coastal waters.

Other common mammals which in most instances are too numerous to list by species, and are thus listed by Family, include a variety of: tenrecs and moles (*Chrysochloridae*), shrews (*Macroscelididae* and *Soricidae*), aardvarks (*Orycteropodidae*), hyraxes (*Procaviidae*), manatees and dugongs (*Dugongidae*), primates including bushbaby (*Galagidae*), and Old World monkeys (*Cercopithecidae*), baboons (*Papio ursinus* and *Papio cynocephalus*). Additionally, a variety of species of rodents are numerous in Mozambique, including rats (*Bathyergidae*), porcupine (*Hystrix africaeausfralis*), squirrels (*Sciuridae),* mice (*Gliridae, Muridae*, and *Nesomyidae*), rabits (*Leporidae*), hedgehogs (*Erinaceidae*), bats (*Emballonuridae, Molossidae, Nycteridae, Pteropodidae, Rhinolophidae*, and *Vespertilionidae*), and anteaters (*Manidae*).

Over 740 species of birds have been documented in Mozambique, and are too numerous to name here. Many of these species are sea birds or rely on wetlands and are not expected to be directly affected by the REDD+. Commonly seen birds include greater and lesser flamingos (*Phoenicopterus roseus*, *Phoenicopterus minor*), storks (*Circoniidae*), herons (*Ardeidae*), pelicans (*Pelecanidae*), cormorants (*Phalacrocoracidae*), kingfishers (*Alcedinidae*), pigeons and doves (*Columbidae*), geese, swans and ducks (*Anatidae*), and owls (*Tytonidae* and *Strigidae*). Common scavenger birds include crows and white necked ravens (*Corvus sp*.) and bustards (*Otididae*), and game birds such as guinea fowl (*Numididae*), quail (*Turnicidae*), and pheasants and partridges (*Phasianiidae*).

Numerous reptiles, amphibians and invertebrates are present in Mozambique and project specific ESIAs should ensure that potential Project effects on specific species and their habitat are evaluated.

5.10 Quirimbas National Park (QNP)

This park was established in June 2002. It covers 110 kilometres along the northeast coast of Mozambique, and contains 11 of the Quirimbas islands in the southernmost section. The park has a tropical climate with a rainy season from December to April and a drier but cooler season from May to September, much like the rest of Mozambique in general. The park protects 750,639 hectares of coastal forest, mangroves and coral reefs (WWF). Some of the animals found there include elephants, lions, leopards, crocodiles and wild dog. Habitats include mountains, forests, woodland, savannah, mangroves, beaches, coral reefs and sea grass beds. Marine life found here includes sea turtles, dugongs and at least 375 species of fish, including threatened pipefish and seahorses. (Source Wikipedia, accessed 2015)

5.11 Gile National Reserve (GNR)

Gile National Reserve was first declared as a partial hunting reserve in 1932. It is located in the districts of Pebane and Gile in Zambezia Province and covers and area of 2,860 km^2. There is miombo forest, dambos, reforested savannah and riverine vegetation along various rivers and streams. There are also granitic Kopjes' habitats. There are 95 species of mammals, including elephant, lion, leopard, wild dog, spotted hyena, kudu, nyala and waterbuck, together with 114 species of birds.

6 Socioeconomic Baseline

6.1 Introduction

This section provides a summary of the country's demographics, political structure and infrastructure, and provides a more in depth discussion of the demographics and economy of uses of forest resources. This social, economic and cultural baseline study is designed to contribute to the identification of potential social and economic risks associated with REDD+, as well as assist in the identification of mitigation measures to reduce those risks.

6.2 Country demographics

Mozambique is made of 3 regions- South, Center and North and 11 provinces- Maputo city, Maputo province, Gaza, Inhambane, Sofala, Manica, Zambézia, Tete, Nampula, Niassa and Cabo Delgado. The population includes three main ethnic groups- Tsongas on the south, Shona in center and the Macua-lomue in the northern region. The 3 groups make about 99.66 percent of the total population, followed by the Europeans with 0.06 percent; Euro-Africans with 0.2 percent and the Indians with 0.08 percent.

The country's population is estimated at 21.8 million (2008), 63% of whom live in rural areas. During the 16 years of civil war that followed the country's independence from Portugal in 1975, much of the large rural population migrated to urban centers and across international borders to escape the violence. Following the declaration of peace in 1992, many returned to their rural homes, relying on subsistence farming, forest products and the development of cash-cropping for their livelihoods (Hatton et al. 2001; ARD 2002; FAO 2005a). About 52 % of the country's population is female and 45.7 percent are under the age of 15 years. The annual population growth rate of the past two decade stands at 2.7 percent, having the population increased from 6.5 million in 1950s to 7.5 million in 1960, 12.1 million in 1980, 16 million in 1997 and 21 million in 2007. Table 5 below presents an historical population breakdown by province and gender from census of 1997 and 2007 and a projection for 2013.

Nampula and Zambézia are the most populated provinces with a population of 4,085,000 and 3,890,000, respectively. Niassa province is the least populated and Maputo city the most populated.

Niassa, Tete and Manica provinces are the fastest growing with annual growth rate equal or above 4% (well above the national average), while the Inhambane, Gaza and Maputo city the annual growth

rate is below 2%. Growth in population is primarily driven return immigration, especially to provinces the fastest growing economy, while the lowest growth rate is associated emigration.

Though Mozambique is undergoing a rapid urbanization process especially in the southern region (Inhambane, Gaza and Maputo provinces), the country remains predominantly rural. In 2010, about 62% of the total population lived in rural areas. The country will remain rural in years to come with rural population project at 54% in 2020, 46% in 2030, 39% in 2040 and 33% in 2050, according to the United Nations Population Division. According to the 2007 Population and Housing Census, Mozambique is predominantly a Christian country. Christians are more than half (56.1%) of the entire population; Muslims population 17.9%; 7.3% hold other types of belief and non-believers stand at 18.7%. While Christian population is fairly distributed across the country, Muslim communities are in big numbers in the northern region of Mozambique comprising of Nampula, Cabo Delgado and Niassa provinces.

Table 15 Population size (,000) by provinces 1997, 2007 and 2013.

	Size(sq. km2)	1997 (number/percentage)			2007 (number/percentage)			2013 (number/percentage)		
		Total	**% Male**	**% Female**	**Total**	**% Male**	**% Female**	**Total**	**% Male**	**% Female**
National	**801,590**	**16,076**	**7,703**	**8,373**	**20,632**	**9,930**	**10,702**	**24,366**	**11,752**	**12,614**
Niassa	122,827	809	5.1	4.9	1,213	6.0	5.8	1,532	6.4	6.2
C. Delgado	78.778	1,380	8.7	8.5	1,634	8.0	7.9	1,830	7.5	7.5
Nampula	79,010	3,063	19.8	18.4	4,085	20.3	19.3	4,767	20.0	19.1
Zambézia	103,478	3,096	19.5	19.1	3,890	18.9	18.8	4,563	18.7	18.7
Tete	98,417	1,226	7.6	7.6	1,807	8.9	8.7	2,322	9.7	9.4
Manica	62,272	1,039	6.5	6.5	1,438	6.9	7.0	1,800	7.4	7.4
Sofala	68,018	1,369	8.7	8,4	1,686	8.3	8.1	1,951	8.1	8.0
Inhambane	68,775	1,157	6.6	7.8	1,305	5.8	6.8	1,451	5.5	6.3

Gaza	75,334	1,117	6.2	7.6	1,236	5.6	6.4	1,368	5.3	5.9
Maputo Province	22,693	831	5.1	5.2	1,225	5.9	6.0	1,571	6.4	6.5
Maputo City	346	988	6.3	6.0	1,112	5.4	5.3	1,210	5.0	5.0

Source: INE, II, RGPH, III RGPH 2007; Projecções da População 2007-2040.

6.3 Infrastructure of Mozambique

Infrastructure in Mozambique is generally poor and inadequate, especially in the many areas heavily affected by the civil war. The country has approximately 30,400 kilometers of highways, 5,685 kilometers of which are paved. Large sections of the remaining 24,175 kilometers of highway are virtually impassable during the rainy season. The World Bank is currently implementing an $850 million program to rebuild the road network, along with the coastal port system.

In addition to the road network, there is a total of 3,131 kilometers of railway, as well as 170 airports, although only 22 have paved runways (est. 1996). Major rail lines connect to South Africa, Malawi, and Zimbabwe. The latter two countries are dependent upon railway links with Mozambique since they are landlocked and must access Mozambican ports to send exports and receive imports. There are a total of six ports and harbors in Mozambique, with the largest being the port of Beira.

6.4 Land Use Practices of Mozambique

According to the USAID (2010) country profile, Mozambique has a total land area of 786,380 square kilometers, comprising three geographic areas: (1) a plateau and highland region running from the northern border to the Zambezi River (27% of total land); (2) a middle plateau region that extends south of the Zambezi River to the Save River (29%); and (3) a low-lying coastal belt running south from the Save River to the southern border (44%). The dominant vegetation is woodland, which covers roughly 78% of total land. About a quarter of the country's woodlands and forests are generally free from cultivation. Average annual deforestation is 0.3%. Protected areas comprise 6% of Mozambique's land area (World Bank 2009a; FAO 2005a; ARD 2002).

Agricultural land makes up 62% of Mozambique's total land area. Cultivated area was estimated at between 3.8 and 5.3 million hectares in 2002, with the large range attributed to inconsistent definitions, use of woodlands for cultivation and lack of data. About 3% of cropland is irrigated. An estimated 90% of producers (three million peasant families) are smallholders cultivating rain-fed land. Most smallholder production (63%) concentrates on staple food crops (maize, pigeon peas, cassava and rice) for

household consumption. The balance of production is cash crops such as cotton, tobacco, oil seeds and tea (17%) and vegetables (4%). Tree crops, especially coconut and cashew, are grown by small farmers and are a significant source of income in coastal areas of Inhambane and Gaza provinces north of Maputo. Much of the country's soil is nutrient-poor. Most smallholders have limited inputs, and yields are generally low. Smallholders also raise cattle, pigs, chickens and goats, although cattle production is limited by the prevalence of the tsetse fly in two-thirds of the country (ARD 2002; World Bank 2009a; FAO 2005a; USDOS 2010; FAO/WFP 2010).

The remaining 10% of producers are commercial farmers producing crops for the national market, agro-industry and export. Major agricultural exports are cotton, cashew nuts, sugarcane, tea and cassava. Large commercial operations cultivate an estimated 100,000 hectares, including about 40,000 hectares of industrial sugarcane plantations (35,000 hectares of which is under irrigation) near sugar mills in the southern Maputo and Sofala provinces (ARD 2002; USDOS 2010; FAO/WFP 2010).

Mozambique's coastline is 2515 kilometers long, and a wide range of marine fish products are available and marketed. The domestic market is mainly confined to the marine and coastal areas, although aquaculture production is increasing. Fishing accounted for 2% of GDP in 2008 (FAO 2010).

Thirty-seven percent of Mozambique's population lives in urban areas. An estimated 75% of urban residents live in unplanned informal settlements, many without access to safe water and sanitation. Most urban residents are engaged in subsistence agriculture at the outskirts of cities or in the informal labor market. About half the urban population lives on less than US $1.25 a day (UN-Habitat 2009; UN-Habitat 2008; World Bank 2006; Negrão 2004).

6.4.1 Land Use of Miombo Forests

An in depth study of land use and land use change in miombo forests in Africa, undertaken by the International Geosphere-Biosphere Programme (IGBP), Stockholm, Sweden in the late 1990s (Desanker et al. 1997), provides an excellent overview of how traditional exploitation of miombo forests affects the landscape in Mozambique. Desanker et al; (1997) found that at the time of writing their report that human population densities over much of the miombo region were relatively low, averaging about 15 persons per km^2. They however projected that population growth of 2.5-3.5 % per annum would result in greater demands on the land and its resources and changes in the kinds and intensities of land use. This has clearly been observed in Mozambique.

Their research found that there is considerable diversity in the ways people use miombo (Trapnell and Clothier 1937; Allan 1965; Puzo 1978). Apart from commercial farming (tobacco, maize, soya) and land set aside for wildlife conservation and tourism (national parks, safari areas and game reserves etc.) the

main form of land use is small-scale sedentary and shifting cultivation of maize, cassava, small grains and pulses. Where present, dambos are used for growing cereals and root crops during the wet season, and for growing vegetables and grazing livestock during the dry season. The interfluves are used for cultivating rain-fed crops, wet-season grazing, and as the source of wood for fuel and construction, as well as of various non-timber forest products (NTFPs). Apart from the drier areas of Zimbabwe and Tanzania, there are relatively few livestock, many fewer than people would like to have. The reasons are complex; low forage quality and animal diseases are major proximate constraints, themselves reflections of broader influences of climate, geology and soils (Bell 1982).

Many households depend on natural products derived from the surrounding woodlands and grasslands. These products include fuelwood, charcoal, timber, thatching grass, fibre, fruit, mushrooms, honey, edible caterpillars and other animals, organic inputs for fields, fodder for livestock, and many other items. At least 50 edible plant species are recorded from miombo (Malaisse 1978a). A number of cultural practices, largely unique to the miombo region in their extent, have developed in response to some of the prominent ecological features of miombo ecosystems. For example, the widespread traditions of bee-keeping, gathering mushrooms, and collecting edible caterpillars reflect, respectively, the dominance of prolific flowering entomophilous trees (Clauss 1992); the dominance of tree species with ectomycorrhizal associations, many of which produce edible mushrooms (Pegler and Piearce 1980); and periodic eruptions of some lepidoptera populations (Malaisse-Mousset et al. 1970).

The farmers use miombo landscapes in a fine-grained manner, exploiting localised patches of higher fertility and avoiding areas of particularly poor soils (Carter and Murwira 1995). Because of the low fertility of most of the soils, few areas, other than fertile alluvium in river valleys, can be cultivated continuously without a decline in fertility. Organic amendments (leaf litter, manure), termitarium soil, ash from burnt brush piles and, where available and affordable, inorganic fertilizers, are used to counter low and declining soil fertility (Swift et al. 1989; Carter and Murwira 1995). Shifting cultivation is carried out where there is enough land, though this is changing as population pressures increase (Chidumayo 1987a; Stromgaard 1989).

Slash-and-burn (ash-fertilisation) agriculture in particular is widely practised in miombo. The practice appears well adapted to the generally infertile soils of miombo, particularly in the wetter regions where woody plant biomass is high and cut trees regenerate rapidly through resprouting. The best-known of these is the large-circle chitemene system practised by the Bemba people of northern Zambia and southeastern Zaire (Richards 1939; Allan 1965; Puzo 1978). In this system the foliage and outer branches of trees are cut from an outfield area and stacked in an infield area where they are left to dry before being burnt just prior to the annual rains. The outfield area is about 5-8 times larger than the

infield area, which averages about 0.3 ha (range 0.02-1.03 ha). Traditionally, the trees are not stumped but are allowed to resprout before again being harvested about 25 years later (Chidumayo 1987a; Stromgaard 1988).

The plots to be chopped are selected on the amount of wood available for burning (Puzo 1978). By concentrating the brush into large piles, rather than spreading them over a wider area, farmers obtain a deeper ash bed and a greater fertilising effect through the release of plant nutrients and increases in soil pH (Stromgaard 1984; Mapiki 1988; Araki 1992). A deeper ash bed reduces the amount of soil tillage required, an advantage to farmers who have no livestock, while the greater fertility contributes to larger crop yields. This means that the plots to be cultivated can be smaller and more manageable. More brush also means a hotter fire, more complete combustion of the plant material, and the suppression of weeds during the first few years of cultivation. The land is cultivated until the added fertility is exhausted or until the regenerating woody vegetation and weeds make continued cultivation unproductive. The plot is then abandoned to a long fallow period and new fields are opened up (Puzo, 1978).

Various other forms of shifting cultivation occur within the region. Some are variants of the chitemene system described above, others involve short-rotation fallows. On inherently infertile soils, a long fallow period is necessary for replenishment of both the vegetation and soil nutrients. With the ongoing expansion of the human population in the region, leading to a reduction in the area of uncultivated land, fallow periods are becoming shorter and shifting cultivation is gradually being replaced by more permanent agriculture (Lawton 1982; Chidumayo 1987a; Stromgaard 1989). As the duration of the fallow declines, trees are felled rather than lopped to produce sufficient biomass to burn and fertilize the soil, reducing subsequent fallows to a fire-maintained wooded grassland called chipya. Eventually, most of the potentially arable land is cultivated more-or-less permanently. In the absence of more intensive soil fertility management, this is likely to result in a gradual and long-lasting decline in fertility.

6.5 Economy of Mozambique

Following the civil war, in an effort to rebuild the economy, the state ultimately reoriented economic policy in accordance with plans imposed by the International Monetary Fund, which emphasized decentralization and privatization and provided assistance to family farmers. Although agriculture has been the most widespread economic activity, remittances from migrant labourers in South Africa and revenues from tourism and the country's port and railway sector have been equally important historically as sources of foreign exchange. While all these sectors declined severely during the 1980s

and early ’90s because of civil unrest, they rebounded after the 1992 peace accord, and the industry sector —specifically, resource exploitation, aluminum smelting, and electricity production—also expanded. By the early 21st century, Mozambique had attained a significant amount of economic growth.

Mozambique’s 2008 GDP was US $9.7 billion. Agriculture accounts for 28% of GDP, industry 26% and services 46%. An estimated 54% of Mozambique’s population lives below the poverty line (2008). Life expectancy has fallen to 41 years, primarily due to the prevalence of malaria, HIV/AIDS, tuberculosis and waterborne disease. The national adult HIV and AIDS prevalence rate is over 16%, with four provinces registering rates above 20% (World Bank 2009a; UNDP 2009; USDOS 2010a; USDOS 2010b; FAO/WFP 2010).

6.5.1 Agriculture

Agriculture is the main activity for the vast majority of households in Mozambique. There are around 3.7 million smallholdings, out of which 24.1% are headed by women. The smallholders are responsible for the production of 95% of the agriculture output. The remaining 5% comes from around 400 commercial farmers mainly involved in cash crop production- sugar cane, tobacco, tea, citrus and livestock. There are significant differences in the food crops production across regions. While maize and cassava are produced almost across the country, sorghum production is confined to the northern region (Nampula, Niassa and Cabo Delgado provinces); the central region (Sofala and Zambézia) produces mainly sweet potatoes and rice. The southern region (Gaza, Inhambane and Maputo) have an edge in groundnut production.

Irrigation agriculture occurs primarily in the area along the Zambezi River, which is irrigated by the Cahora Bassa Dam and in the former settler areas in the south, particularly along the Limpopo River, which are irrigated by schemes developed in the 1950s and 1960s.

Cash crops are predominant in the central and northern regions; cotton and sesame in the north; sunflower and tobacco in the central region. While tobacco is predominant in Tete, sesame and sunflower are particularly produced in Manica province.

Animal breeding takes place throughout the country and although beef and pork were formerly important, chicken production is the main product now. Cattle are primarily farmed in the southern and central regions; while the northern region produces mostly ruminants (e.g. goats).

The use of fertilizers and pesticides for agriculture production by rural households is primarily associated with cash crop (tobacco and cotton) production in the central and northern regions. These

crops are promoted by large commercial farmers who provide technical assistance and incentive for smallholdings' involvement.

The sale of agriculture produce is the main and most important source of income for rural communities, especially in the central and northern regions. Wage labor, remittances and pensions are the most important sources of income for the southern region mainly because of the historical tendency for immigration of this region to South Africa.

6.5.2 Forestry

The role of forests in creating income among rural communities is undeniable. The forests along the Beira railway and in Zambézia province in the north have been exploited since independence as the country's key source of domestic fuel, firewood, and charcoal. South African and Chinese investors are interested in Mozambique's potential to provide wood for building materials and pulp for paper industries. Production of firewood and charcoal is predominant in all three regions. Significant hardwood forest reserves have survived deforestation, but more timber is cut than is replaced by reforestation initiatives.

While cutting long grass and collecting leaves is a dominant feature in the northern and central regions, households in the southern region are mostly involved in cutting wooden poles for house-building. Hunting is significant in the central and northern region.

6.5.3 Fishing

Mozambique's offshore waters contain lobster, tuna, mackerel, sardines, and anchovies, but are best known for the shrimp (prawns), are an important export commodity. Since 1973 production and marketing of saltwater fish, shrimp, and shellfish have increased steadily, and are the third highest contributor to the per household income in the country.

6.5.4 Mining

Mozambique is rich in mineral resources, and mining exploration and development is actively growing in the country. The Mineral industry of Mozambique plays a significant role in the world's production of aluminium, beryllium, and tantalum. In 2006, Mozambique's share of the world's tantalum mine output amounted to 6%; beryllium, 5%; and aluminum, 2%. Other domestically significant mineral processing operations included cement and natural gas. In 2012 the mining and quarrying sector accounted for 1.5% of the economy and energy accounted for 5%. However these sectors were expected to expand by more than 10% per year due to increased output of coal and gas. Gas reserves were estimated to be the fourth largest in the world.

Resources mined in the country include: aluminum, bauxite, coal, copper, iron ore, nickel and cobalt, tantalum, niobium and rare earth elements, and vanadium. In addition to these minerals, gold, silver and diamonds are mined in Mozambique. Gemstones mined in Mozambique include aquamarine, morganite, tourmaline, dumortierite, and garnets. Gems are principally mined in Zambezia, Tete and Niassa provinces.

Bauxite is mined at a small mine in Manica province, and is only a minor contributor to the country's GDP. Copper-containing tourmaline was mined from an alluvial deposit in the Alto Ligonha District of Zambezia Province starting in early 2004; the mines were still producing at the end of 2006. Mozambique has substantial coal deposits situated in the Moatize and Mucanha - Vuzi coal basins in the Tete province. The basin contains seven coal seams and has reserves estimated at 750 Mt. The Mucanha – Vuzi basin is said to contain as much as 3 600 Mt coal reserves, although the basin is severely block faulted.

Mozambique's gold production has traditionally come from the Manica greenstone belt situated close to the border with Zimbabwe. The Niassa province in the northwest of Mozambique has seen an increase in gold exploration and mining, in particular by artisanal workers. Gold is located within structurally controlled quartz veins located within Palaeo Proterozoic greenstone belts located close to the shores of Lake Nyasa.

All of the diamonds recovered in Mozambique to date have been derived from alluvial sources draining Zimbabwe and South Africa. Although several kimberlites have been found close to the Zambian border as well as in northwestern Mozambique, little work has been carried out to evaluate the diamond bearing potential of them.

6.5.5 Potential Constraints to Economic Development

Macroeconomic stability is a basic condition for promoting economic growth and increased confidence in the economy. The process of economic development implies institutional arrangements, fiscal and legal systems, and incentives which are needed for investments and innovations, as well as providing conditions for an efficient system of production and distribution of goods and services to the population.

This improvement is dependent upon the growth of exports since the domestic market is too small and the purchasing power of consumers Mozambicans is too low to support the required growth rate only fulfilling domestic demand. The challenge is to formulate strategies that will help Mozambique achieve rapid growth in exports, while this growth creates economic opportunities and higher incomes for the poor.

The economic development of Mozambique needs to create an enabling environment for business in order to stimulate domestic and foreign investment in the productive sectors including agriculture, in becoming a labour-intensive economy, in transport infrastructure and in customs clearance procedures to reduce transaction costs that make Mozambican goods uncompetitive in global markets. The potential risks and returns from the perspective of potential investors are primarily determined by market conditions. At the same time, policies and programmes in the public sector play an extremely important role in the definition of market conditions and prospects of success of private investment. Investment in trade policies and in the commercial institutions at the levels of technical and analytical skills and of policy coordination processes to tackle the impediments to exporting in a coordinated and comprehensive fashion.

6.5.6 Economic Summary

There is a positive correlation between households with higher levels of assets, higher income and the pursuit of off-farm income generating activities than from agriculture. Charcoal is found as the most important income source. Plants for food, firewood, construction provide an extra-income equivalent to 65 USD per household per annum. The agriculture (crop and livestock) provides an income equivalent to 79 USD per annum per household; fishing contributes with 35 USD per year, according to a survey conducted by Nielsen et al (2010).

6.6 Anthropogenic Effects on Forests

Population increase in Mozambique is a major driver to a reduction in biodiversity. The civil war between the government and the former guerrilla movement RENAMO (1975-1992), led to considerable loss and fragmentation of habitats and change in the distribution of terrestrial mammals. Hunting, uncontrolled bush fires and destruction of habitats are the main threat to fauna. The vegetation is affected by clearing, slash-and-burn agriculture, human settlement and uncontrolled fires. The development of mines and commercial agriculture result in large areas of land clearance and deforestation, and are significant contributors to deforestation in the country. Urban areas' demand for wood fuel, commercial farming, and uncontrolled fires are major drivers of deforestation. Forest inventory for 1994 and 1997 estimate deforestation rate at 0.21% from 1972-1990 and at 0.58% during the period from 1990-2002.

Threats to mangrove forest are posed by deforestation, aquaculture and construction of salt plains. Sea grasses are threatened by siltation caused by floods, disruption of sea grass for collection of invertebrates, trampling and destructive fishing techniques.

6.7 Health and Education

Access to health care in Mozambique is very low and it is estimated that 50% of the population lives more than 20 kilometres from the nearest health facility, which implies that a large proportion of the population has no access to health services. MOPH data indicate that in 2008 there were 1,227 primary level health units in the country, 77 of which are in Manica province and 141 in Sofala Province.

The results of the IAF 2002-2003 show that only 36.1% of the Mozambican population has easy access to a health facility (less than 30 minutes), most of these are urban dwellers in contrast with only 21% of the rural population who have good access. In Manica, Sofala, and Tete provinces less than 30% of people have access to health facilities. This situation is worrying when considering that malaria, cholera, tuberculosis and HIV/AIDS are the diseases that most affect Mozambicans and their reduction depends on early diagnosis.

Malaria is the leading cause of mortality in hospitals in Mozambique (MISAU) - almost 30% of all deaths. It is also responsible for 40% of all outpatient visits and about 60% of patients hospitalized in paediatric wards. For children aged one to four years old, malaria is responsible for 46% of deaths.

Other causes include AIDS (13%), infectious diseases, gastrointestinal (8%), acute respiratory infection and malnutrition (6%), other infectious diseases (4%, including meningitis) and 16% for other non-infectious diseases. The fact that over 80% of neonatal deaths in post and one to four years were of an infectious nature highlights the importance of prevention services for this age group.

The national strategic plan for addressing HIV/AIDS, indicates that the current prevalence of HIV is 11.3%, which shows, compared to previous years (12.2% - 2000, 13.1% - 2002, 15.6% -2004) that the incidence may be decreasing, however, remains one of the highest in the world. The three regions of the country have different variations (North-9%, Centre - 18% South - 21%) showing that the specific regional or cultural practices associated with the geographical situation have a significant influence on the situation. Sofala and Manica have high prevalence rates at 15.3% and 15.5% respectively, influenced by their proximity to Zimbabwe which has prevalence of 13.7% and the Beira Corridor where groups with high risk behaviour are most concentrated and in constant movement.

The issue of sanitation in Mozambique is also troubling. Over 50% of households interviewed in the 2003 IAF were reported to have no bathroom or use the bush to meet their needs (rural 66.3% and 27.3% in urban areas). Poor sanitation, lack of social infrastructure and issues related to malnutrition together with lack access to health services, puts the rural population in a highly vulnerable situation.

Disease and death reduce productivity of the sick person and the one who has to stay at home to take care of him or her. As many as 41% of the households surveyed by the CMI team (2009), had at least one child who had died before the age of five years. The psychological toll also contributes to the reduction of productive activities of families during prolonged mourning processes.

The high child mortality rate is an important reason given for the elevated fertility rate of 5.5 live births per woman (MISAU, 2005). Both limit the work and productivity of women who carry out the bulk of agricultural tasks. The rapidly increasing spread of HIV/AIDS has similar implications for poverty and well-being. When household members are sick or dying and an increasing proportion of the most productive women must also be carers who divide their time to cover all additional tasks, reducing their productivity that may gain income or food for their families.

The Ministry of Education and human development aims for a net enrolment rate in primary education of 97% and 69% reaching completion in 2010. In 2005, the primary level enrolment rate was 81% and 33% reached completion. This sector still has serious shortcomings, due to the lack of schools, school supplies and teachers.

In 1974, Mozambique had an illiteracy rate of around 90%. This decreased to 72% in 1980, but during the war years (1983-1990) more than 3,000 schools were closed. Estimates after ten years of reconstruction (Ministry of Education, 2001) indicate that about 68% of the school-age population was attending primary school. By 2008/2009, the national illiteracy rate is down to 48.1% and in the central provinces of the country is 54.8% (INE, 2009).

The percentage of girls in the early grades of primary education increased from 43% in 1999 to 46% in 2005. However the percentage of girls who stay in school reduces over time, influenced by economic and cultural factors that emphasize the preparation of a girl to be a mother, wife and responsible provider for the family (in terms of diet, health, education, moral, social and cultural as well as agricultural production for sustenance of the family). The regional and geographical differences between and within provinces concerning these factors also influence the permanence of girls in school.

An important observation made by recent PARPA II Qualitative Monitoring report (CMI 2009) is that although a lack of education has been defined as one of the four main determinants of poverty in Mozambique (DNPO, 2005), poor health may be a more important determinant for keeping people in poverty than assumed. People surveyed perceived illness and death of family members to have a greater impact on their future wellbeing than education. The importance attached to education is seriously threatened by the current inability of educated young people to find employment.

6.7.1 Forest and Health Issues

The rural community depends significantly on forest resources. This dependency tends to increase in regard to events related to health. Bryson (2006) found the HIV/AIDS pandemic placed excessive pressure on woodland resources in a study conducted in Mozambique that led to woodland degradation and a consequent decrease in resource availability in communities with HIV high prevalence. The combination of HIV illness and short supply of health services lead to dependency not only on medical plants to alleviate HIV related illnesses, but also as source of income to cope with demand on food HIV/AIDS poses on the patients.

The demand for plants for medical purpose increased the overharvesting of medicinal trees and shrubs and these types of plants are becoming scarce due to pressure imposed upon them. The higher mortality rates associated with HIV/AIDS and other illnesses resulted in the increase for fuelwood to prepare food for a higher number of funerals. Presently communities have to walk long distances to collect sufficient fuelwood.

Higher mortality rates associated with HIV and other pandemic such as malaria have contributed to a decrease in productive capacity and productivity amongst community households. The combination of this and other factors (natural disasters) have led to an increased demand for forest resources such as fruits, roots, tubers and vegetables.

The degree by which diseases affecting the population, in turn affects the woodland varies according to factors such as gender, household composition, household wealth, social safety net, labor requirements, access to market and access to forests, etc. Households use existing resources to respond to the crisis of illness; and female headed-households are the most affected as they do not have a sufficient safety net and will find forest resources as the main source for income.

6.7.2 Health Constraints and Effects on Labor

Although there is little literature addressing health issues as one of the main constraints to economic development in Mozambique, the presence of an adult suffering from a chronic illness in a household can have multiple effects on the distribution of labour, land, and other household goods. Disease not only deprives a household of the sick person labour during the period of the disease but may also require the relocation of a portion of the time of the carer from farming or non-agricultural activities (or school) to provide care. Thus, the characteristics of adult patients and caregivers in the family influence the way a family adapts to illness of a household member of working age.

Most of the adults who care for the sick are the spouse of an adult patient (44%) or parent (30%) (Mather et al., 2004). In addition, approximately 60% of people who care the patients in the family are

female. It is women who traditionally perform the vast majority of household tasks including caring for children, the elderly and the sick, and who are more likely than men to work in agriculture than outside it. This suggests that time devoted to care is more likely to increase the constraints on domestic activities, agriculture and outside of agriculture more for women than for men in a household.

Much of the literature on the effects of HIV/AIDS on rural households maintains that the constraints on work that result from death of working age family members typically require the affected rural households to reduce the rate of cultivation, replacing the production of cash crops, and reducing labour for weeding (du Guerny, 2002).

In addition, reduced rates of cultivation and/or the loss of a male head can result in less access to land. As a result of these adverse effects on agricultural production it is also concluded that many affected households will be impoverished.

Malaria remains a major challenge to public health and sustainable development in Mozambique. Beyond the direct impact on health, there is a huge socioeconomic burden on communities and the country in general, particularly for the poorest and most vulnerable. The precise scale of economic loss due to malaria in Mozambique is not clear, but it is apparent that malaria contributes to economic losses, high rates of absenteeism and low productivity in agriculture, the main livelihood of the rural population. (National Malaria Control Programme - NMCP, Mozambique).

6.8 Cultural heritage

The Law 10/88 of December 22 1988 defines the legal protection of tangible and intangible assets that constitute the cultural heritage of Mozambique. The law entails the identification, recording, preservation and promotion of the material assets and spiritual wealth that constitute the cultural heritage of Mozambique. The law applies to assets making part of Mozambique's cultural heritage belonging to the state, public bodies or legal persons with no prejudice of relevant holders. The scope of the law extends to cultural assets that may be discovered on Mozambique territory, in particular in the soil, subsoil, beds of inland bodies of water or continental shelf.

Mozambique is also a signatory party to the World Heritage Convention concerning the Protection of World Cultural Heritage, and has one site inscribed on the World Heritage List, and four others on the tentative list. The listed World Heritage Site is the fortified city of Mozambique, and the tentative sites include the cultural sites of Manykeni – Chibune and the Vumba Mountain Range; the natural site of Ponta de Ouro Protected Marine Area; and the cultural and natural site of Quirimbas Archipelago.

The fortified city of Mozambique, on the island of Mazambique within the Ilha de Mocambique District, of Nampula Province is on the UNESCO World Heritage List. The fortified city is a former Portuguese trading-post on the route to India, and is listed due to its importance to Mozambique history as well as its architectural style. Its remarkable architectural unity is due to the consistent use, since the 16th century, of the same building techniques, building materials (stone or macuti) and decorative principles.

Manykeni – Chibuene is considered culturally significant because of the relationship of these two trading centers located in the interior (Manykeni) and on the coast (Chibuene). Manykeni is a Zimbabwe tradition regional centre of the second millennium AD. The site comprises a stone wall enclosure and surrounding settlement situated about 52 km west of Vilanculos in south-central Mozambique. The relevance of Manykeni is the relationship between the interior and the coast. Chibuene is a coastal trading station of the late first and early second millennium AD. The site is situated very close to the seashore 5 km south of Vilanculos (c 700 km north of Maputo) southern Mozambique.

The Vumba Mountain Range is located in Central Mozambique, and has a sacred Hill denominated Chinhamapere standing as a prominent feature on the landscape. The site comprises the best-known hunter-gatherer rock art paintings (comprising several human figures, some holding bows and arrows and others in trance) tucked into a sacred forest and a set of living Shona rituals connected with rock art symbols and the landscape.

Located along the south-eastern coast of Maputo Province in Mozambique, the Ponta de Ouro Protected Marine Area (POPMA) is considered one of the 8 key biodiversity sites (seascapes) of global importance within the Eastern African Marine Ecoregion (EAME).

The Quirimbas Archipelago, a cultural and natural heritage in northern Mozambique, consists of 31 islands stretching south from Cape Delgado for approximately 200 miles. These islands, running along the coast, are partly linked to the coast by sand bars, coral reefs, mangroves and water rich in marine life. Of special interest are the Islands of Ibo, and to a less extent, Quisiva and Matemo, that are old Portuguese settlements with pre-colonial Swahili settlements.

In addition to these internationally important sites, Mozambique has several sites that are important to local communities, including sacred sites. Consultation with local authorities and communities is required to identify these sites prior to development or forestry projects, to help ensure they are avoided, or that impacts are mitigated.

6.9 Community views on the drivers of deforestation and degradation

The drivers of deforestation and degradation that are recognized by the communities are not much different than the drivers identified in the literature: slash & burn agriculture, illegal logging, and in the north burning is conducted to flush out game for bush meat. Burning is also conducted for road rehabilitation and road clearing and at times burns out of control.

The researchers speculate that fewer bush fires occur in coastal areas than inland areas because this region is dominated by Muslims, and they do not burn employ burning to flush out game here because bush meat is considered to be similar to pork and is not eaten by them.

In addition to these localized sources of deforestation and degradation, large scale development projects, infrastructure projects and mining projects have a significant impact on deforestation and degradation. For example, the proposed Port project in Chinde District, Cabo Delgado Province will result in construction of a Port along the coast, impacting coastal forest resources, a railway running 1,070 kilometers from the Port to the coal mine in Tete, as well as the development of the coal mine and local support infrastructure.

Large scale projects of this nature have a significant adverse effect on forests, undergrowth and soils and the carbon stock held therein. In addition to consideration of the environmental effect of large scale development projects, impact on forests and carbon, it is important to consider the social impacts, particularly if resettlement is required. For example, large scale commercial agricultural developments, such as the pro-Savannah project, being developed by Brazil, Japan and Mozambique, will result in large scale deforestation and degradation, and would require resettlement of some communities and individuals.

Members of the communities interviewed at Quirimbas and Gilé note that to reduce deforestation and degradation in the area, proper management of bush fires is one of the key things that would help. They note that in addition to burning for agriculture and for hunting, burning for clearing roads often gets out of control. Community members recommend establishing local committees responsible for managing all burning activities that occur in the area as the effective way to deal with bush/wildfires. In addition to controlling burning, community members state that involving community members in reforestation projects would also help alleviate deforestation and degradation in the region.

7 Mozambique's REDD Strategic Options

7.1 Introduction

The REDD+ national strategy seeks to reduce CO_2 emissions from deforestation and forest degradation and secure sustainable management of forests, forests conservation and enhance carbon stocks, as defined by UNFCCC COP 16. The national strategy provides options for reducing deforestation and degradation, contributing to biodiversity conservation and reducing GHGs.

7.1.1 National Strategy Options and Drivers of Deforestation and Degradation

Table 16 presents the priority drivers of deforestation and degradation and the proposed national strategy options identified to address each of them. . The information presented in the table is derived from a study currently being conducted by CEAGRE (2015). Section 7.2 elaborates on the strategy options and discusses provides a broad overview of some of the potential environmental and social issues associated with these options as identified during field visits to the REDD pilot project areas. The full risk analysis of the strategy options is presented in Section 8.

Table 16 Priority drivers of deforestation and degradation and strategy options

Drivers of deforestation and degradation	Strategy options
Subsistence farming (itinerant farming)	- Sustainable agriculture - Intensification of agriculture practice - Introduction of perennial crops (cashew, coconut and macadamia) - Agroforestry system (agriculture or livestock with trees)
Urban and infrastructure expansion	- Urban planning - Vertical urbanization (better utilization of space) - Urbanization containing green space and urban parks - Reduction of rural-urban migration
Wood and forest products exploitation	- Sustainable forest management (wood concessions of native forest) - Community management(sustainable utilization of natural forest) - Development of value/supply chain of Non-wood forest products - Conservation in native forest (parks, reserves and game hunting) - Forest plantation (in deforested or degraded areas, i.e. reforestation or afforestation)
Firewood and charcoal production	- Sustainable production of biomass from natural forests (forest management for firewood and charcoal production) - Forest plantations (energy) - Sustainable utilization of biomass energy (improved stoves) - Hydro-electric power - Other sources of renewable energy (wind, solar, biogas, etc)
Commercial agriculture	- Directing commercial agriculture into non-forest areas
Livestock	- Agro forest systems (agriculture or livestock without trees) - Production of forage
Mining activities	- Recovery of degraded areas

	- Biodiversity offsets and green financial influx (e.g. Equator principles)

Source: Draft report on drivers of deforestation and degradation (CEAGRE, 2015)

7.2 Proposed REDD+ Strategy Options

In the following sections brief background information is presented under each of the proposed REDD+ national strategy options to provide a context for the evaluation of these options. This background information is derived from a combination of literature review, results from stakeholder consultations and obervations gathered during vists to REDD+ pilot project sites in Cabo Delgado, Zambézia, and Gaza provinces.

7.2.1 OPTION 1: Promoting alternative practices to itinerant agriculture

In order to reduce deforestation and degradation resulting from agricultural activities, the REDD+ national strategy will promote sustainable agriculture through a combination of activities, including: a) diverting commercial agriculture into non-forest areas; b) promoting agro-forest systems that are adapted to each region; and c) promoting best practices of livestock and pasture management. A critical component of this option addresses traditional agriculture practices in an effort to reduce slash and burn agriculture andpromote conservation of soil and water.

7.2.1.1 Subsistence and commercial farming

Agriculture is the most important economic activity in Mozambique. Approximately 80% of Mozambicans report agriculture as a livelihood and the sector comprises 29% of the country's GDP (World Bank 2013). There are about four million smallholder farming families in Mozambique, with the majority of food crops grown for family consumption (66%), and only 16% are cash crops (e.g. cotton and tobacco). Crop production in rural communities accounts for approximately 73% of family income. The vast majorityof smallholder farmers do not have access to agriculture inputs such as fertilizers, pesticides and high quality seeds and as a result their crop production is limited. Rural society traditionally grows crops in cleared and burned woodland areas that are farmed for a few years, and then left fallow to recover as the family moves on to farm a new area, commonly refered to as slash-and-burn agriculture.

Slash-and-burn or shifting cultivation is the traditional agricultural system practiced widely in tropical forests and deciduous woodlands, and is common in northern Mozambique. Under this practice, some or all trees in a stand are cut and burnt to release the nutrients in the ash, and the soil is tilled before various crops are cultivated (Figure 16a). The rootstocks of the cut trees are not removed when the crops are cultivated. Initially the crops, such as maize, show a luxuriant growth (Figure 16b), but crop

productivity declines after 2-4 years. The practice is often perceived as promoting forest and soil degradation and many advocates for biodiversity conservation argue that it should be stopped wherever it is practiced. However, it forms the basis of subsistence agriculture in rural areas, and people in rural Mozambique rely heavily upon this form of agriculture for survival. Traditionally this system is practiced in cyclesof seveal years, with one type of crop followed by another in a specific sequence. The plot is abandoned when it is no longer productive and left fallow to enable recovery of the vegetation and soil fertility before it is cleared, burnt and farmed again. In Miombo forests, which is the predominate forest type in Mozambique where slash-and-burn agriculture is practed, the Miombo trees recover from the remaining rootstocks in the ground (Geldenhuys, 2005). The sprouting rootstocks become regrowth woodland and eventually grow into trees.

In areas with a growing population, such as near villages, the periods when plots are left fallow becomes shorter. Due to population pressure, farming intensity increases and often much of the rootstocks become removed or depleted of reserve nutrients and woodland recovery becomes patchy or simply cannot recover (Figure c). In many rural areas of Mozambique, the landscape appears very fragmented, with woodland in all stages of recovery (Figure d), giving the impression of the forest being degraded or deforested; but in a Miombo forest, there is potential for full recovery if the forest is left fallow for a period 5 to 10 years. Depending on the density of forests being exploited for farming, people living in rural areas use the forests differently. When there is a perception of dense and extensive woodland in the area, people tend to cut, pile and burn most of the trees in the area they clear to grow crops. In areas with sparse woodland, people tend to use the wood they cut for other purposes, such as fence posts.

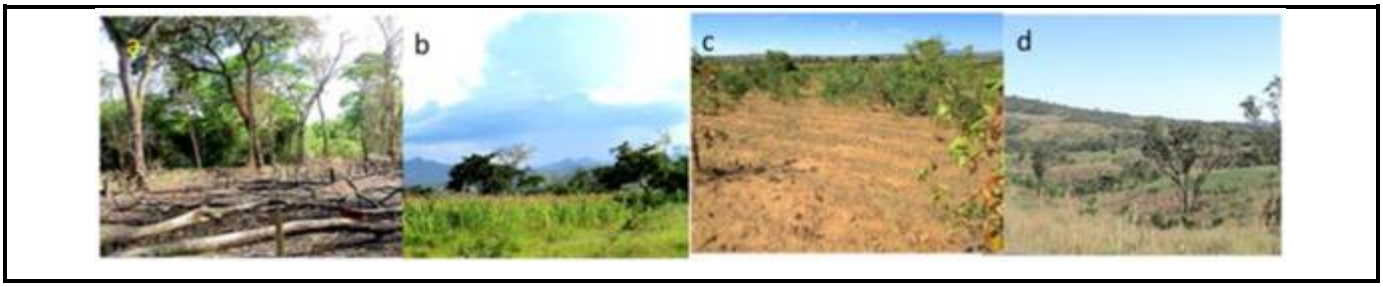


Figure 16 The cyclic process of slash-and-burn traditional agriculture

(a) Clearing a stand of trees and burning the branches to release the nutrients in the ash and to prepare the site for growing crops. The larger pieces of wood are often left on site (a kind of slow-release fertilizer). (b) Good growth of maize on a site that cleared as in (a): (c) The productivity of the site declines and coppice regrowth from the rootstocks of the trees take over the site; (d) A landscape mosaic of different stages in this cyclic process.

Another important feature of agricultural practices in rural Mozambique is commercial small-scale agriculture (out-growers schemes) involving cash crops such as tobacco, cotton and timber. For the past 20 years, Mozambique Leaf Tobacco Lda. (MLT) has been growing tobacco in Mozambique through an out-grower scheme model that includes agreements with several thousand rural farmer families.MLTC employs approximately 400 permanent employees and 1,200 seasonal employees in Tete during peak season and an additional 600 permanent, 2,200 seasonal and 500 casual employees in outlying agronomy areas during peak season (MLTC, 2015). This type of outgrower scheme helps to eleviate poverty in Mozambique without resorting to subsidies and without taking any land: earnings from tobacco have lifted thousands of Mozambican families out of poverty. Currently tobacco is grown in Tete, Zambézia, Niassa and Manica Provinces. The company supports the farmers with resources and logistical input, and the farmers produce a certain quantity of tobacco under contract, linked to the amount of land they have available. MLTC then pays the farmer in cash when he/she delivers the cured tobacco leaves, based on the quality of the leaves.

Increasingly in Mozambique, there is growing pressure to grow food instead of cash crops, and competition for wood resources needed for households rather than for tobacco curing. As early as 2004, this growing pressure prompted MLTC to formally plan the establishiment of a sustainable wood supply through planting various introduced tree species. To further reduce pressure on natural Miombo woodland, and encourage farmer participation in out-grower schemes, the GoM commissioned Working on Fire Africa (WoFA) in 2012 to teach best practices for the management of tree nurseries, tree planting and tending, fire management, and indigenous woodland management (particularly Miombo woodland), and to train the trainers of the tobacco farmers. Most wood resources used by MLTC and its out-grower farmers are derived from well-managed tree stands of Miombo woodland in all stand development stages. Farmers are compensated for the trees that they plant, and supported with growing maize and other vegetable crops by being provided with seed.

Figure 17 Stages of Miombo woodland recovery following slash and burn practices

The figure above illustrates Miombo Woodland in different stages of regrowth as a result of forest management practices implemented by tobacco farmers. Active management of the forest provides

trees to shelter the village against wind, sources of firewood and other wood needed by households, and facilitates recovery of the woodland. The figure illustrates (i) Left: Woodland in stage 1 three years after abandoning two years of cassava production; (ii) Trees of former mature woodland (large trees in centre of the photo), surrounded by stage 3 woodland, managed since 1995 by one family.

Regarding cotton, in Mozambique it is grown both as an out-grower scheme and as a large-scale commercial crop. In the area between Gilé town and Gilé National Park, some woodland was cleared to grow a field of cotton (Figure 18 below). Shoots of regrowth of various Miombo tree species can be clearly seen between the planted cotton, suggesting this field repesents small-scale farming.

Figure 18 A field of cotton grown in cleared woodland in the Gilé area. Note tree regeneration of woodland species developing (photo on right).

It is unclear whether small-scale tree stands of high-value timber species are grown in Mozambique as an out-grower scheme, as is done in parts of South Africa. This scheme entails a plantation forestry company facilitating small-scale tree growers in the planting and management of selected tree species in scattered woodlots, and when the trees are mature the company buys the wood from the small-scale tree grower. In many ways, these woodlots are similar to the woodlots managed by the small-scale tobacco farmers, but in this case the wood is sold to the plantation forestry company rather than being used to cure tobacco.

7.2.1.2 Conservation agriculture (CA)

The FAO defines three broad principles that make up CA: minimum or reduced soil disturbance, maintaining a permanent soil residue or vegetative cover, and crop rotations or intercropping with legumes (FAO, 2002). CA results in a reduction in labor needed for land preparation, improved soil fertility and a reduction in water stress, making it important to Mozambique in the context of regional impacts of climate change, which is marked by increased temperatures and increasingly erratic rainfall.

Though CA appears to be a relatively new development its practice dates back to the mid-1990s when Mozambique introduced it with the view of increasing smallholder farming productivity, minimizing soil erosion, increasing soil fertility and improving drought tolerance. Since then, there has been a surge of

multiple CA projects implemented by the GoM, Non-Governmental Organisations (NGOs) and international development institutions across different agro-ecological conditions.

As part of the fieldwork undertaken for this SESA, two CA projects were visited, one having been implemented by the Agha Khan Foundation (AKF) in the Quirimbas National Park (QNP) and another by IGF Foundation in the Gilé National Reserve (GNR). The AKF project aims to improve production and productivity and improve farmers' land management practices. The AKF does not provide chemical fertilizers and herbicides partly because of the cost of these items, but also because they are not readily available in the area. Most of the smallholder farmers involved in the AKF project are low income and can barely afford to pay for the fertilizers and herbicides required to embark in the CA program. This is exacerbated by the fact that the majority of smallholder farmers have a low level of education which poses challenges associated with handling the complexity of CA and risks associated with handling the chemicals used for pest control and soil fertility.

CA projects also involve an element of agricultural extension work. In this way, agricultural extension officers can work with communities to provide them with new techniques and information to better enhance crop yields.During fieldwork it was noted that agricultural extension services are weak mainly due to the limited number of extension officers in the area, but also the lack of a clear vision and commitment in relation to the agenda of CA.

In QNP, other problems were encountered implementing CA. Communities within the QNP reported that for some project initiatives funded by Envirotrade, trees provided to encourage perennial crop production (e.g. *Gliricidia sepium, Faidherbia albida*, cashew trees, mango trees) were distributed to smallholder famers during the dry season. Planting trees during the dry season has a very low probability of success because of the lack of a water supply. For example, a community member consulted in Nacoja (Quissanga district of Cabo Delgado Province) indicated that of the 20 trees his family received only 3 of the trees survived. Many community members indicated that climate change, characterized by erratic rainfall that has hit the area over the past decade or so, has made it even more difficult for new trees to become established in the region.

The CA project in GNR is part of a REDD+ project designed to promote CA within the communities on the buffer zone of the GNR, and is designed to improve food security and forest conservation. However this CA component of the project was only initiated in early 2015, so it was not possible to make an informed assessment of the effectiveness of the introduction of CA within the communities.

The literature reviewed suggests that despite the existence of a considerable number of CA projects in the country, there is little evidence as to the effectiveness of implementing conservation principles on

reducing soil degradation. The table below provides an important reflection on the effectiveness of the adoption of conservation agriculture in Mozambique (Grabowski et al., 2013).

Table 17 Effectiveness of conservation agriculture in Mozambique (Grabowski et al., 2013)

Areas	Analysis	Field observations
Biophysical	Yield differences with CA and conventional systems	• There are limited technical studies (agronomic and fertility) that have documented the combined effects of using all three CA principles (minimum soil disturbance, permanent soil cover, and crop rotation) together, to demonstrate reduced soil degradation and increased crop production ; • CA has several dynamic soil processes that alter the soil microbiological communities which gradually affect the soil physical properties; • These processes are yet to be understood and documented by researchers in Mozambique.
	Soil changes with CA and legumes	• Depending on th type of soils, climate and legumes, the integration of legumes into maize-based systems has the potential to increase carbon sequestration and nitrogen in the soil. Grain legumes are associated with the potential to remove a significant amount of the fixed nitrogen at harvest; • However, more investigation is required to determine the advantage between legumes and non-legumes in the cropping system as in some cases its inclusion may be beneficial because they provide persistent soil cover and considerable benefits associated with increased carbon sequestration; • The performance of CA technologies should be assessed in contrasting soils and agro-ecological conditions in order to draw a better understanding about its specificities across Mozambique.
	Water dynamics with CA	• Agronomic results show that crop rotation with or without legumes improved water infiltration (between 70 and 238%), soil moisture, soil carbon, macro-fauna and crop productivity; • Employing crop rotation increases infiltration and reduces erosion; • CA decreases runoff and erosion and there are significant differences on soil moisture between CA and conventional agriculture; • There is higher soil water content in CA system comparing to conventional agriculture in a clay-sandy soil; • Because the population of cattle is generally low in Mozambique, the competition for crop residues are less problematic with the exception of areas that are cattle and goat intensive, where it is unsuitable for agriculture except livestock production (e.g. Gaza and Manica province).
	Profitability	• High input maize production does not necessarily translate into higher profitability than low income maize production; • Higher prices of herbicides compared to paying labor to weed; • Farmers prefer to use limited cash to buy fertilizer for crops with a higher rate of return (e.g. potatoes) than for maize; • Compost production is too labor intensive to make a profitable

Socioeconomic		alternative to fertilizer on a large scale; • Production costs are similar between CA and conventional agriculture but yields are 50% higher with CA making it relatively profitable; • Rotations and intercrops with legumes are a critical part of CA that would require market research otherwise farmers will have no incentive to reserve part of the land for legume production; • Weeding labor is relatively higher with CA than conventional agriculture unless herbicides are used; • CA requires more labor than conventional agriculture especially for land preparation, but can be less time and labor intensive in terms of watering and irrigation because of the mulch;
	Gender	• There is a potential that gender labor differences could constrain CA, especially when it comes to control of resources as there are no equitable gender outcomes; • Projects should address gender elements of agriculture (e.g. labor), especially by looking at female needs and unintended impacts on women.
	Adoption levels	• Despite the fact that CA has been promoted in Mozambique since the 1990's there are no thorough adoption studies that can provide an aggregate picture of CA use at the national level; • Existing experience is limited in scope and geography. • A participatory approach to adapting the technology is more appropriate than a technology transfer approach.
	Livelihood	• Evidence from Angónia district (Tete Province) suggest CA farmers on the whole bought less maize and sold more maize than non-CA farmers, suggesting that CA may increase food security, however this study did not control for a variety of other factors that are likely to correlate with CA adoption, so more research is required to assess the impact on livelihood
	Constraints to adoption	• **Competition for Crop Residue by Livestock**- in areas with higher population of livestock, livestock in itself may be an hindering factor to CA due to competition for crop residues; • **Lack of easy and affordable access to inputs**- the lower adoption of CA seems to be intrinsically linked with unavailability of inputs (fertilizers, herbicides, insecticides and improved seeds) and seeding equipment (jab planters, or animal traction) and the lack of markets for farmers' surplus; • **Land tenure**- Loss of land would be an issue of concern where land availability is limited. This issue has not been examined in Mozambique.

Source: summary based on Grabowski, et al (2013)

7.2.1.3 Introduction of perennial crops

Some of the perennial crops (especially coconut, cashew and tea) indicated in the proposed REDD+ national strategy are not entirely a new development in Mozambique. They date back to the 1960s or 1970s when these crops were introduced under colonial rule. The inclusion of perennial crops in the REDD+ strategy is largely associated with climate change mitigation through carbon sequestration, but also because of the ability of perennial crops to provide timber and non-timber products which are

important to communities. Perennial crops also play an important role in reducing topsoil loss resulting from erosion and reducing waterway pollution through runoff. Perennial crops can sequester carbon for longer periods with minor annual fluctuations in comparison with annual crops, such as maize, which sequesters carbon for shorter periods of time. Although annual crops have the potential to sequester more carbon for a longer period of time, the biomass of cashew and tea crops tends to decompose rapidly resulting in a high rate of return of sequestered carbon into the atmosphere.

The socio-economic benefits of perennial crops (employment, increased income, food security), has resulted in many developing countries to choose establishing perennial crop plantations over the exclusive implementation of afforestation and reforestation projects. Perennial crops are particularly important for the smallholder-based system where local people have control over the production process. Large scale production of perennial crops provides considerable economic benefits, but they are also associated with serious environmental and social challenges, e.g. potential noncompliance with environmental regulations and implications of changes in land leasing patterns on the socio-economic structure of rural communities.

The utilization of perennial crops as part of REDD+ is not widely documented in Mozambique. Much of the existing information relates to the pilot projects in Cabo Delgado, Zambézia, Manica, Sofala and Gaza provinces. Of these, the Nhambita Community Carbon Project in Sofala is the most documented. The Nhambita Community Carbon Project aims to promote sustainable land use and rural development initiatives within the Gorongoza National Park buffer zone in order to improve rural livelihoods, habitat restoration, forest management and conservation of biodiversity and generate verified emissions reduction (VER's). The planting of *Faidherbia*, cashew, mango and other indigenous species constitute the main agro-forestry and REDD+ activities promoted under the project. The project is jointly managed by Envirotrade and the local community association. A similar project was also implemented within the QNP, but the introduction of perennial crops here was not easy.

Although communities within QNP appreciated the GoM's and Envirotrade's plan to create a more sustainable income for them, and protect the environment, they complained about the lack of their involvement in the decision-making about which kinds of tree crops should be introduced. Communities indicated a much higher preference for fruit crops over the trees introduced by Envirotrade (e.g., *Faidherbia albida):* this tree is known for its nitrogen fixing characteristics and soil enrichment properties, which are key reasons it was selected by Envirotrade. However, some families within the QNP were upset about the choice of *Faidherbia albida*, because in many instances it attracted elephants into their farms because the trees provide pods, foliage and bark for the elephants to eat. As a direct result of elephants coming to eat the trees, other crops grown by the farmers were either eaten

or destroyed by the elephants walking over them. The issue with the *Faidberbia* and elephants destroying crops is only one example of poor communication between the REDD+ team and the community. As mentioned earlier, some trees were distributed to communities for planting during dry the season and as a result of a lack of water the survival of the introduced trees within the QNP was below 25%. During consultation for the SESA, community members stated that poor communication between Envirotrade project management and the communities was a serious issue.

7.2.2 Option 2: Energy

The proposed REDD+ national strategy establishes the promotion of alternative sources of energy to biomass in urban areas and efficient utilization of biomass as the second strategy option. This option envisages the promotion of improved and efficient cook stoves. The rationale for the proposed option stems from the recognition that charcoal production is among the principal drivers of deforestation and forest degradation. Introducing alternative sources of energy to biomass is not, however, an entirely new phenomenon. On the contrary, it is an integral part of the GoM's Biomass Energy Strategy (BEST) validated in 2013. Under the Ministry of Energy, the BEST defines, amongst others, two important priorities relating to the promotion of alternative sources of energy to biomass:

(i) Promotion of improved cook stoves which entails a combination of approaches such as the establishment of efficient and cleaner stoves and education of key players on the relevance and value of cook stoves;

(ii) Promotion of modern biomass-based cooking fuels alongside modern fuels, which should include the shift from traditional, non-standardized and non-sustainable biomass to modern standardized biomass fuels based on residues and standardized products such as briquettes and pellets to enhance production sustainability and the efficiency of use.

7.2.2.1 Firewood and charcoal production

The NGO Global Alliance for Clean Cook Stoves estimates that wood fuel emissions alone are equivalent to approximately 25% of global emissions from deforestation in the tropics. If wood fuel is unsustainably harvested, increased wood fuel consumption is likely to lead to localized degradation of forest.

The relationship between firewood, charcoal production and deforestation and degradation in Mozambique has been widely examined (see Sitoe et al., 2007). Large amounts of fuel wood (firewood and charcoal) are collected in the woodlands. Wood is used in most rural households to cook food, with different types and sizes of wood used to cook different types of food. Women and children regularly

collect dry, small pieces of wood for firewood (Figure 19). They also cut small stems and branches and let this dry before they bundle the material to carry it home. Some people cut pole-size trees up to 10 cm stem diameter, pile them in approximate 1 m^3 bundles, and sell them along the road. Wood of a larger dimension (larger trees as opposed to pole size) is also used as energy in the curing of tobacco. Fuel wood is traded in many different forms in urban areas as the main source of affordable energy for poor families who have moved to the towns and cities with an expectation of better living conditions. However, it is also used by wealthier families who prefer some foods cooked over charcoal because of the flavor it imparts to the food. Electricity is mainly used for light, radio and TV, but is not used for cooking because of the expense of using electrical stoves. Cooking fires also have significant cultural meaning for families who gather around the fire as meal are prepared.

Figure 19 Different uses of wood In rural society, wood is the main source of energy for preparing meals (left and middle). Tobacco curing uses an additional amount of wood, both in the sheds for air-drying of the tobacco, but also in the barns (right) for circulating heat and smoke for more advanced curing of the tobacco.

Rural farmers and traders prepare firewood and charcoal and transport this by bicycle sometimes over considerable distances, to the urban markets, as packaged firewood, or as bagged charcoal (see Figure 20 below). The SESA team also observed that firewood and charcoal are sold at roadside, and it seems that there are traders with trucks that buy the firewood and charcoal at these roadside points and transport it to urban centers for sale. It appears that the producers of charcoal and firewood operate at increasing distances away from the markets that use the firewood and charcoal. As observed with the slash and burn agriculture in Miombo woodlands, it appears that some areas where wood has been cut for charcoal production that trees are growing back (Figure 21 below).

Figure 20 Trade of wood as firewood or charcoal between the rural areas and villages and towns/cities, to provide in the needs of affordable fuel for household needs.

Figure 21 Areas showing regrowth following cutting for charcoal production and slash and burn agriculture.

Left: Abandoned cleared site with large trees killed without using them (such as for charcoal), but with good regrowth of tree regeneration. This tree loss can also happen with uncontrolled intense fires. Right: The Google Earth image of a woodland landscape in Mozambique, showing a mosaic of vegetation cover under slash-and-burn traditional agriculture, and abandoned sites in various stages of recovery.

Charcoal is produced from cutting large trees of a variety of species (Figure below). Commonly used trees for making charcoal are Brachystegia and Julbernadia species, the characteristic species of the Miombo woodland. They are not otherwise commonly harvested from timber concession areas (Geldenhuys, 1996). Sometimes a stand of trees is cleared in total, but sometimes some trees are left standing. The impression is that recovery of the woodland through vegetative regrowth from the cut stumps and the soil-stored rootstocks is faster and more uniform in height, than when some large trees are left standing. The stems of the cut trees are sawn into smaller sections of even length to be stacked in heaps (Figure 21b), before it is covered with soil for the processing of charcoal (Figure 22c).

Figure 22 Charcoal process Cutting a group of trees for making charcoal: (a) Left: The trees are cut into smaller sections of equal length; (b) Middle: The pieces are stacked and eventually cover with soil gathered from around the stack of wood; (c) Right: The stacked is fired and smolders for a number of days during the processing of charcoal.

The site of one or more charcoal heaps provides several advantages to the farmer (Figure 23 below) in addition to the money obtained from selling the charcoal. The site also develops good regrowth from the cut tree stumps and soil–stored rootstocks of a variety of species because of the better light conditions. Planted trees (eucalypts) and maize grow much better where piles of branches and stems were burnt in preparation of the area for planting the trees and within the charcoal burning sites.

Figure 23 Developments at a charcoal production site After the charcoal had been removed in bags and taken away for selling on roadside or transported: (a) The site is still being used to bag the charcoal; (b) Maize is growing particularly luxuriant in the middle of former charcoal production sites; (c) Active regrowth from the cut stumps and rootstocks on a charcoal production site, after a fire burnt through the site; (d) Woodland regrowth in Lichinga area after charcoal production from area

A rural farmer can produce charcoal without a permit if it is for household use. However, it seems that most charcoal produced by households is sold and thus is considered a commercial trade requiring a permit for use of the woodlands. It may therefore be necessary to manage this charcoal trade as an income-generating venture for many rural people, instead of criticizing this rural industry of destroying the woodlands.

The socioeconomic role of charcoal and firewood production in Mozambique is undeniable. Across the country, thousands of households rely on this activity as a primary means of livelihood including households in areas where food production is challenging due to the agro-ecological situation, especially in the southern region of Mozambique.

The social and environmental impacts of charcoal production are widely documented and these impacts range from respiratory health impacts to charcoal producers from inhaling emissionsduring

production, respiratory health of charcoal users, GHG emissions, deforestation and depletion of woodland. In addition to these more obvious issues, the extensive use of child labor, potential for physical injuries, and gender disparities in income and education associated with charcoal production are critical issues to be addressed in Mozambique. .

The NL Agency report "Making charcoal production in Sub-Saharan Africa Sustainable" (2010) provides a framework to make charcoal production sustainable using a Cramer Sustainability Themes reference. The table below lists the major steps in charcoal production and use, and identifies important sustainability themes and emerging issues associated with each theme.

Table 18 Classification of charcoal sector based on Cramer sustainability themes

Step	Sustainability theme	Key issues
Step 1: Forest resource production and harvest	GHG balance	Unsustainable harvest leads to increased GHG emissions
	Biodiversity	Over exploitation; in low rainfall areas over exploitation can accelerate desertification
	Food versus fuel	In general no competition with land for food. Possible if plantations are employed on agricultural land
	Local prosperity	Low income from wood collection, often performed by women
	Local welfare	Hard work for low income; serves as extra alternative income
Step 2: Charcoal production	GHG balance	Low conversion efficiency increases environmental impact including GHG emissions of whole supply chain
	Environment	Emissions of smoke: local air pollutions and low green gas balance; low conversion efficiency increases environmental impact of the whole supply chain
	Local prosperity	Low income, weak negotiation position towards traders
	Local welfare	Poor labor conditions: inhalation of toxic smoke and charcoal dust
Step 3: Transport and trade	GHG balance	Increased transportation distance s, leading to higher energy use and GHG emissions
	Environment	Increased transportation distance s, leading to higher energy use and GHG emissions
	Local prosperity	Most benefits in transport and trade (on the cost of other beneficiaries in the supply chain)
Step 4: End use	GHG balance	Efficiency charcoal stove sub optimal, leading to higher demand for charcoal and subsequent GHG emissions
	Environment	Ash is not recycled (however, this happens almost nowhere in the world)
	Local prosperity	Changing charcoal price affects the poor more than the rich
	Local welfare	Reliable source of energy for the poor and less poor users

Aaddressing sustainability issues (social and environmental) relating to charcoal production should consider important key steps in the value chain- the site where forest resources for charcoal production

are derived (step 1); the actual process of charcoal production (step 2); the transportation process (step 3) and the end user (step 4). Using criteria such as GHG balance; biodiversity; food production, local prosperity and level of welfare, the table above provides important insights into possible aspects to take into account if the proposed strategy option of introducing sustainable production of charcoal is accepted. This framework is used to identify major socioeconomic and environmental issues associated with this energy option under the section “Assessment of Results”.

7.2.2.2 Forest plantations for energy production

The REDD+ national strategy envisages as part of its broader strategic option 2 to promote forest plantations for energy production (i.e. firewood and charcoal), to reduce the deforestation resulting from the demand to supply these fuel sources to people, mostly in urban areas. Like the other proposed strategic options, promoting forest plantations for energy dates back to the colonial period. In the 1920s the first forest department was established and it was during this period that the Marracuene and Limpopo wood fuel plantations were first established.

This policy was strongly pursued after the colonial period marking the emergence of important fuelwood forest plantation projects in Manica and around Maputo, Beira and Nampula cities. Besides large scale commercial fuelwood plantations around the city, non-commercial small village wood lots were established throughout the country for subsistence purposes, especially in Namahacha, Nacala, Lichinga, Boane, Marracuene, Xai-Xai, Chokwé, Inhambane, Dondo and Rapale. The idea behind these wood lots was to serve as centers for technology transfer, from which forest government technicians trained rural communities in forestry techniques.

These projects no longer exist as originally conceived. For example many of the subsistence wood lots have been supplanted by housing resulting from urban expansion, and some of the larger scale commercial plantations have been handed over to communities. Information on the performance of these past fuelwood projects is scarce. A review report by FAO on “the existing studies related to fuelwood/or charcoal production in Mozambique,” however, indicates small scale wood lots production projects were successful while recognizing the challenges they faced at the time (i.e. lack of funding and insufficient knowledge in forest management may have contributed to a cessation of the projects). Further, there are no documented examples of recent projects of forest plantations for firewood and charcoal production.

Recent examples of establishing tree plantations for energy generation (including biomass) have raised concerns throughout the world. Some of these concerns include transforming the land for monoculture plantations, which could exacerbate conflicts between different land uses, limit rural community access to water and food, and result in a loss in biodiversity. (World Energy Assessment - Energy and the Challenge of Sustainability (UNDESA - UNDP - WEA - WEC, 2000.)

7.2.2.3 Sustainable use of biomass, improved and efficient cookstoves

Another important component of the strategy option 2 is the sustainable use of biomass through the introduction of efficient and improved cookstoves. Although many efficient cookstove "introduction projects" have been implemented by the GoM and NGOs in Mozambique, the current level of adoption of efficient cookstoves is very limited. In addition to a knowledge gap regarding the extent of the efficiency of promoted fuel efficient cookstoves compared to traditional ones, there are no testing standards and labeling mechanisms that ensure minimum standards of emissions, safety and efficiency. There is a need to establish a mechanism to ensure that promoted cookstoves (irrespective of the model) are objectively efficient and operate within defined (international and national) emissions and safety standards.

Effective adoption of efficient cookstoves is equally hampered by sociocultural factors associated with the traditional use of open fires rather than cookstoves in rural communities. Moreover, the adoption is hampered by the fact that cookstoves are more expensive to purchase than fuelwood and many rural families, prefer to cook with firewood (as opposed to charcoal) because of the way it makes food taste. A study by Meyer (2014) on improved cookstoves and small-scale irrigation in Mozambique investigated the extent of adoption of improved cookstoves. A majority of people in rural communities indicated financial reasons for not adopting cookstoves (38%), and lack of information about the existence and importance of improved cookstoves (38%). Very few people (2%) indicated they were not interested in learning more about cookstoves, while 22% indicated they were not aware of any improved cookstoves in their village or region.

Information gathered during consultations undertaken for the SESA indicated that a lack of institutional coordination for different project initiatives prevents community members from obtaining a comprehensive understanding of the benefits of adopting improved cookstoves. An initiative of the "Fogão Poupa-Lenha- Save Wood Fuel Cookstove" is seen as an important initiative in Manica, Sofala and Zambézia, but results from stakeholders consultation suggest the initiative is finding it difficult to live up to initial expectations. In addition to a low level of adoption of cookstoves by community

members, the initiative is seen as isolated and not well integrated in the effort to reduce deforestation and forest degradation resulting from charcoal and firewood production. In Zambézia, stakeholders noted that women must be involved in the process of introducing improved cookstoves if the initiative is to succeed.

Reports from other developing countries indicate financial incentives from the carbon market alone should not be used as the primary incentive for communities to adopt efficient cookstoves, but rather recognizing that stoves are an intrinsic need in their lives. In Ethiopia, a study on the contribution of cookstoves for REDD+ found that each household using Mirt (a type of cookstove) would benefit USD3.00 per year for the sequestrated carbon, which was considered too low to serve as a primary incentive for Ethiopian families to adopt the stoves. Reduced smoke appeared to be one of the major drivers for its adoption among Ethiopian families. (Beyene, A. et al, WB Policy Research Working Paper 7394, 2015)

7.2.2.4 Promotion and adoption of other sources of renewable energy

The relationship between renewable sources of energy and REDD+ is a recent development. There is a general view and recognition that investing in natural capital (non-renewable and renewable resources) alongside ecosystem services under REDD+ has the potential to promote development, economic growth and poverty alleviation. It is argued that investing in natural capital is most effective within the context of a green economy given that these investments will result in improved well-being of people, social equity and at same will reduce environmental risks and ecological scarcities.

In Mozambique, the energy supply has largely been confined to traditional forms (fuelwood and charcoal for cooking) as well as off-grid power supply sources, such as solar power. Recently, there has been an increased interest by the GoM and the private sector to invest in the development of renewable energy. This is partly due to an increased demand for energy and the potential for developing hydropower, biomass energy, solar energy and windpower in Mozambique (Hankins 2009).

The province of Manica possesses the best and most profitable potential for small-scale hydro projects on the Nhakamuara, Rotunda, Bande, Mussambizi and Nhamutsawa rivers. A 200 kW hydro-power plant has already been installed in Honde (Manica province) and several feasibility studies are currently being conducted for small hydro-power plants in Maue (Tete province), Chidzolomondo (Tete province), Mavonde (Manica province) and Rotanda (Manica province). Unfortunately, to date, there has been very little progress in the successful development of small-scale hydro projects because of a lack of local capacity, unclear processes, cumbersome investment procedures and lack of government focus

on the subsector. However, the government is conducting legal reforms to facilitate the acquisition of exclusive rights for development concessions of less than 15 MW, and this may ease the process for small scale plants to be developed in Mozambique

Biomass and biofuels are also increasingly seen as major source of modern electricity and fuel in Mozambique. The Renewable Energy Plan (Hankins 2009) indicates there is significant potential for development of biofuels in Mozambique: only 6.6% of a total of 63.5 million hectares of arable land are in use, and approximately 41 million hectares of land unsuitable for food production are available for the production of crops that can be used as a source of biomass/biofuels.

Experiences from other countries that have embarked on the production of biofuels indicate that there are social and environmental risks associated with biofuel production, including displacement of vulnerable communities and loss of productive land without adequate compensation. In addition to these risks, large scale production is largely driven by foreign investment, rather than developing community-driven partnerships and hence there are often few local benefits. To avoid these types of risks in Mozambique and ensure positive outcomes of a biofuel programme, the Renewable Energy Plan calls for the protection of community land rights and clear policies to avoid impacts on food production.

Of late, the GoM has expressed increased interest in converting agricultural wastes to energy, given the abundance of agriculture waste from sugar production and coconut processing (copra). Wastes from the sugar mills (Maragra, Xinavane, Búzi, Mafambisse and Marromeu) were estimated at 419,000 metric tonnes in 2009 and this figure may have doubled by the time of writing this report based on the historical growth rate.

The production of jatropha for energy has also been promoted, although the government's initial enthusiasm has faded away despit large investors involved from China, Italy, Portugal and Brazil. Other potential biofuel projects being promoted include cassava; and a pilot project for coconut shells/coil is underway in Inhambane and Zambézia.

In addition to hydro-power and biomass energy, Mozambique has tremendous unexploited solar energy potential. The Renewable Energy Plan for Mozambique indicates that annually solar radiation distributed across the country represents 1.49 million GWh, many times more than the country's present annual demand for energy. Participation in the sector is largely dominated by the government through the Energy Fund (FUNAE), which is the legal institution tasked with promoting the conservation, rational and sustainable management of power resources. Participation of the the domestic private sector in solar energy development has been very limited, because most of the

projects have been awarded to international companies – this appears to be associated with the high cost of solar photovoltaic cells and lack of fiscal incentives for domestic companies to import solar equipment.

Like solar energy, Mozambique also has considerable wind energy potential. Wind energy potential occurs primarily along the country's coastline and in the Niassa Highlands. The annual average wind speed is 6 m/s, with June to August being the windiest months of the year. Two wind projects are currently being developed in the southern region of Mozambique on Ponta de Ouro in Maputo Province and Tofinho in Inhambane Province. Despite the potential to harness winds for energy in Mozambique, wind maps have yet to be developed for the country which limits the potential for projects to be proposed, financed and developed. As such, the Renewable Energy Plan recommends production of a wind atlas to establish a clear picture of the country's wind energy potential.

In addition to the above primary sources of renewable energy identified for the country, geothermal energy also has the potential to be developed. About 35 geothermal springs have been identified in the geothermal area of the east African Rift Valley, with the area north of Metangula indicating the most significant area of geothermal energy potential.

7.2.2.5 Option 2 Summary

For green development to materialize under REDD+ opportunites, the UN-REDD Programme Policy Brief issue #1 "REDD and Green Economy: Opportunities for mutually supportive relationship", has identified the following strategic actions: increase awareness about the mutually supportive nature between REDD and green development; (i) outline a clear investment strategy; (ii) focus on a sector that requires lower investment; (iii) set up clear guiding indicators for green development; and (iv) enhance the financial flow from the private sector to green development. The policy indicates that countries should also initiate enabling actions that include: (i) expanding the scope of the REDD agenda; (ii) developing computer-based models for trade-off analysis; (iii) ensuring broader consultation on green economy development; and (iv) utilizing actors that show leadership and commitment to a green economy (UN-REDD Policy Brief Issue #01, Sukhdev et al, 2011).

7.2.3 Option area 3- Conservation areas

The REDD+ national strategy option 3 proposes that conservation areas be enhanced and also be ued to generate income for communities. This strategy would entail improvements of the management regime and protection of conservation areas with natural forest, including parks, reserves and game hunting. The current situation of land use practices that impact forest conservation is described below.

The information presented was derived from published literature, observations on the ground during vistis to REDD pilot projects, and views aired by stakeholders and community members.

7.2.3.1 Protected areas, from National Parks to Nature reserves to Forest reserves

National Parks, designed purely for the protection of nature, are managed by the Department of Conservation Areas of the Ministry of Tourism. No resources may be extracted and no settlements are allowed within this category. Many of the parks are co-managed with international funding, for example, Gorongosa NP which is jointly managed with the Gorongosa Restoration Project.

National Reserves, which include game and forest reserves, are managed by the Department of Forestry and Wildlife of the Ministry of Agriculture and Rural Development. Human settlements and resources extraction are allowed but are restricted by the rules set by the conservation plan for the reserve. Areas under this category may also be co-managed by other organizations including local communities and NGOs, for example the Niassa Reserve. Community conservation areas with local or cultural interest are managed by local or district authorities, such as occurs at the Chirindzene Forest.

Three REDD+ conservation areas were visited as part of the SESA evaluation: Moribane Forest Reserve west of Chimoio; Nhambita project adjacent to Gorongosa National Park; and Gile National Reserve. These REDD+ programs implement a hands-off approach in the core areas of the parks, but core areas were not visited for the SESA evaluation. Rather, the zones between the core-park and communities were visited. Those assisting GoM in management of these conservation areas interact with communities living in the development zone or adjacent to these reserves/parks, in terms of planting trees to provide for their needs for firewood and construction material, and other activites associated with promoting forest conservation.

7.2.3.1.1 Moribane Forest

Two areas were visited in the Moribane forest protected area (A & B in the Figure below). At site A there were some ecotourism activities and a small nursery had been established to grow plants for planting within the community, Both of these activities were initiated to help combat deforestation. Figure 23 provides a series of pictures along a transect starting at point B in Figure 22, and extending up the hill. The pictures illustrate what the landscape looks like during different stages of recovery and regrowth after slash and burn farm plots are left fallow. These pictures were taken by Dr. Geldenhuys as he led a group of stakeholders on a field trip in May 2015, designed to provide information on forest recovery and forest management in Moribane forests. There were many saplings (stems below 1 cm stem diameter at breast height [DBH] or 1.3 m above the ground) and poles (stems 1-5 cm DBH) of

particularly Panga-panga (*Millettia stuhlmannii*), an important indigenous timber species and also used locally for construction. Scattered trees of Iroko (*Melicia excelsa*) were present, with one tree having a DBH of 75 cm (Figure 24d). Dr. Geldenhuys demonstrated how pruning stems and branches of Panga-panga can improve stem form and promote regrowth of the woodland and development of useful wood resources at a low cost.

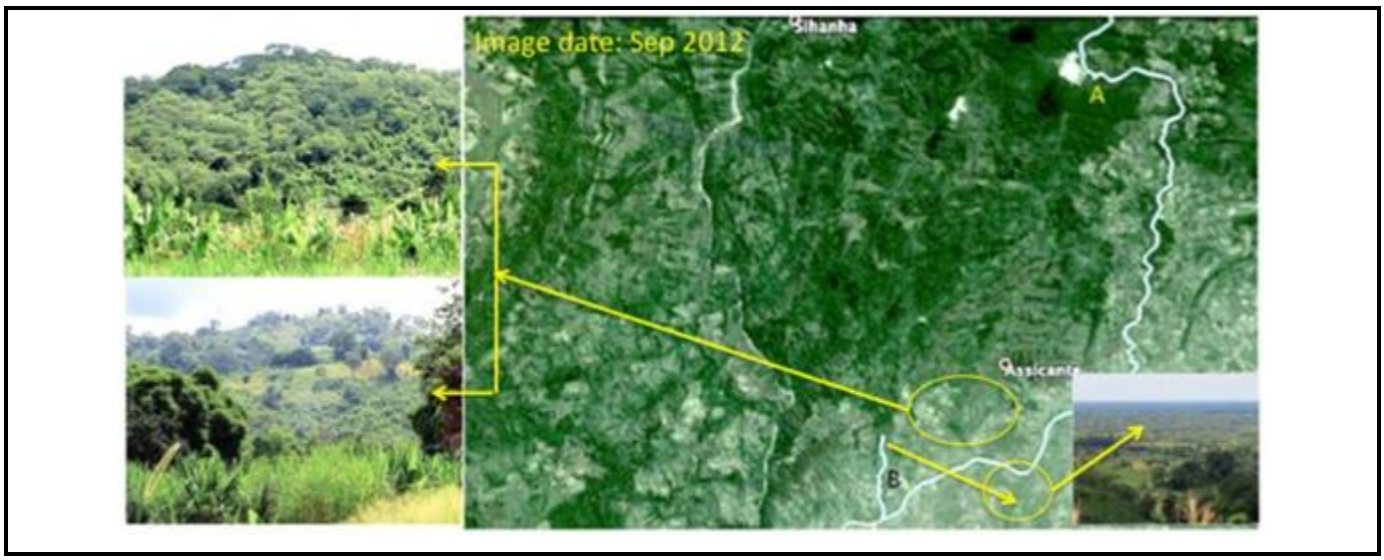


Figure 24 Moribane forest protected area in Manica Province (A) Ecotourism facilities (for income generation) & nursery (for planting in open areas); (B) Community interaction & tree planting. Two photos on left show forest within buffer zone (tall closed mixed woodland-evergreen forest). Photo at bottom right shows lowland woodlands, outside the protected area.

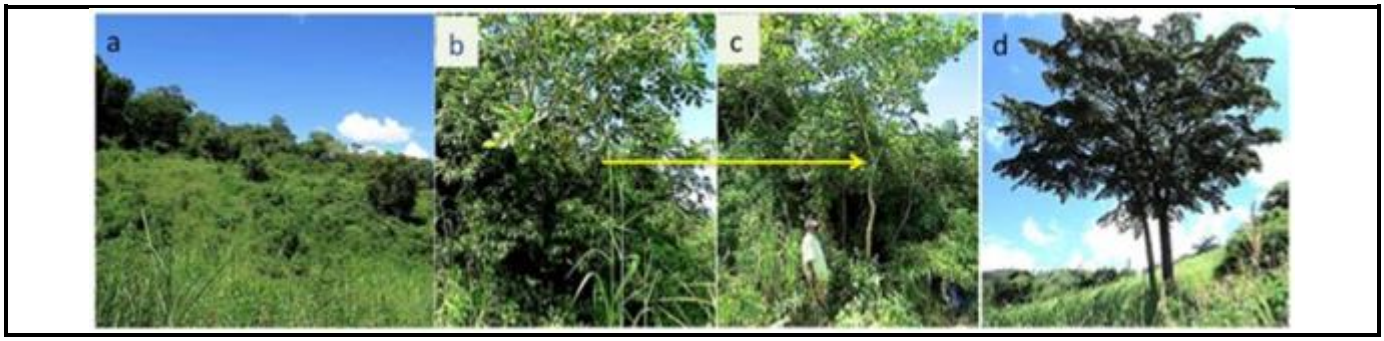


Figure 25 Examples in Moribane forest buffer/development zone (a) early regrowth after slash-and-burn traditional agriculture, that can be managed silviculturally (b & c) to prune multi-stem trees of valuable timber species such as this Panga-panga (*Millettia stuhlmannii*), with many saplings & small poles in this area. This action could eventually produce quality logs, 6 – 10 m long, such as in (d) of an Iroko (*Melicia excelsa*) tree.

Another important conservation activity visited with stakeholders was the honey processing facilities in Chimoio. The honey was obtained from beehives managed along the border of the buffer zone of the Moribane forest protected area, and provided insights to the value of this small-scale industry to income

generation. However, the sustainability of this industry is currently unknown in terms of providing enough adequate income to discourage participation in activities that result in deforestation. The long-term viability of this industry will depend on technical/financial capacity and the collaboration between different stakeholders.

7.2.3.1.2 Gorongosa National Park

Within Gorongoza National Park, four REDD+ activity areas were visited, including forest harvesting for timber processing & furniture making; timber & fruit tree nursery; planting fruit trees to serve as windbreaks; and conducting burning trials to understand fire impacts on forest stands (Figure 25). Timber processing and carpentry require special skills and interests and provide for community needs, and the wood products sequester carbon stock. It is therefore a useful activity in terms of skills development and income generation and concurrently help reduce deforestation. Carpentry is practiced in many small towns and villages in Mozambique and there is potential to use the GNP facility to train carpenters and generate entrepreneurial activities for income generation in a wider area and concurrently teach better use of timber products in order to promote forest conservation. Woodcarving is another activity that could be combined with carpentry in order to utilize small off-cuts resulting from timber processing and making furniture. Woodcarvings are popular with many tourists, and teaching carving and providing woodcarving opportunities could contribute to income generation for local artisans.

Figure 26 Resource use management activities observed in the buffer zone of Gorongosa National Park as part of Nhambita project A = Furniture production with timber cut from area; B = Tree nursery; C = Tree planting of various species (Fruit & wind breaks); D = Burning trials.

How trees are harvested for use in furniture making was not observed and it is unknown whether provision is made to ensure good regeneration of the harvested trees.

Trees for timber and fruit are grown in the tree nurseries. Many NGO's support the development of nurseries in rural areas because they can be monitored relatively easy. There are several concerns around developing nurseries in the context of climate change mitigation actions: a nursery (i) has a limited potential for cost-effective use of the grown plants/trees; (ii) is a costly operation in a rural environment; and (iii) requires good hygienic care to prevent the spread of pests and diseases into natural areas. However, positive aspects of nurseries include the potential use as a training facility for growing fruit trees, and for growing trees of timber species that are needed by communities to maintain their houses, furniture, etc. By establishing nurseries in areas where there is deforestation, this activity can also help minimize further deforestation and degradation of the environment. There is also potential to establish nursery co-ops that are managed by women, which can create independent income opportunities for women.

Planting trees around villages to serve as windbreaks as well as to enhance natural forests is a costly activity in terms of transport of the trees in bags, and after-planting there are intensive care needs. Newly planted trees require regular watering and weeding for one to two or more years to ensure successful establishment, until the tree grows to a height above the level that fires would kill it within the grassy layer. Furthermore, tree planting is not a traditional activity in rural society.

In the Gorongosa National Park area, Miombo woodland trees occur in relative abundance and there is good regeneration of canopy species in the more open areas. Training local people in techniques to improve regeneration through regrowth, and to apply selective stem thinning and branch pruning of trees, particularly of useful commercial timber species, would enhance regrowth at a low cost. Incentive schemes, such as REDD+, could be used to provide training of local community members in forest resource use and management. Selective thinning and pruning of existing natural regeneration stands would be a much more viable activity than tree planting, particularly in terms of REDD+.

Burning trials conducted to better understand how fire impacts different tree species require careful planning and design. A burning trial was conducted by Envirotrade and the University of Edinburgh, United Kingdom, at Nhambita, Gorongosa National Park to evaluate 'the effect of fire on trees in a dry Miombo woodland. As part of this project, the researchers conducted experimental burns and modeling under different fire regimes. The experimental burns were conducted once within six 1.5 ha treatment plots and one unburned control plot was used as a baseline. Observations were based on pre- and

post-fire tree and sapling surveys to assess top kill and rootstock mortality of 1,628 saplings and 944 trees (Ryan, et al. undated poster at Envirotrade Office). The results showed that mortality rates of trees and saplings increased with fire severity, and decreased with increasing stem size.

The long-term impact of fires on stand characteristics was based on a gap phase dynamics model, using a 0.02 ha gap of 8 m diameter tree crown of a large tree. Annual fires (fire return interval [FRI] = 1) of any fire severity (at end of dry season) did not allow large trees to become established, but with FRI increasing beyond 10 years, varying fire severity caused little variation in growing stock. The simulation of a 100-year FRI and low severity fires ran over 1000 years showed that the woodland would become a closed canopy dry forest.

The reality is that Miombo woodland species show varied adaptations to fires: thick bark in many species, sprouting from below-ground rootstocks (also an adaptation to browsing/cutting/damage, and the long dry season). It is a reality that the shoots of seedlings and saplings of tree species do get burnt back to ground level during fires, and they need a FRI long enough to allow them to grow higher than the grass level in order to become established as trees. The FRI in Miombo woodlands is relatively frequent, hence the prevalence of a dense grass layer under mature woodland canopies and a lack of seedlings and saplings. In terms of natural fire regimes supporting biodiversity, there are many herbaceous species that grow at ground level under the woodland canopy that depend on the regular fires to sprout, flower and fruit during their life cycle. The reality is that fire is an integral part of Miombo woodland dynamics, and exclusion of fire will cause a development away from typical Miombo woodland.

7.2.3.1.3 Gile National Reserve

Around the Gile National Reserve (GNR), several sites were visited. As with the SESA group's visit to the Moribane Forest Reserve west of Chimoio, Dr. Geldenhuys led the group on a survey of different forest areas within the GNR, accompanied by stakeholders and community members from Musseia. Figure 27 shows the survey transect and inset pictures show of some of the areas visited. Figures 28 through 30 illustrate some of the forest features observed on the survey, including a mature woodland area where several large trees were debarked,and areas with different stages of forest regrowth were observed elsewhere on the transect.

It was not clear whether the debarked trees were inside or outside the buffer zone of GNR. Debarking is done to make bark beehives that are placed in trees (Figure 28). Debarked trees are often affected

by bark borer insects and fungi, and are prone to damage by fire. Debarked trees generally die prematurely and thus debarking trees to build bee hives contributes to deforestation. Management of this activity might include encouraging multiple uses of trees that are cut down for other purposes, including taking the bark of the cut down trees to use for beehive construction. Other multiple uses would include using different tree parts forfiber, maybe medicine (depending on the species), wood for various types of construction of various dimensions, and charcoal.

Figure 27 Gile Reserve visit with road from Gile to the Park: A = Harvesting of bark from large trees for beehives, fibre and maybe medicine (Figure 7); B = Site of pruning of a young tree of *Pterocarpus angolensis* (Figure 8); C = Good tree regeneration in old settlement gaps (Figure 9); D = Comparison of mature woodland with open understory and mixed woodland with coastal forest in the absence of fire for longer periods (Figure 10); E = Use of construction material for houses. Note also the settlement areas (light color) at, for example, Etaga, Vasseile, Namurra, Mujaine, Malema & Musseia (community project visited).

Figure 28 Harvesting of bark from a variety of large trees most likely for making beehives. Note that in a) and b) only a small part of the stem is debarked, and in b) the bark is recovering as edge growth (on the right side of the wound), but the wound may never recover and is likely to become infested with pinhole borers and/or damaged by fire. Tree c) is already dead because of total ring-barking. Tree d) is in the process of being debarked and e) shows how it is done.

Further along on the survey, near the main road, several relatively old, abandoned settlement gaps were observed. In many of the gaps regrowth of pole-stage canopy trees was evident, with regrowth in some areas denser than in others. Variation in regrowth density may reflect variation in soil compaction with more sparse regeneration occuring on compacted soil around former houses (Figure 29).

Along the main road to the Gile Reserve office, there are some good examples of tall, mature Miombo woodland on one side of the road, and mixed woodland-coastal forest on the other side of the road (Figure 26, point D; Figure 30). It is likely that the contrasting understories of the two stands in close proximity resulted from the frequency of fires through the two stands. The Miombo woodland would

experience regular fires with the woody plants having no chance to survive above-ground. The mixed woodland would experience less frequent fires with a woody understory developing, similar to what has been described for the Gorongosa burning trial (Ryan, et al. undated poster at Envirotrade Office) and what developed with annual cool fires in the woodlands of northern Namibia (Geldenhuys, 1977).

Figure 29 Pruning of Pterocarpus angolensis in regrowth stand near Gile office

Figure 30 Diverse regrowth woodland on former settlement areas, between Gile office and the Camping site along the river. Regrowth is faster with abandoned cultivation (left) than with soil compaction around former homes.

Areas where forest is actively being used by rural communities were also observed, and Google images of these areas show the impact on the forest (Figure 31). Although rural communities are adopting use of bricks for construction, they still use wood to build homes, but the main use of wood is still for fuel and charcoal production. The impact of such use on the woodlands can be seen in the lighter areas on the Google Earth images, as shown for the Etaga area along the road from Gile town to the Gile Reserve (Figure 31). There is still some woody growth, some planted stands of introduced

timber and fruit tree species, and some regrowth of Miombo woodland. Active management of the regrowth woodland in and around these settlements could contribute to restoring carbon stock in woody biomass, provide a variety of products (poles, fuel wood, fruit, etc) and environmental services (shade, windbreaks, biodiversity, etc). Such tree management could also be conducted outside of natural reserves and parks to help meet the basic resource needs of people in rural areas. .

Figure 31 Two mature stand types on opposite sides of the road to the Gile Reserve office a) Left: Large trees with an open understory and grassy-herbaceous cover; b) A mixed stand with species of Miombo woodland and Coastal forest, with fires most likely less regular, with a dense understory of woody plants, and most likely mainly shrubs and sub-canopy trees.

Figure 32 Clearing of most woodland cover in settlements such as Etaga along road between Gile town and Gile Reserve The woody cover is either planted tree stands of Mango or Cashew nut, or Miombo woodland in different stages of development, as shown in insert.

7.2.4 Option 4 – Sustainable Forest Management

The REDD+ national strategy envisages promoting the forest concession system with value added to the forest products. This involves enhancing sustainable forest management (including forest concessions of native forest) and promoting development of value chain of non-timber forest products (NTFP). Forest production in Mozambique is divided in two major activities: (i) exploitation of native forest, based on selective trees cut under a long term concession regime (up to 50 years) or simple or short-term licenses (up to 5 years); and (ii) forest plantations focusing on production of exotic trees (e.g., eucalyptus) for timber and non-timber products. The main forest product is timber and the native timber is mainly exported unprocessed and exotic timber products are for local consumption.

7.2.4.1 Timber concessions

Timber concessions are managed by the Department of Forestry and Wildlife and generally allocated to private operators under long-term timber concessions or annual licenses, but local communities are also eligible. Timber concession management is based on single-tree timber harvesting, minimum tree size limits for cutting timber species, planting to replace harvested trees, and require no silvicultural management. Dr. Geldenhuys, a member of the SESA team has been involved with the assessment, resource inventories, development planning and guidance on silvicultural management of woodlands in various parts of Mozambique over many years (Geldenhuys, 1992, 1996, 2003, 2004a, b, 2005a, 2015).

Recently four timber concessions covering 119, 000 ha between Gile and Alto Molócuè in Zambézia province were assessed in terms of potential and variation in growing stock, woodland condition and regeneration status (Geldenhuys, 2015). There was limited access to many parts of the concession areas. Google Earth imagery showed different zones of vegetation cover, including riverine zones, granitic domes and areas of human settlement and slash-and-burn traditional agriculture. Each of these zones could be expected to have a different species composition of different important timber species and therefore timber potential, and some areas should have been excluded from the effective concession areas.

The management plans for the four timber concessions, based on resource inventories, showed no zonation of the vegetation cover and habitat conditions as basis for the sampling design and timber growing stock assessments. Growing stock assessments require accurate determination of area coverage of each zone separately to extrapolate the sampled information to the total area of each zone, as basis for reliable estimates of annual allowable harvests of quality timber in large trees over the

concession areas (Geldenhuys, 1996, 2004a). In the management of the woodland for sustainable timber supply over the concession period, each zone also needs to be managed differently in terms of resource use and silvicultural management.

Two field sites were visited in the Gile concessions to observe harvested areas, in terms of size range of trees present in areas where timber had been harvested, condition of the woodland after timber harvesting, and regeneration potential of harvested timber species for the future. Tree stand structure showed a relatively uniform tree size with few large trees, mostly less than 40 cm DBH, with an open understory with no saplings and small poles of tree regeneration (Figure 32). There are spots and small areas with good tree regeneration (Figure 29). In several places in the harvested area there was regeneration of various good timber species, mostly sprouting from cut stumps, damaged stems or from rootstocks with signs of being damaged by fire.

For example, there were several plants of *Millettia stuhlmannii* (Figure 33a) and *Pterocarpus angolensis* in the early sprouting phase of the regeneration, but showed no height growth under the tree canopy. However, *P. angolensis* in an open area with no tree cover (Figure 33b) and sprouts from a cut stump (Figure 33c) showed strong and vigorous height growth. In the same area, in a small spot with no large trees, there was a stand of young trees between 4 and 6 m tall, with a uniform tree size and of several tree species (Figure 33d). Along some of the roads inside the harvested forests, there were sites of abandoned former homesteads, some former cultivation, and also recently abandoned cultivation.

These sites showed a range of development states of the vegetation, from clearing woodland for crop cultivation, through all development stages up to stage 3 (Figure 33e), showing the recovery process of woodland after traditional practices of slash-and-burn agriculture. This active regrowth of the woodland trees in large canopy gaps (Figure 34) and in the abandoned sites of homesteads and crop fields is in sharp contrast to the lack of tree regeneration in the understory of the woodland canopy in the harvesting sites (Figure 32), and shows that regeneration and small trees of many of these tree species need enough light to ensure good growth in height.

Figure 33 Tree stand structure in the Gile timber harvesting areas after being harvested. Note that tree size is relatively uniform and saplings and small poles of tree regeneration are generally absent.

Figure 34 Relative successful regeneration within the Gile timber concessions (a) *Millettia stuhlmannii* sprouting from a damaged stem under the canopy with no height growth; (b) Strong shoot growth of *Pterocarpus angolensis* from damaged stem in large opening; (c) Strong sprouting from cut stump of *P. angolensis* in large gap; (d) Dense young stand of various canopy tree species in site with no overhead canopy of large trees; (e) Good regeneration of various tree species in abandoned slash-and-burn site.

Figure 35 A patch of good tree regeneration (within yellow outline) in a mature stand of *Brachystegia spiciformis* woodland (with no tree regeneration in sapling and pole stage), within Sofala Province. The canopy gap was formed by either slash-and-burn agriculture or charcoal production. Note how fire burnt the understory in the mature woodland, but did not burn through the stand of regeneration.

In the visited sites, timber harvesting was confined to a few species with highly valued timber (for example, Umbila [*Pterocarpus angolensis*], Chamfuta [*Afzelia quanzensis*], Panga Panga [*Millettia stuhlmannii*] and Pau Ferro [*Swartzia madagascariensis*], growing scattered amongst many other tree species that dominate the woodland canopy. In this case it was good to see that they use one of the common canopy species, *Brachystegia spiciformis,* for railway sleepers. There were several examples of tree stems that were left behind and not utilized (Figure 35) as also reported by Geldenhuys (2005a) for other parts of Zambezia Province. There is a definite need to utilize more of the other species that grow in the forests and develop better utilization of the wood of the cut trees (see also Geldenhuys, 2005a), for a diversity of products, other than just for structural timber.

Figure 36 Wastage of good Pterocarpus angolensis timber in various timber concessions (Geldenhuys, 2005a, 2015): (a) Wood above a fork in a cut tree in Gile concession was not used because it was considered to be too small for timber use although it could be used for other products; (b) Some stem sections left behind in a harvested area of Gile concession; (c) Large timber left behind in a timber concession in Morrumbala-Derre area of Zambézia Province because forestry officials had a wrong understanding of the minimum cutting limit for high quality tree species; (d) Cut timber logs left behind by concessionaire in Pebane area of Zambézia Province.

These woodlands have a low density of high value, high quality timber trees. The harvesting practices and log extraction and transport need to consider this to make the practices more cost-effective. The best approach is to use mobile saws (Figure 36a), either on the harvesting site or at a nearby site, and to do the transport of logs by tractor with trailer, with most of the log processing nearby for using the off-cuts when producing quality structural timber, in other local small businesses and crafts, and to support local employment and capacity building. There seem to be a current export of large quantities of timber, with very local employment (Figure 36c).

Figure 37 Timber processing and transport (a) Mobile sawmill within the Gile concession area provide for local employment and (b) more complete use of cut trees and conversion into different product dimensions; (c) Export of large quantities of timber, with very little local employment, and finished products will be sold back in Mozambique at much higher prices.

In recent years, several large trucks hauling timber of one tree species have been observed around the town of Tete, and a large number of timber depots of the same species are also present around Tete. A similar situation was observed in the Nampula and Gile areas. The practice of harvesting and exporting large volumes of single species from natural forest areas is not sustainable and better management practices should be implemented to reduce the risk of deforestation and degradation stemming from this practice.

7.2.5 Option Area 5 – Business Environment for Forest Plantation

The REDD+ national strategy has as one of its strategic options the improvement of the business environment for forest plantations, including the day-to-day relationship between the forest companies and local communities. More specifically, the option includes the facilitation for forest companies to establish their business in deforested and degraded areas or areas with other non-forest cover.

In Mozambique two different systems are used to grow wood with introduced tree species: (i) large-scale commercial forestry plantations for poles, pulpwood and saw timber products; and (ii) small-scale woodlots to provide alternative sources for poles and fuelwood.

7.2.5.1 Commercial plantation forestry

Development of forestry plantations in Miombo woodland raises many concerns. The main areas of commercial plantation forestry seem to be in the Chimoio area (Figure 37), and parts of the Sofala, Zambézia and Niassa Provinces (Figure 38). The issues experienced by the plantation forestry companies, and the impacts they have on the woodland resources of Mozambique, have been highlighted during consultations provided to Rift Valley Forestry (RVF) who initiated the commercial Florestal de Niassa Limitada (FdN) afforestation project in Niassa Province in northern Mozambique (Geldenhuys, 2009, 2014).

RVF's objective is to develop industrial plantations of introduced pine and eucalypts for the production of poles, pulpwood and saw timber products in the Lichinga, Muembe and Majune districts. FdN is one of several companies implementing large-scale commercial forestry projects in this area. The question is how to stimulate and facilitate socio-economic development in an area with natural Miombo woodland interspersed with settlements, a fast rate of woody vegetation clearing for traditional slash-

and-burn crop cultivation (food and tobacco), charcoal and wood-fuel production, and homestead construction.

Figure 38 Commercial plantation forestry in the Chimoio area, Manica Province

The FdN afforestation project covers an area of about 210,000 ha within an area regarded as sparsely populated, with poor infrastructure, few commercial enterprises and predominantly rural traditional agricultural practices. The first tree plantings were established in 2007, in one part of the project area. The long-term plan is to expand the commercial forestry component with pines and eucalypts up to 120,000 ha by the year 2033 to produce poles, pulpwood and sawn timber on a sustainable yield basis for supply into the local and export markets. They intend to conserve about 70,000 ha as natural woodland, and to do infrastructure development (roads, firebreaks, nurseries, office complex, etc) on the remaining 20,000 ha. Forestry rotation periods range from minimum 8 years for pine pulpwood, 10 years for eucalyptus poles, 20 years for eucalyptus sawn timber and up to 25 years for pine sawn timber.

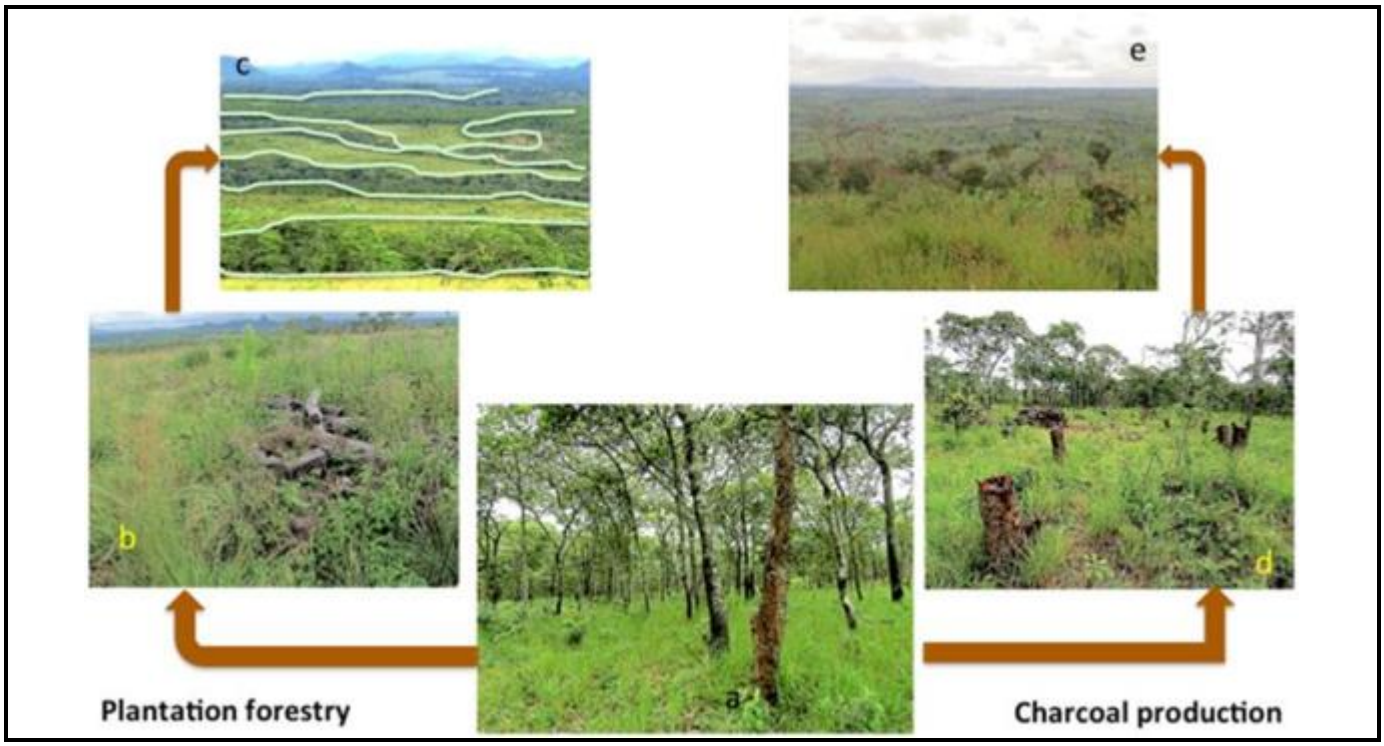


Figure 39 Commercial plantation forestry stages: in the early stages in the Lichinga area, Niassa Province (b) Debris of cut Miombo trees that are being burnt before pines or eucalypts are planted (but such wood may not be used for charcoal production); (c) Buffer zones of Miombo woodland had been retained when some areas were cleared for planting of pines or eucalypts; (d) Miombo woodland in an area retained as buffer zone is being cleared by charcoal producers; (e) Regrowing Miombo woodland in areas that had been cleared for production of charcoal (along main road from Lichinga to coast).

One critical success factor for the project is the availability of suitable land for afforestation to plant the annually planned areas as per the business model. Such suitable land has to be opened up by developing roads and settlements, cleared, prepared and planted within a short annual planting window – during the 4 to 5 month rainy season (December to April).

Several other large commercial forestry companies compete for this finite resource of land. Currently FdN is pursuing planting on land promised to them by the government officials in the Lichinga, Muembe and Majune districts. The open, generally flat to gently undulating areas with good soils suitable for commercial afforestation are generally the same areas that communities target for agriculture and hence these areas are not always available for afforestation projects. This leaves areas that have soils that are too shallow soils for forest establishment, or which have dense indigenous vegetation types that need to be cleared and disposed of or burned prior to commercial planting.In these instances, clearing and grubbing the land and burning indigenous vegetation releases sequestered carbon to the atmosphere – this needs to be balanced with the provision of commercial wood products for the

country, and long term capture of carbon in the afforested areas as the planted trees become established.

Most of the FdN areas that had been allocated to FdN by the relevant government authority, and made available by the local chief, are secondary woodland after being used for traditional agriculture or being cleared for charcoal production. FdN has to negotiate with the relevant traditional leadership within a potentially suitable area for afforestation, on the availability of land for afforestation. Some of the land may not be suitable for afforestation based on two major requirements of certification of sustainable forest management: (SFM): no clearing on natural forest and woodland for afforestation; and abiding by other legal requirements.

Principles, criteria, indicators and standards (PCI&Ss) for SFM have been developed by the international community (e.g., UNFCCC, IUCN and World Bank) to consider associated environmental, social and economic issues. Various systems are in place to assess the compliance of different forestry management actions, and forestry activities can be certified as abiding to SFM requirements. The normal plantation forestry activities within the FdN project seem to largely conform to the SFM certification requirements, with the exception of Miombo woodland being cleared for the project. For example, some areas made available by the local chief, were old farm plots abandoned when the farmers moved to the towns or other areas during the civil war. Regrowth stands of >30 years have become established in these areas and have the appearance of mature Miombo woodland (Figure 39).

Stand structure in the Miombo woodland (high stem density, uniform stem diameters of generally relatively small trees, and a lack of large stem diameters) indicated that much of the Miombo woodland within the FdN area are in early regrowth stages. There are relatively small areas of mature and old-growth Miombo woodland (with a greater range of tree sizes and lower stand density) located in the FdN project area. This means that many areas of Miombo woodland had been previously cleared, even though this may not be the case in all areas of open woodland or wooded grassland.

Within the FdN project area, tree plantings were done with both pines and eucalypts after clearing natural vegetation. These planted areas showed that:

i) Cultivated areas are only planted once there was an agreement with the people from the local village and after they terminated the cultivation activities in the particular area. Areas with scattered fruit trees (mainly mango and banana clusters) were not planted, or the fruit trees were not removed but left within the planted area (Figure 42);

Figure 40 FdN afforestation with pines and eucalypts in areas with little Miombo woodland but scattered mango trees and banana clusters.

ii) Many natural areas have been left unplanted, such as rocky hills, cultural sites, seepage lines and streams;

iii) Some of the planted compartments are small and surrounded by these unplanted natural areas. A block of for example about 1000 ha could therefore be composed of a number of small compartments that would allow the natural areas to persist in connected zones with other natural areas in a landscape mosaic of planted and unplanted areas;

Planted trees in micro-sites of burnt clearing debris (and charcoal production sites) grew much faster and showed the need for fertilizer application;

iv) People from the local village were participating in the afforestation program, either as workers in the nursery, in site preparation or planting, or in collecting stems and branches of cleared trees for fuel wood or for production of charcoal.

Different authorities apply different rules in decision-making of what practices are allowed for sustainable development (Figure 43), and plantation forestry has to make viable business amidst such conflicts in decision-making. In general, actions allowed for one user (Village resource use) seem to be not allowed for other users (Forestry company and Charcoal producers). For example, the Mozambican Forestry department agreed to the development of plantation forestry by FdN, if they can negotiate land for afforestation from the local villages. The Chief of a Village allocated land to FdN, but on inspection it appears that when legislation, regulations and standards are considered, only a small portion of the land made available by the village chief could be used for afforestation.

Figure 41 Conflicts in decision-making driven by different levels of authority in the management of Miombo woodland resources

If RVF must withdraw from the FdN project because they cannot plant all of the areas they had planned on developing for afforestation, the village chief and community members may lose faith in the afforestation programme. Although RVF may withdraw because rules and regulations prohibit them from pursuing the afforestation programme, community member do not need to adhere to these same rules and regulations – resulting in disjointed land management practices. For example, RVF would be required to zone the land into productive and protected zones, whereas the community can clear areas within these protected zones (Figure 38c). Similarly, the RVF would be heavly fined if they impacted riparian areas, but community members often adversely affect riparian areas as a result of traditional agricultural practices (Figure 44). Ultimately, sustainable management of forest resources should be applied to community members as wel as commercial afforestation programmes, and community members should be trained in sustainable forest and land management practices.

Figure 42 Conflicting decision-making affect sustainable management of woodland resources and environmental services (a) Mature Miombo woodland (left of road) has been cleared to plant pines for FdN commercial plantation forestry and are to right of road retained as buffer zone, but the buffer zone may be cleared for crop production or charcoal production (see Figure 26d); (b) Riverine vegetation maintained downstream of a bridge during afforestation; (c) Upstream of same bridge all woody growth on both sides of the same stream had been cleared for agricultural production.

Other issues observed in the management of forest concesions include the lack of management of cutting saplings, versus cutting mature trees. Within timber concessions, cutting down mature growth protected species is controlled throughestablished cutting limits, but there are no established limits on

cutting pole-stage trees of these same species, which impacts the potential for these species to become established as mature trees. Other management issues include changes to the fire regime, which may suit wildlife but may reduce the regeneration capacity of important tree species such as umbila (*Pterocarpus angolensis*), and the government bringning in elephants and buffalo to please tourists, but not assisting communities with wildlife impacts on crops and wood resources used for timber, poles and charcoal

Figure 43 Miombo clearing (a) Left: Area had been cleared of Miombo woodland for afforestation with pines north of a ridge (see area in Figure 26c). (b) Right. Extensive areas of Miombo woodland had been cleared by rural farmers for crop cultivation, to the south of the same ridge.

In addition to the above mebntioned concerns regarding development of afforestry concessions in rurl Mozambique, it is important to consider other cultural and social issues associated with changing the use of the landscape. Current settlements and cleared agricultural areas, as well as remnant clusters of banana and mango trees, remnant Miombo stands and past cleared farm plots that are in different stages of regrowth suggest that the villagers have been living in this area for several generations. This means that people in the current villages have a long-term history of traditional attachment to the landscape. There is potential for community members to be aware of archaeological sites and historical monuments, as well as to have ties to sacred sites within the FdN project area. Additionally, community members likely still use the area for hunting and resource gathering for medicines and special food plants. Cultural resources and traditional plants ad other food resources that community members rely upon may be affected by the afforestation project. Communities should be consulted regarding these issues, and an agreement reached regarding potential impacts to these resources.

It will also be important to consider providing alternative land uses for the development of small enterprises to enable the villagers to supplement their income; potentially, some opportunities could be created by the afforestation project such as providing fire control and weed control. Ultimately, it is

important to develop incentives for villagers to support afforestation projects through directly or indirectly benefiting from the projects.

7.2.5.2 Small-scale woodlots for poles and fuelwood

In various areas of Mozambique intensive agricultural practices have left large areas with few to no Miombo trees on the landscape. There is always a need for fuelwood and many areas also need for poles of various kinds for construction. Various NGOs, and the Forestry Department, have established woodlots of indigenous or introduced species to help fill these needs (Figure 45). As previously discussed, the Mozambique Leaf Tobacco Company (MLTC) has a specific program for planting woodlots to provide fuelwood needs for the tobacco curing process.

Figure 44 Various types of woodlots of a wide range of species mostly introduced, have been planted to provide in the needs of society for poles and fuel wood. However, often the woodlots are managed by outside organizations but it is not really used by the rural society.

7.2.5.3 Strategy Option Summary

The implementation of the above strategy options have the potential to cause adverse environmental and social impacts or risks that should be minimized during all phases of design, implementation and post-implementation if projects or programs are discontinued. These environmental and social impacts and risks were identified in different stages (scoping and analytical phases) of developing this SESA report. Prior to presentation of the identified impacts and risks for the above strategy options, a discussion on the proposed assessment tools and their rationale is provided

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8 Strategic Assessment Methods

A variety of tools were implemented to evaluate the potential biophysical, socio-economic and socio cultural impacts of the REDD+ strategy options in Mozambique, including:

- Evaluating the issues that emerged from stakeholder consultation;
- Evaluating the strategy options relative to current environmental and social policies in Mozambique
- Evaluating biophysical, social, cultural opportunities and risks;
- Evaluating options against the Verified Carbon Standard (VCS); and
- Evaluation options against UNFCCC and World Bank Environmental and Social Safeguards

Each of these tools is described below, and the results of the analysis are presented in Section 9, Strategic Assessment Results.

8.1.1 Issues emerging from stakeholder consultation

Emerging issues from consultation process was divided into two categories - the first category related to consultation conducted at community level. This consultation involved mainly rural communities who were directly affected by REDD+ activities. The second category was related to consultation at provincial level which targeted stakeholders with direct interest in the forest sector either as civil society organizations, government or private sector. The analysis outlined the risks and opportunities associated with the implementation of the proposed REDD+ strategy options.

8.1.2 Policy Consistency Analysis

Each strategy option was evaluated against existing policies in the country to determine whether the strategy complied with current environmental and social policies.

8.1.3 Opportunity and Risk Analysis

This tool was used to summarize the opportunities and risks associated with each of the strategy options, based on generalized baseline conditions and the various activities that are associated with implementation of each option. The analysis determined the level of the risk (graded as low, medium and high) and provides an explanation of the process to determine the level of the identified risks.

8.1.4 Verified Carbon Standard

The Verified Carbon Standard (VCS) is a voluntary GHG reduction program designed to measure quality standards for voluntary carbon offset industry and sets the parameters for validating and measuring carbon offset projects. Among other forest management, social, environmental and carbon

standards[1], VCS is the most comprehensive model to deliver on criteria of poverty alleviation, sustainable management of forests, biodiversity protection, quantification of net GHG benefits as well as monitoring and evaluation and certification procedures. Because REDD+ required an assessment of GHG benefits as well as monitoring and reporting certification, the VCS model was applied in the assessment of the proposed REDD+ options for Mozambique to determine the types of activities which could be applied into REDD+ strategy implementation and also assessed the potential environmental and social impacts and opportunities for each strategy option. Annexure B presents additional requirement of VCS in applying for Carbon Credits for REDD+ and other projects.

8.1.5 Environmental and Social Safeguards

The environmental and social safeguards are principles, rules and procedures applied to projects or programs to achieve social and environmental goals. The safeguards are intended to achieve minimum social and environmental standards, considering the incentives to supply and demand of carbon credits produced in compliance with international standards. In addition, the safeguards are intended to guide expectations around social and environmental outcomes related to reduction of carbon emissions in development. The establishment of safeguards for programs aiming to reduce emissions from deforestation and forest degradation result from the notion that there is always a dimension of human rights associated with climate change. The use of environmental and social safeguards as one of the tools for analysis in this SESA distinguishes the UNFCCC from the World Bank safeguards applied to REDD+.

The UNFCCC safeguards ensure that REDD+ will be implemented in “an inclusive, transparent manner, with respect for the rights of indigenous people and local communities with consideration for protection of biodiversity”. The UNFCCC safeguards originated from COP16 in Cancun- Mexico in 2010 and the following safeguards were agreed:

a) Actions complement or are consistent with the objectives of national forest programs and relevant international conventions and agreements;

b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;

1 Climate, Community and Biodiversity (CCB), CCB REDD+ Social and Environmental Standards (CCBA REDD+ S&E), CarbonFix Standard (CFS), Forest Stewardship Council (FSC), Global Conservation Standard (GCS), ISO 14064:2006, Plan Vivo Standard, Programme for Endorsement of Forest Certification (PEFC), SOCIALCARBON Standard and the Voluntary Carbon Standard (VCS).

c) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

d) Full and effective participation of relevant stakeholders, including, in particular, indigenous peoples and local communities;

e) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits;

f) Actions to address the risks of reversals;

g) Actions to reduce displacement of emissions.

In addition, the UNFCCC safeguards highlight the need to address land tenure, gender rights, drivers of deforestation and forest degradation and forest governance aspects in national strategies.

The World Bank safeguards on the other hand, draw primarily from the UNFCCC safeguards and basically establish social safeguard policies under each of the UNFCCC safeguard principles. In addition, the World Bank put forward specific criteria and indicators to address each social safeguard policies, and these criteria and indicators are:

1) requirement for Emission Reduction Program (ER program) that meets World Bank safeguards and supports the safeguards included in the guidance related to REDD+;
2) the requirement for ER program to provide information on how relevant safeguards are complied with or addressed and respected and
3) establishment of an appropriate feedback and grievance redress mechanism exists before negotiating and emission reductions payment agreement (ERPA).

The table below summarizes the UNFCC REDD+ safeguards and the respective World Bank safeguard policies and procedures.

Table 19 UNFCCC safeguards and World Bank Safeguard Policies and Procedures

UNFCCC Safeguards for REDD+	Relevant World Bank Safeguard Policies and Procedures
1) That actions complement or are consistent with the objectives of national forest programs and relevant	**OP 4.01 on Environmental Assessment**, in particular paragraph

international conventions and agreements;	("para.") 3 **OP 4.36 on Forests**, in particular paras. 14 and 6
2) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;	**Access to Information** policy, in particular para. 1 **OP 4.01 on Environmental Assessment**, in particular paras. 3 and 13 **OP 4.36 on Forests**, in particular para. 14 **BP 4.04 on Natural Habitats**, in particular para. 5 **BP 4.10 on Indigenous Peoples**, in particular para. 10 **BP 4.12 on Involuntary Resettlement**, in particular para. 2
3) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;	**OP 4.10 on Indigenous Peoples**, in particular para. 1; para. 16 and footnote 17; paras. 19 to 21 **OP 4.36 on Forests**, in particular paras. 10 and 14 **BP 4.36 on Forests**, in particular para. 4
4) The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of this decision;	**OP 4.01 on Environmental Assessment**, in particular paras. 14 and 15 **OP 4.10 on Indigenous Peoples**, in particular para. 1 and footnote 4 **OP 4.04 on Natural Habitats**, in particular para. 10 **OP 4.12 on Involuntary Resettlement**, in particular para. 7 **OP 4.36 on Forests**, in particular paras. 11 and 12
5) Actions are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in paragraph 70 of this decision are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits;	**OP 4.04 on Natural Habitats**, in particular para. 1 and Annex A, para. 1(a); para. 4 and Annex A, para. 1(c) **OP 4.36 on Forests**, in particular paras. 1, 2, 5, and 7
6) Actions to address the risks of reversals	**OP 4.01 on Environmental Assessment**, in particular paras. 1 and 2 **OP 4.36 on Forests**, in particular para. 14
7) Actions to reduce displacement of emissions.	**OP 4.01 on Environmental Assessment**, in particular para. 2 and footnote 3; para. 3 and footnote 5 **OP 4.04 on Natural Habitats**, in particular para. 4 and Annex A, para. 1(c)

Source: FMT Note CF-2013-3

The table below summarizes relevant features of the World Bank safeguards policies and procedures.

Table 20 Description of the World Bank safeguards policies and procedures

World Bank safeguard policies and procedures	Important paragraphs	Description
OP 4.01 on Environmental Assessment	**Paragraphs :** 1,2,3,4,13, 14 and footnote 5	**1**: The Bank requires environmental assessment (EA) of **projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making**. **2:** EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA **evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation**. The Bank favors preventive measures over migratory or compensatory measures, whenever feasible. **3: EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. EA considers natural and social aspects in an integrated way**. It also takes into account the variations in project and country conditions; the findings of country environmental studies; national environmental action plans; the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements. The Bank does not finance project activities that would contravene such country obligations, as identified during the EA. EA is initiated as early as possible in project processing and is integrated closely with the economic, financial, institutional, social, and technical analyses of a proposed project. **4:** The borrower is responsible for carrying out the EA. For Category A projects the borrower retains independent EA experts not affiliated with the project to carry out the EA. For Category A projects that are highly risky or contentious or that involve serious and multidimensional environmental concerns, the borrower should normally also engage an advisory panel of independent, internationally recognized environmental specialists to advice on all aspects of the project relevant to the EA. The role of the advisory panel depends on the degree to which project preparation has progressed, and on the extent and quality of any EA work completed, at the time the Bank begins to consider the project. **13:** When the borrower has inadequate legal or technical capacity to carry out key EA-related functions (such as review of EA, environmental monitoring, inspections, or management of mitigatory measures) for a proposed project, the project includes components to strengthen that capacity. **14:** For all Category A and B projects proposed for IBRD or IDA financing, during the EA process, the borrower consults project-affected groups and local nongovernmental organizations (NGOs) about the project's environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible. For Category A projects, the borrower consults these groups at least twice: (a) shortly after environmental screening and before the terms of reference for the EA are

		finalized; and (b) once a draft EA report is prepared. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them.
OP 4.36 on Forests	**Paragraphs :** 1,2,4,5,6,7,10,11,12 and 14	**1**. The management, conservation, and sustainable development of forest ecosystems and their associated resources are essential for lasting poverty reduction and sustainable development, whether located in countries with abundant forests or in those with depleted or naturally limited forest resources. The objective of this policy is to assist borrowers to harness the potential of forests, reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests. **2**. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank also assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services. **4**. The Bank uses environmental assessments, poverty assessments, social analyses, Public Expenditure Reviews, and other economic and sector work to identify the economic, environmental, and social significance of forests in its borrowing countries. When the Bank identifies the potential for its Country Assistance Strategy (CAS) to have a significant impact on forests, it integrates strategies for addressing that impact into the CAS. **5**. The Bank does not finance projects that, in its opinion, would involve significant conversion or degradation of critical forest areas or related critical natural habitats. If a project involves the significant conversion or degradation of natural forests or related natural habitats that the Bank determines are not critical, and the Bank determines that there are no feasible alternatives to the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the Bank may finance the project provided that it incorporates appropriate mitigation measures. **6**. The Bank does not finance projects that contravene applicable international environmental agreements. **7**. The Bank does not finance plantations that involve any conversion or degradation of critical natural habitats, including adjacent or downstream critical natural habitats. When the Bank finances plantations, it gives preference to siting such projects on unforested sites or lands already converted (excluding any lands that have been converted in anticipation of the project). In view of the potential for plantation projects to introduce invasive species and threaten biodiversity, such projects must be designed to prevent and mitigate these potential threats to natural habitats. **10.** To be acceptable to the Bank, a forest certification system must require: a) compliance with relevant laws; b) recognition of and respect for any legally documented or customary land tenure and use rights as well as the rights of indigenous peoples and workers; c) measures to maintain or enhance sound and effective community relations; d) conservation of biological diversity and ecological functions; e) measures to maintain or enhance environmentally sound multiple benefits accruing from the forest; f) prevention or minimization of the adverse environmental impacts from forest use;

		g) effective forest management planning; h) Active monitoring and assessment of relevant forest management areas; and i) the maintenance of critical forest areas and other critical natural habitats affected by the operation. **11.** In addition to the requirements in paragraph 11, a forest certification system must be independent, cost-effective, and based on objective and measurable performance standards that are defined at the national level and are compatible with internationally accepted principles and criteria of sustainable forest management. The system must require independent, third-party assessment of forest management performance. In addition, the system's standards must be developed with the meaningful participation of local people and communities; indigenous peoples; non-governmental organizations representing consumer, producer, and conservation interests; and other members of civil society, including the private sector. The decision-making procedures of the certification system must be fair, transparent, independent, and designed to avoid conflicts of interest. **12.** The Bank may finance harvesting operations conducted by small-scale landholders, by local communities under community forest management, or by such entities under joint forest management arrangements, if these operations: a) have achieved a standard of forest management developed with the meaningful participation of locally affected communities, consistent with the principles and criteria of responsible forest management outlined in paragraph 10; or b) adhere to a time-bound phased action plan to achieve such a standard. The action plan must be developed with the meaningful participation of locally-affected communities and be acceptable to the Bank. **14.** For projects involving the management of forests proposed for Bank financing, the borrower furnishes the Bank with relevant information on the forest sector concerning the borrower's overall policy framework, national legislation, institutional capabilities, and the poverty, social, economic, or environmental issues related to forests. This information should include information on the country's national forest programs or other relevant country-driven processes. On the basis of this information and the project's EA, the borrower, as appropriate, incorporates measures in the project to strengthen the fiscal, legal, and institutional framework to meet the project's economic, environmental, and social objectives. These measures address, among other issues, the respective roles and legal rights of the government, the private sector, and local people. Preference is given to small-scale, community-level management approaches where they best harness the potential of forests to reduce poverty in a sustainable manner
Access to Information policy	**Paragraph:** 1	**1:** The World Bank recognizes that transparency and accountability are of fundamental importance to the development process and to achieving its mission to end extreme poverty and promote shared prosperity. Transparency is essential to building and maintaining public dialogue and increasing public awareness about the Bank's development role and mission. It is also critical for enhancing good governance, accountability, and development effectiveness. Openness promotes engagement with stakeholders, which, in turn, improves the design and implementation of projects and policies, and strengthens development outcomes. It facilitates public oversight of Bank- supported operations during their preparation and implementation, which not only assists in exposing potential wrongdoing and corruption, but also enhances the possibility that problems will be identified and addressed early on.
BP 4.04 on Natural Habitats	**Paragraphs :** 1, 1(a and	**1.** The conservation of natural habitats,[1] like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects

	c),4,5,10 and Annex A	borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development **4.** The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation[3] of critical natural habitats. **5.** Wherever feasible, Bank-financed projects are sited on lands already converted (excluding any lands that in the Bank's opinion were converted in anticipation of the project). The Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the environmental assessment[4] indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g., strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. The Bank accepts other forms of mitigation measures only when they are technically justified. **10.** The Bank expects the borrower to take into account the views, roles, and rights of groups, including local nongovernmental organizations and local communities, affected by Bank-financed projects involving natural habitats, and to involve such people in planning, designing, implementing, monitoring, and evaluating such projects. Involvement may include identifying appropriate conservation measures, managing protected areas and other natural habitats, and monitoring and evaluating specific projects. The Bank encourages governments to provide such people with appropriate information and incentives to protect natural habitats. **Annex A:** i. **1**. The following definitions apply in OP and BP 4.04: a) *Natural habitats*[1] are land and water areas where (i) the ecosystems' bio-logical communities are formed b) Largely by native plant and animal species, and (ii) human activity has not essentially modified the area's primary ecological functions. All natural habitats have important biological, social, economic, and existence value. Important natural habitats may occur in tropical humid, dry, and cloud forests; temperate and boreal forests; Mediterranean-type shrub lands; natural arid and semi-arid lands; mangrove swamps, coastal marshes, and other wetlands; estuaries; sea grass beds; coral reefs; freshwater lakes and rivers; alpine and sub alpine environments, including herb fields, grasslands, and paramos; and tropical and temperate grasslands. ii. c) *Critical natural habitats* are: i. existing protected areas and areas officially proposed by governments as protected areas (e.g., reserves that meet the criteria of the World Conservation Union [IUCN] classifications), areas initially recognized as protected by traditional local communities (e.g., sacred groves), and sites that maintain conditions vital for the viability of these protected areas (as determined by the environ-mental assessment process); or ii. sites identified on supplementary lists prepared by the Bank or an authoritative source determined by the Regional environment sector unit (RESU). Such sites may include areas recognized by traditional local communities (e.g., sacred groves); areas with known high suitability for bio-diversity conservation; and sites that are critical for rare, vulnerable, migratory, or endangered species.[4] Listings are based on systematic

		evaluations of such factors as species richness; the degree of endemism, rarity, and vulnerability of component species; representativeness; and integrity of ecosystem processes. d) Significant conversion is the elimination or severe diminution of the integrity of a critical or other natural habitat caused by a major, long-term change in land or water use. Significant conversion may include, for example, land clearing; replacement of natural vegetation (e.g., by crops or tree plantations); permanent flooding (e.g., by a reservoir); drainage, dredging, filling, or channelization of wetlands; or surface mining. In both terrestrial and aquatic ecosystems, conversion of natural habitats can occur as the result of severe pollution. Conversion can result directly from the action of a project or through an indirect mechanism (e.g., through induced settlement along a road). e) Degradation is modification of a critical or other natural habitat that substantially reduces the habitat's ability to maintain viable populations of its native species. (e) Appropriate conservation and mitigation measures remove or reduce adverse impacts on natural habitats or their functions, keeping such impacts within socially defined limits of acceptable environmental change. Specific measures depend on the ecological characteristics of the given site. They may include full site protection through project redesign; strategic habitat retention; restricted conversion or modification; reintroduction of species; mitigation measures to minimize the ecological damage; post development restoration works; restoration of degraded habitats; and establishment and maintenance of an ecologically similar protected area of suitable size and contiguity. Such measures should always include provision for monitoring and evaluation to provide feedback on conservation outcomes and to provide guidance for developing or refining appropriate corrective actions.
OP 4.12 on Involuntary Resettlement	**Paragraphs :** 2 and 7	i. **2.** Involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out. For these reasons, the overall objectives of the Bank's policy on involuntary resettlement are the following: iv. a) Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs. b) Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient 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. c) 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.4 v. **7.** In projects involving involuntary restriction of access to legally designated parks and protected areas (see para 3(b)), the nature of restrictions, as well as the type of measures necessary to mitigate adverse impacts, is determined with the participation of the displaced persons during the design and implementation of the project. In such cases, the borrower prepares a process framework acceptable to the Bank, describing the participatory process by which a) Specific components of the project will be prepared and implemented; b) The criteria for eligibility of displaced persons will be determined; c) Measures to assist the displaced persons in their efforts to improve their livelihoods, or at least to restore them, in real terms, while maintaining the sustainability of the park or protected area, will be identified; and

		d) Potential conflicts involving displaced persons will be resolved. The process framework also includes a description of the arrangements for implementing and monitoring the process. i.
OP 4.10 on Indigenous Peoples	**Paragraphs :** 1,4,10,16,19 ,21 and footnotes 4 and 17	**1.** This policy[1] contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and intergenerationally inclusive. i. **4.** For purposes of this policy, the term "Indigenous Peoples" is used in a generic sense to refer to a distinct, vulnerable, social and cultural group[6] possessing the following characteristics in varying degrees: a) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others; b) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories7 c) customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and d) an indigenous language, often different from the official language of the country or region. i. A group that has lost "collective attachment to geographically distinct habitats or ancestral territories in the project area"; (paragraph 4 (b)) because of forced severance remains eligible for coverage under this policy. Ascertaining whether a particular group is considered as "Indigenous Peoples" for the purpose of this policy may require a technical judgment (see paragraph 8). **10**. *Consultation and Participation.* Where the project affects Indigenous Peoples, the borrower engages in free, prior, and informed consultation with them. To ensure such consultation, the borrower: (a) establishes an appropriate gender and intergenerationally inclusive framework that provides opportunities for consultation at each stage of project preparation and implementation among the borrower, the affected Indigenous Peoples' communities, the Indigenous Peoples Organizations (IPOs) if any, and other local civil society organizations (CSOs) identified by the affected Indigenous Peoples' communities; (b) uses consultation methods appropriate to the social and cultural values of the affected Indigenous Peoples' communities and their local conditions and, in designing these methods, gives special attention to the concerns of Indigenous women, youth, and children and their access to development opportunities and benefits; and (c) provides the affected Indigenous Peoples' communities with all relevant information about the project (including an

		assessment of potential adverse effects of the project on the affected Indigenous Peoples' communities) in a culturally appropriate manner at each stage of project preparation and implementation. **16.** Indigenous Peoples are closely tied to land, forests, water, wildlife, and other natural resources, and therefore special considerations apply if the project affects such ties. In this situation, when carrying out the social assessment and preparing the IPP/IPPF, the borrower pays particular attention to: (a) the customary rights of the Indigenous Peoples, both individual and collective, pertaining to lands or territories that they traditionally owned, or customarily used or occupied, and where access to natural resources is vital to the sustainability of their cultures and livelihoods; a) the need to protect such lands and resources against illegal intrusion or encroachment; b) the cultural and spiritual values that the Indigenous Peoples attribute to such lands and resources; and c) Indigenous Peoples' natural resources management practices and the long-term sustainability of such practices. x. 19. If the project involves the commercial development of Indigenous Peoples' cultural resources and knowledge (for example, pharmacological or artistic), the borrower ensures that as part of the free, prior, and informed consultation process, the affected communities are informed of (a) their rights to such resources under statutory and customary law; (b) the scope and nature of the proposed commercial development and the parties interested or involved in such development; and (c) the potential effects of such development on Indigenous Peoples' livelihoods, environments, and use of such resources. Commercial development of the cultural resources and knowledge of these Indigenous Peoples is conditional upon their prior agreement to such development. The IPP reflects the nature and content of such agreements and includes arrangements to enable Indigenous Peoples to receive benefits in a culturally appropriate way and share equitably in the benefits to be derived from such commercial development x. **21.** In many countries, the lands set aside as legally designated parks and protected areas may overlap with lands and territories that Indigenous Peoples traditionally owned, or customarily used or occupied. The Bank recognizes the significance of these rights of ownership, occupation, or usage, as well as the need for long-term sustainable management of critical ecosystems. Therefore, involuntary restrictions on Indigenous Peoples' access to legally designated parks and protected areas, in particular access to their sacred sites, should be avoided. In exceptional circumstances, where it is not feasible to avoid restricting access, the borrower prepares, with the free, prior, and informed consultation of the affected Indigenous Peoples' communities, a process framework in accordance with the provisions of OP 4.12. The process framework provides guidelines for preparation, during project implementation, of an individual parks and protected areas' management plan, and ensures that the Indigenous Peoples participate in the design, implementation, monitoring, and evaluation of the management plan, and share equitably in the benefits of the park's and protected areas. The management plan should give priority to collaborative arrangements that enable the Indigenous, as the custodians of the resources, to continue to use them in an ecologically sustainable manner i. Footnote: 1. "Free, prior, and informed consultation with the affected Indigenous Peoples' communities" refers to a culturally appropriate and collective decision-making process subsequent to meaningful and good faith consultation and informed participation regarding the preparation and implementation of the project. It does not constitute a veto right for individuals or groups (see paragraph 10).

		2. “Customary rights” to lands and resources refers to patterns of long-standing community land and resource usage in accordance with Indigenous Peoples’ customary laws, values, customs, and traditions, including seasonal or cyclical use, rather than formal legal title to land and resources issued by the State.

Source: World Bank website

For the purpose of this SESA, the following World Bank safeguards policies and procedures were used for the assessment of the strategy options:

A. **Environmental Assessment**- assessed potential risks, impacts and alternatives of the strategy options on the biophysical environment (air, water, soil, etc); its impacts on human health and safety, social impacts (e.g., involuntary resettlement, physical cultural resources)).

B. **Forest**- assesed the potential of options to reduce poverty and evaluated whether they would be integrated into the sustainable economic development goals of Mozambique, and protect vital local and global environmental services and forest values. It further assed whether options would maintain biodiversity and ecosystem functionality, and whether they are socially beneficial and economically viable to meet the demands for forest goods and services. The assessment also evaluates with impacts of the options on natural habitats and compliance with laws;

C. **Access to information**- this will address how the formulation of strategy options observed aspects of transparence and accountability;

D. **Natural habitats**- assess each strategy option to determine whether it would protect, enhance and rehabilitate natural habitats and also evaluated whether a specific strategy option would result in significant conversion or degradation of natural habitats;

E. **Involuntary resettlement-** the assessment evaluated whether any proposed strategy option may result in involuntary resettlement, including the World Bank policy provision for involunatray resettlement that incorporates forced changes in traditional land use practices and resource use.;

F. **Indigenous people-** the assessment reviewed the implication of the proposed strategy option on minority groups in Mozambique. The term ‘indigenous people’ does not apply in Mozambique.

9 Strategic Assessment Results

9.1 Issues emerging from stakeholder consultations

9.1.1 Community level consultation on REDD+

Table 21 Results of community level consultation in Cabo Delgado, Zambezia and Gaza

Selected issue consulted on	Findings
Forest use	• The use of the forest varies by age group and gender; with young men (18-35 years of age, especially men) using forest intensively for market purposes and in some instances with lucrative illegal logging • The intensive use of forest by this group seems associated with early marriages and the responsibilities they have resulting from children they have to take care of • Lack of jobs in the rural community may also be one of prime reason for their intense involvement in forest activities • The use of forest is also reported for food, firewood, furniture production, building fences and homes • Around the GNR, because forest resources are depleted in the buffer zone, communities, especially youth, tend to harvest these resources from within the protected areas with the justification of distance as the prime resource to get in the protected area (3km from their homes) whereas the alternative would be to go as far as 8 to 10 kms to get the resources they need in the buffer zone they are allowed to harvest from. So the incentive to enter the protected area is much greater, especially because these communities do not own any means of transportation to carry large quantities of timber or related products • Older people, both men and women, tend to have a traditional connection to forest- they do not use it as intensely as the young men. As most live alone, the demand for forest resources is limited by the level of consumption (food preparation and others) but also by their physical capabilities • Some of these elders have been involved in REDD projects (especially in QNP), where they planted trees in their yards and have been since then taking care of these plants • Forest for medicinal purposes was reported across all demographic groups, given the limited coverage of health services in Mozambique in general • Charcoal production was observed in all provinces and communities visited but with different intensities (e.g more seen in the South and North, and little or none in the Central Zone). However, rural communities (producers/suppliers) appear to benefit less in charcoal production as in most cases licenses are owned by the wealthier sellers mainly from urban areas as they invariably set the final price (with few exceptions where an association acts on behalf of the producers,e.g. Mabalane district in Gaza) • Charcoal is widely used in urban and peri-urban areas to cook food because of the taste it imparts whilst most people in rural communities use firewood.

REDD+ Impacts on Forest Use	• REDD+ pilot projects have contributed to an increase in levels of awareness concerning the need for sustainable use of forest and conservation but this awareness has not changed the patterns of forest use described above, mainly because of poverty levels • Money earned through carbon trading was less that that acquired through illegal logging for example • The proximity of hunting/timber concessions to a protected areas (GNR) poses a serious threat to resources in the reserve (there was a recommendations that the tourism law be modified to prevent the establishment of concessions for tourism and hunting immediately adjacent to the protected areas) • Complaints were raised about job opportunities in the protected areas. Communities want priority in receiving job opportunities in the protected areas, for positions such as rangers in order to supplement income while protecting their traditional land • There were reports of rangers facilitating illegal logging and charcoal production
REDD+ Impacts on Land Use and Land Tenure	• Learning tree planting technique, e.g. leaving gaps, fencing homes • Communities encouraged to implement crop rotation • Planting of fruit trees and providing alternative sources of livelihood and soil enrichment through faidherbia planting, although this had a downside of attracting elephants into the gardens and farms which destroyed crops • There were no reports of land conflicts deriving from the implementation of REDD pilot projects. The few cases reported were outside REDD and they were all solved through communitarian system of conflict resolution. Very few cases are channeled to formal institutions to be resolved.
Potential Alternatives to Reliance on Forest	• Community members noted that the REDD+ reforestation projects are one of the key alternatives to replace their heavy reliance on forest resources for survival. They recognize the need to replant trees in areas that have been deforested, and they would like jobs participating in the reforestation project. • In addition to reforestation projects, it would be beneficial if individuals could participate in commercial agriculture. • At present, 90% of people living in the rural areas of Cabo Delgado and Zambézia rely on subsistence agriculture, but cannot participate in selling agricultural products because taxes are too high
Sources of Deforestation and Degradation	• The drivers of deforestation and degradation recognized by the communities are not much different than the drivers identified in the literature: slash & burn agriculture, illegal logging, and in the north, burning is conducted to flush out game for bush meat. Burning is also conducted for road rehabilitation and road clearing and at times burns out of control. • Fewer bush fires occur in coastal areas than inland areas because this region is dominated by Muslims, and they do not burn here because bush meat is considered to be similar to pork and is not eaten by them. • In addition to these localized sources of deforestation and degradation, large scale development projects, infrastructure projects and mining projects have a significant impact on deforestation and degradation. For example, the proposed Port project in Macuse District in Zambézia provinces, and the Pemba Port in Cabo Delgado Province will result in construction of a Port along the coastline, impacting coastal forest resources, as will a railway running 1,070 kilometers from the Port to the coal mine in Tete, as well as the development of the coal mine and supporting infrastructure • Large scale projects of this nature have a significant adverse effect on forests, undergrowth, soils and the carbon stock held therein. In addition to consideration of the environmental effect of large scale development projects, impact on forests and carbon, it is important to consider the social impacts, particularly if resettlement is required. • Similarly, large scale commercial agricultural developments, such as the pro-Savannah project being developed by Brazil, Japan and Mozambique, will result in large scale deforestation and degradation, and would require resettlement of some communities and individuals.
Local perspective on	• Community members note that to reduce deforestation and degradation in the area, proper management of bush fires is one of the key things that would help

managing deforestation and degradation	• They note that in addition to burning for slash & burn agriculture, and for hunting, burning for clearing road right of ways often get out of control • Community members recommend establishing local committees responsible for managing all burning activities that occur in the area. • In addition to controlling burning, community members state that involving community members in reforestation projects would also help alleviate deforestation and degradation in the region
Institutional consideration for managing deforestation and degradation	• Under the existing REDD+ pilot projects, conservation agriculture is being introduced by external sources. The concepts and ways of farming are new to the people in the region, and in many ways clashes with local land use/forest use traditions. It will take time to raise awareness for the need for change, and to get people to accept the conservation programs and adopt them.

9.1.2 Provincial level consultations on REDD+

Table 22 Results of Provincial level consultations on REDD+ in Cabo Delgado and Zambezia

Province	Findings	
Cabo Delgado	**Potential social risks**	**Potential social benefit**
	• Loss of customary rights to land • Loss of income if carbon price decreases in value • Potential land conflict in areas close to protected reserves • Bushfires, use of witchcraft - as a result of conflict/jealousy of those gaining money from carbon credits • Complexity of programs brought in can bring additional problems if community does not understand the issues. For example the faidherbia that was planted as part of REDD+ pilot program attracts elephants, which eat the trees and then destroy their gardens. The community was not aware that elephants like faidherbia, or would have discouraged it from being planted	• Investment flowing into the province (job creation) • Community empowerment (people can be educated in different arenas, e.g. carbon credits) • Income generation resulting from payment of carbon credits • Increased use of conservation agriculture
	Potential environmental risks	**Potential environmental benefits**
	• Bushfires • Potential loss of biodiversity resulting from introduction of new invasive species • Potential increase in deforestation because of restrictions imposed	• General improvement of quality of life with increased water quality, more biodiversity, reduced air pollution, health benefits of a cleaner environment, etc • Reduces respiratory disease • Conservation of biodiversity • Keeping soil fertile • Minimizing effects of climate change • Reduces erosion • Reduce rate of loss of tree species • Mitigation measures • Re-afforestation • Environmental education/capacity building and monitoring • Community sensitization and involvement of schools and local organizations
Zambézia	**Potential social risks**	**Potential social benefit**
	• With restrictions there may be less charcoal/firewood available • Land conflicts – increased forested area would compete with agricultural land requirements • Lack of construction material – decrease	• Forest conservation – increase in species • Retention of carbon • Increase in agricultural incomes • Conservation agriculture • Increased tourism • Better organization of land distribution

	in household income which could lead to more conflicts between humans and animals	• Increased community income • Production of medicine • Increased capacity building • Gaining more than the 20% income from forestry projects
	Potential environmental risks	**Potential environmental benefits**
	• Competition of forest resources • Increased bushfires • Migration of species • Loss of agricultural areas • With introduction of new species brings risk of disease • Disturbance of ecological corridors	• Carbon retention • Reduction of the ozone layer hole • Increased biodiversity • Better management of forests/ecosystems • Reduction of pollution • Mitigation measures • Promotion of houses built with locally made bricks • Production of fuel efficient stoves • Use of renewable energy • Promotion of eco-tourism

9.1.3 REDD+ recommendations based on stakeholder consultations

Based on the results of community consultation, SWMOZ recommends the following for consideration in developing a national strategy for REDD+.

- In order to get agriculture inputs that are efficient and can contribute to the economy, it would be necessary to change the country's agricultural policy and Value Added Tax (VAT) system so that regular people can participate in commercial agriculture (Mertens, 2012). A change in agricultural policy and tax structure should be implemented to make small scale commercial farming affordable. If locals could afford to participate in production of agricultural products for sale, rather than exclusively for use by their families, agriculture would absorb many of the people who are now involved in illegal logging/forest timber cutting.

- Modify tourism law so that concessions for tourists and hunters cannot be developed immediately adjacent to protected areas. They should be far enough away that illegal timber harvesting and transport of the timber back to the hunting/tourism concession could be more easily policed, as vehicles would be required to transport the materials.

- Encourage communities to start compositing their food waste and collecting livestock waste, herbivore waste, to use as fertilizers for their gardens.

- Transfer the local system of conflict resolution to the local management of REDD+ projects.

- Address institutional capacity needs by initially training existing personnel in provincial offices to implement and manage REDD+ MRV; they could do this work as an addition to current responsibilities until the program became large enough to hire positions exclusively for REDD+.

- Work to enhance coordination between national, provincial and local levels so that there is clearer understanding of REDD+ programme goals and objectives.

- Enforce laws and increase penalties to minimize or eliminate institutional corruption so that politicians and police cannot profit individually from agricultural trade and taxes, logging trade (legal or illegal), or cash sales in agriculture or timber.

- Enhance policing of reserves to stop illegal logging.

- Create a balance between discouraging traditional land use to reduce deforestation and degradation, and planning large scale mining and large sale agricultural projects that will effect deforestation and degradation. These larger scale projects should be developed in a manner to minimize impacts on forests.

9.1.4 Summary of stakeholder consultation results based on the proposed pillars of drivers of deforestation and degradation of the REDD+ strategy

The REDD+ national strategy identified four major pillars underlying the drivers of deforestation and forest degradation. The pillars include- governance, economic, technological and sociocultural aspects under which the cause of deforestation and forest degradation navigate. Using the results of the stakeholder consultation both at community and provincial level, we present below results of the causes of the deforestation and degradation based on the pillars of the REDD+ national strategy.

Table 23 Issues affecting deforestation and degradation based on the REDD+ strategy pillars

Issues raised affecting deforestation and degradation			
Governance	**Economic**	**Technological**	**Sociocultural**
• Weak extension	• High levels of poverty	• Development of	• Strong community

services to support smallholder farmers involved in tree planting projects (e.g. QNP) • Limited institutional coordination (competing practices of NGOs with similar goals- ego. Promotion of CA and improved cookstoves) • Limited skills and personnel within government departments at provincial • Weak law enforcement (reports of corruption practices in forest sector were reported) with impacts on the community right and participation in natural resource management • Unclear procedures on carbon rights (QNP) • Weak contract enforcement between REDD+ promoters and communities • Weak enforcement of community benefits resulting from natural resources exploration (timber and charcoal production licensing) • Relation of power between the management of protected areas and communities in outside protected areas, leads to permanent confrontation • Unfavorable laws/policies for private sector involvement in REDD+	and erratic rains contribute to pressure on forest resources (e.g. Mabalane district and others in the northern region of Mozambique) • Limited financial capacity for rural communities acquire agriculture inputs relevant for CA • Limited government funding to perform, especially at duties at district and provincial level to carry out supervision/inspection in environmental and forest departments • No incentive economic for community to engage in purely REDD+ activities (viewed as carbon trading alone) as the benefits do not outweigh benefits derived from charcoal production or illegal logging, especially among youth • Tree planting activities are seen as costly and communities have limited incentives to embark upon this • Unsustainable income generating activities (hampered either by limited skills among participants or limited funding. But the two should not be viewed in isolation)	infrastructure, e.g. the new projects of deep water port in Macuse district (Zambézia province) and the Pemba port • Extensive land clearing employing technology for commercial agriculture • Lack/limited access to technology for sustainable use of natural resources (biomass and others) • Lack of skills and limited funding led to unsustainable timber processing, not making integral uses of the harvested timber	attachment to traditional agriculture practices, which makes difficult to adopt new practices such as CA • Mismatch between community preferences and tree plantation projects • Limited women involvement in natural resource management (especially forest) • Mistrust of REDD+ due to lack of contracts enforcement • Poverty levels • Unresolved issues between protected areas management and communities on the buffer zone, relating to community cultural sites (graveyards) and livelihoods within the protected areas • Demographic factors play a significant influence in deforestation and degradation, with youth highly involved in timber exploration including illegal logging and hunting • Bush fires not only related to agriculture practices but also hunting of bushpig, which is mainly consumed among Christians.

9.2 Policy consistency analysis

Table 24 Policy consistency analysis

Law or regulation	Compliance			Comments
Environmental	**NO**	**YES**	**Unknown**	
Environmental Law Nr 20/1997 of October		X		The law is generally regarded as modern in terms of addressing main environmental challenges. However, the law does not have specific provisions of concept of climate change except that in some instances it does mention issues of desertification and soil degradation
Regulation on approval of REDD Projects – Decree Nr 70/2013		X		The regulation establishes the approval procedures for REDD projects as well as the institutional framework and competencies. It includes projects for forest production, protection, conservation, forest plantation. The provisions do not cover for natural forest conversion into forest plantations and other activities developed within the context of forest legislation and unlicensed under Decree Nr 70/2013
Benefit sharing regulation- Decree Nr 19/2007 of 9 August		X		The regulation sets out the foundation for sharing of benefits deriving from exploration of genetic and traditional resources within the context of the Environmental Law. However this law does not protect the Public Interest (Community) as provided by the Competent Authority.
Climate change	**NO**	**YES**	**Unknown**	
National adaptation strategy		X		There is no a specific legal framework covering climate change issues. The National Adaptation strategy is a step ahead in the absence of this specific regulation
Risk and disaster management	X			Another important step was the approval of the Law Nr 15/2014 of 20 June. However there is still a lack of a law that defines the legal basis to ensure national climate resilience in the agriculture, construction, energy, roads and health
Conservation	**NO**	**YES**	**Unknown**	
Conservation National Policy and Implementation Strategy		X		It is provided under the Resolution Nr 63/2009 of 2 November.
Biodiversity Law		X		Provided under the Law Nr 16/2014 of 20 June. It provides the rights to carbon stocks in conservation areas and buffer zones. There are no major aspects to comment on

Forest	**NO**	**YES**	**Unknown**	
Policy and strategy for forest and wildlife development		X		This strategy was approved under the Resolution Nr 8/97 of 1 of April. It is aimed to promote protection, conservation, development and rational utilization of forest and wild resources for the economic social and ecological for the current and future generations.
Law and regulation for forest and wildlife	X			Provided under the Law Nr 10/99 and its regulation under the Decrees Nr 12/2002 of 6 June; 11/2003 of 25 of March and 76/2011 of 30 of December; and 30/2012 of 1 of August. This law does not match with provision under the land law that recognizes the DUAT. Under the Forest and Wildlife laws communities are not recognized acquired rights of forest and resources
20% community transfer	X			Provided under the article 5 of the Law Nr 10/99 of 7 of July, the law establishes 20% as the share channeled to communities resulting from forest and fauna exploration in any location that resources are extracted. However for community to receive the 20% they have to be organized into a Natural Resource Management Committee, which has primarily been supported by NGOs. This means that where there are no NGOs there is a likelihood for community to be unable to access the benefits of this income.
Forest plantation regime		X		Provided under the Decree Nr 30/2012, the forest plantation regime establishes the norms for forest plantation for conservation, commercial, energetic, sociocultural, economic and environmental purposes. There are no major issues against the legal provision
Land	**NO**	**YES**	**Unknown**	
Land Law		X		Provided under the Law Nr 19/1997 of 1 of October and the Land National Policy under the Resolution Nr 10/95 pf 17 of October. There no provisions against REDD implementation
Agriculture and Food security	**NO**	**YES**	**Unknown**	
Agrarian Policy and Implementation Strategy	X			The two documents are provided under the Resolution Nr 11/95 of 31 of October. There also important provision under the Food Security Educational Programme (Resolution Nr 56.2007 of 16 of October). There is no specific regulation for agriculture activity. This provision would contain specific environmental aspect to ensure agriculture activities are conducted in a sustainable manner, especially in connection with water conservation, soil and biodiversity. Seeds are provided under Decree Nr 12/2003 of 10 of April; especial species are under Decree Nr 26/2014 of 28 of May; agro-chemicals under Decree Nr 11/2-13 of 10 of April. Livestock is provided under Decree Nr 26/2009 of 17 of August

Water	NO	YES	Unknown	
Water National Policy and Laws		X		Provided under the Resolution Nr 46/2007 of 21 of August, the policy defines the foundation for sustainable use of water resources. The Water Law is provided under Law Nr 16/91 of 3 of August. There are no major aspects highlighted in connection with the Water Policy and Laws

9.3 Opportunity and Risk Analysis

REDD+ strategy options	REDD+ strategy sub-options	Opportunities	Proposed mitigation measures	Responsible institution (s)
		Opportunities	**Enhancement measures**	
Agriculture (SO1): Promoting alternative farming practices to ensure increased productivity of subsistence and cash crops	**(SO1a):** Promotion of Conservation Agriculture (CA)	– Existence of a general framework for CA (e.g. agriculture policy and strategy)	– Besides adherence to the current framework, a special focus on CA is required through appropriate instruments that allow for mass practice and adoption – Enhance the instruments and allow for more coordinated efforts in the implementation of CA, including mechanism of sharing experiences and research knowledge	MASA
		– A wide range of players implementing CA programs across Mozambique, with specific focus of Cabo Delgado, Zambézia, Tete, Manica and Sofala provinces	– Necessary to draw lessons (cross-regional and in contrasting soils) on the existing CA projects with focus on understanding the biophysical and socioeconomic factors underpinning its adoption	–
		– The ongoing momentum of CA projects throughout the country	– Use the existing momentum to engage the private sector into CA	–
		Risks	**Enhancement measures**	
		– Inability of most rural communities to acquire necessary inputs used in CA	– Policy measures required to facilitate imports and production of necessary inputs not only for CA but for agriculture as whole –	–
		– Strong community attachment to traditional agriculture practices may reduce the chances of mass adoption of CA across the country	– Communities will require technology transfer relating to the practices of CA , which also needs to be adjusted to suit the local context	–
		– Underestimation of numbers of young males and women that could engage in CA projects	– The inclusion of young males and women in CA projects is vital to reducing the current levels of deforestation and degradation as these two demographic groups are most active in illegal logging and charcoal production respectively	–

		– Weak agriculture extension services	– The expansion of CA should be accompanied by deployment of committed extensionists who are willing to be a true agent of change in rural Mozambique. Invariably we noticed some instances where the extensionists is deployed but has failed to provide the services he/she is meant to provide due to lack of individual commitment and drive	MASA, through the National Directorate for Agricultural Extension (DNEA) and Provincial Agricultural Extension Services (SPER)
		– Lack of clarity about CA	– The lack of clarity will jeopardize full adoption of CA. Thus, alongside institutional measures proposed above, Mozambique should develop its own conceptual framework of CA tailored to suit lcoal conditions in order to facilitate its implementation	MASA
	(SO1b): Introduction of perennial crops	**Opportunities**	**Enhancement measures**	
		– There are existing projects involved in perennial crops introduction (e.g. Cabo Delgado, Manica, Sofala and Zambézia provinces)	– Important lessons can be drawn from the existing projects in order to improve potential scale-up of activities in other areas	–
		– Carbon financing and provision of NTFPs for community livelihoods	– Species with high potential of carbon sequestration and provision of livelihood. should be prioritized based on community wishes and agro ecological conditions	–
		– Reduce soil loss resulting from erosion	– There are multiple solutions to erosion control. Control measures depend very much on the economic situation of the farmer. Some techniques which could be promoted: Conservation Cover; Conservation Cropping; Conservation tillage; Contour farming; Cover and green manure crop; Crop residue use and Terracing	–
		– Reduce waterway pollution through agriculture runoff	– Promote the use of good techniques of land use and management, including the reduction of fertilizers and pesticides as well as by introduction of trees or shrubs in the machambas	–
		– Socio-economic benefits such as employment, especially large-scale production	– Employment for the most active demographic groups should considered- young males and women	–
		Risks	**Enhancement measures**	
		– Mismatch between the introduced perennial crops with local preferences (e.g. local communities	– The introduction of these crops should be carefully negotiated with local communities in order to match	–

		showed preference for fruit trees)	local values, livelihood needs, as well as ability for these crops to sequester high levels of carbon	
		– Unclear rules for compensation based on carbon credits from planted perennial crops	– Clear project design and agreement under which compensation is made as a result for caring the trees and sequestering carbon. Most communities expressed lack of knowledge of the basis under which payments were being made- especially in the QNP in Cabo Delgado province	–
		– Weak technical support and extension services	– The expansion and promotion of perennial crops should be integrated within a comprehensive approach designed to improve agricultural practices in general. E.g. in the Envirotrade project in QNP, some trees were provided during the dry season which drastically drastically reduced their survival rate.	–
		– Undermining biodiversity	– Species suitable for the local agro-ecological conditions should be used to reduce chances of diseases affecting natural forest cover	–
	(SO1c): Support the establishment of commercial agriculture in areas with no forest cover;	**Opportunities**	**Enhancement measures**	
		– Mozambique has history of commercial agriculture and out grower schemes (e.g.tobacco, cotton and timber)	– Lessons drawn from existing commercial agriculture (e.g. tobacco, cotton and timber) – Ensure that there is balance between community involvement in out grower schemes and ability to produce food for their consumption	–
		– Decreases the potential for loss of threatened/ endangered species, red listed species (fauna) that live/use forest habitat; potentially increase biodiversity	– Encourage native forest growth to provide suitable habitat for endemic species – Develop and implement an alternative livelihood programme for forest dependent communities – Improve alternative livelihood skills training for farmers (both men and women) and inputs – Building capacity in agroforestry and conservation agriculture and increase extension technicians to assist farmers	–
		– Reduction of soil erosion from slash and burn fields leading to reduction in silt loading from runoff in water courses	Encourage correct tillage and care of soil	–
		– Contribute to CO_2 storage and reduce impact of anthropogenic driven climate change.	Encourage a larger area to be under crop/vegetation cover	–

		– Increase reliability of cash income to rural families	Grow financially beneficial crops	–
		– Increase of reliability of adequate subsistence crops for rural families.	– Grow crops that communities use – Enhance food security through improved farmland production to reduce forest pressure	–
		– Increase national production of food crops sold in urban areas to encourage less reliance on importing selected food crops	Grow appropriate food crops for use in urban areas	–
		– Increase potential for international trade in selected crops, contributing to micro and macro economies	– Create or improve production collection mechanisms to allow better access to markets and favorable prices for farmers (eg. commodity exchange)	–
		Risks	**Enhancement measures**	
		– Continued use of traditional techniques in farming	Disseminate the best farming practices and improve the assistance for farmers	–
		– May result in changes in social structure due to need to participate in commercial agricultural production, rather than subsistence agricultural production. –	Sensitize communities to not abandon the crops of subsistence in favor of cash crops, showing the value chain of subsistence cultures within the own community as well as its major role in food security	–
		Opportunities	**Enhancement measures**	
	(SO1d): Promotion of best practices of livestock management	– Existence of large and small livestock farmers	– Increasing technical capacity to assist producers – Promote the planting of local and exotic forage trees/shrubs for cattle supplementation	–
		– Existence of government initiatives for restocking livestock	– Expand these initiatives for new areas and new producers especially women (e.g. areas with high potential for fodder supplying)	–
		Risks	**Enhancement measures**	
		– Lack of equitable participation of both genders in livestock distribution by government	– Promote more female participation in restocking livestock in communities	–
		Opportunities	**Enhancement measures**	
Energy (SO2): Increase access to alternative	(**SO2a**)**:** Promotion of forest plantation for energy purpose	– Adequate areas of available land	– Land closer to areas of higher biomass consumption need to be identified – Encourage the use of marginal/degraded land for tree plantation development	–

sources of biomass in urban areas and increase the efficiency of production and use of biomass energy;		– Past experiences of similar projects have shown that this could be a useful supply of energy for urban areas but needs proper management	– Create a body of knowledge relevant to inform future forest plantation	–
		Risks	**Enhancement measures**	
		– Past experiences have not been that successful for larger scale plantations managed by rural communities with inadequate plantation management skills.	– Small-scale projects are recommended as the most appropriate due to the participation of rural communities in managing these plantation	–
		– Lack of funding and insufficient knowledge could lead to potential failure proposed projects	– A special financial commitment is required in order to support the promotion of forest plantation for energy purpose – Adequate training is required to ensure correct management of plantation	–
		– land occupation for monoculture, leading to limited access to water and food and other associated environmental problems (diseases, etc) –	– Crop rotation should be emphasized	–
		Opportunities	**Enhancement measures**	
	(SO2b): Sustainable use of biomass through introduction of improved and efficient cookstoves	– Existing national and local initiatives from both government and NGOs promoting sustainable use of biomass and fuel efficient cookstoves	– Comprehensive and more focused program to encourage the use of fuel efficient stoves	–
		– Potential financial benefit from carbon market through the use of fuel efficient stoves	– Households should be made aware of the benefits of the improved cookstoves both from economic point of view but also from health and social perspective	–
		– Reduction of emissions through mass adoption of improved and efficient cookstoves	– Actual emissions reduction levels through the use of fuel efficient stoves need to be determined	–
		– Existing legal and institutional framework as described under the Energy Policy and the strategy for sustainable use of biomass energy	– More coordinated action is required among different players both at national and local levels (e.g. Ministry of Energy, MASA, MITADER, Ministry of Industry and Trade and Ministry of Economy and Finance). This would also include the strengthening compliance of the law governing charcoal production –	–

		Risks	**Enhancement measures**	
		– High level of poverty undermines poor families access to improved cookstoves	– Measures should be taken to ensure the cost of a fuel efficient stove is affordable even for the most disadvantaged households. This could be done through financing or lowering taxes on imports of raw materials and other equipment used in the industry	–
		– Existing initiatives for promotion of fuel efficient cook stoves are scattered and to large extent uncoordinated through a designated body	– More efforts will be required from the coordinating body -Ministry of Energy to bring together players and important lessons from different initiatives – Determine the value chain (especially of charcoal production) and standard intervention to be carried across value chain for sustainable use of biomass	– Ministry of Energy
		– Limited institutional capacity in terms of testing standards to ensure minimum emissions	– Branding and certification of cook stoves is required to ensure minimum standards of both health and safety including determining the amount of emissions	–
		– Unclear laws on individual carbon rights and benefits that could stimulate the use of fuel efficient cook stoves and other devices relevant for sustainable use of biomass	– Mass adoption of fuel efficient cookstoves will require incentives- carbon rights at the very individual level of cookstoves' users –	–
		– Limited knowledge about the benefits of fuel efficient cook stoves could hinder the chances of mass adoption – Large scale adoption of fuel efficient cook stoves undermined by local tradition of cooking on an open fire both in urban and rural areas	– Systematic education activities to raise awareness among households in the country about the benefits of fuel efficient cook stoves with emphasis on provinces and areas with higher charcoal production (Cabo Delgado, Zambézia, Tete, Sofala, Manica and Gaza provinces)	–
		– Failure to address the role of women in the promotion of fuel efficient cook stoves appear to hinder the overall promotion efforts	– The education and awareness campaign should target women as agents of change	–
		Opportunities	**Enhancement measures**	
	(SO2c): Promotion and adoption of other sources of renewable energy	– Considerable potential of renewable energy (hydro, solar, wind, etc, untapped potential in biofuel (e.g. sugar waste, jatropha) and market (with only 38% of the total population with access to electricity) –	– Make strategic choices of key areas of renewable energy to intervene that are cost effective and can easily integrate into the Mozambican economy and benefit the most disadvantaged groups and biomass dependents	–

		Risks	**Enhancement measures**	
		– Limited systematized information about certain areas of renewable energy (e.g. solar and wind)	– Support the choices made with a clear investment plan that can either be funded through public budget or development institutions – Establish a monitoring and evaluation system to measure the development and progress of the green economy as a whole	–
		– Limited participation of domestic private sector could undermine the necessary technology transfer and sustainability of the sector	– Create measures designed to incentivize the participation of domestic private sector both in joint-ventures with foreign companies or as single entities	–
		– Large scale production of renewable energy such as biofuel may lead to weak community driven partnerships and local benefits	– Enhance protection of community land rights and avoid impact of biofuel production on food	–
		Opportunities	**Enhancement measures**	
Conservation areas (SO3): To strengthen the system of protected areas and find safe ways of generating income;	**(SO3a)**: Improve the management regime of protected areas of native forest (parks, reserves and game hunting reserves)	– Provide better management of the forest and potentially minimize adverse impact impacts associated with illegal logging: grading illegal roads, associated loss of biodiversity, increased erosion, oil and gas leakages , soil contamination, other illegal activities (e.g poaching) – Existence of informal arrangement or agreement for accessing and harvesting of NTFPs, Charcoal Production (Committees of Natural Resource Management)	– Increase community awareness on conservation of natural resources – Clarify and formalize rules for accessing and harvesting NTFPs and for Charcoal Production	–
		– Potential increase in biodiversity as forest areas becomes reestablished	– Increase community awareness on conservation of natural resources	–
		– Provide safe habitat for threatened, endangered, red listed species (fauna/flora)	– Increase community awareness on conservation of natural resources	–
		– Monetary benefits (e.g. income) from tourism for the community	–Benefit sharing mechanism to ensure realistic income/benefits to the communities living in the Parks/Reserves	–
		– Decrease erosion from land clearing and overgrazing		–
		– Decrease chance of flash flooding, improve water		–

		quality through reduced sediment load, improve terrestrial and aquatic habitat		
		– Reduce degradation and deforestation of natural forest		–
		– Contribute to CO_2 storage and reduce impact of anthropogenic driven climate change		–
		– Other forms of income may be established for rural communities through managed pastoralism and fuel-woods farms		–
		– More secure/sustainable pastoralism decreases the need for frequent migration to new grazing lands. Greater community stability and stability for children	– Promote the planting of trees and shrubs forage – Promote the fodder banks to feed the livestock in dry season	–
		– Reduced risk of potentially dangerous encounters of local community members with illegal loggers (increased safety)		–
		– Stop loss of revenue (local, provincial and national) of high valued trees to illegal trade	– Improve monitoring – Improve motivation for field staff (forest guards) – Sensitize judiciary on importance of forests, climate change and other environmental issues – Strengthen capacity for field staff and provide adequate resources (staff, equipment, funds) for effective enforcement and monitoring	–
		Risks	**Enhancement measures**	
		– Increased conservation measures may result in loss of traditional use of natural forest resources including collecting branches and deadfalls for homes/fence and carvings, collecting medicines plants, traditional use of forest resources by women	– Tailor conservation measures with the needs and beliefs of communities and regulate access the sacred areas and exploitation of NTFPs in sustainable way	–
		– May also have an adverse impact on community social structure, gender roles and well-being of individuals through loss of alternate income (e.g. carving), loss of traditional knowledge, loss of access to sacred sites and other cultural sites		–
		– Conflict between protected area management and	– Learn lessons from both ongoing and	–

		community can lead to unrest and luck of support for adoption REDD+ program in the region	executed REDD+ programmes/projects – Strengthen institutions and motivate personnel to implement programs/projects successfully	
		Opportunities	**Enhancement measures**	
Sustainable Forest Management (SO4) : Promote the system of forest concessions with adding value to forest products;	**(SO4a)**: Enhance sustainable forest management (forest concessions of native forest)	– Decreased potential for loss of threatened, endangered species, red listed species (flora/fauna) that live/use forest habitat	– Discourage hunting activities through sanctioning of offenders – Sensitize communities on effects of hunting, bushfires and climate change	–
		– Constrain potential for water courses to be impacted from silt-loading resulting from unmanaged clearing of forest understories, and unmanaged cutting of trees in natural forest		–
		– Reduce degradation and deforestation of natural forest		–
		– Contribute to CO_2 storage and reduce impact of anthropogenic driven climate change		–
		Risks	**Enhancement measures**	
		– Increased use of forest concession for fuel, construction material, etc, may result in loss of traditional use of natural forest resources including collecting branches and deadfalls for homes/fences and carvings, collecting medicines, traditional use of forest resources by women	– Promote the establishment of woodlots with multipurpose, for acquiring carbon credits, fuelwood and timber for construction, etc	–
		– May have an adverse impact on community social structure, gender roles and well-being of individuals through loss of alternative income (i.e. carving), loss of traditional knowledge, loss of access to sacred sites and other cultural sites		–
		– May also result in changes in social economic structures due to need of participating in commercial forestry, rather than in independent forestry, charcoal production/fuel sales, etc		–

		Opportunities	**Enhancement measures**	
	(SO4b): Promote value chain development of non-timber forest products (NTFP)	– Ongoing programs promoting the production and processing of honey, baobab fruit processing for production of cosmetics, etc.	– Spread these initiatives throughout the country – Learning experiences of NGOs that promote the value chain of NTFPs – Developing research in order to know the value chain of other NTFPs	–
		Risks	**Enhancement measures**	
		–	–	–
		Opportunities	**Enhancement measures**	
Forestry Plantations (SO5): To improve the business environment of forest plantations and the relationship between forestry companies and local communities.	**(SO5a)**: Promote small-scale woodlots for poles and fuel production in deforested and degraded areas or in areas with different cover other than forest	– Existence of pilot projects for bioenergy supply that can be explored for other types of uses – Opportunity of employment for the communities around the plantations	– Learning lessons from old energetic projects designed to supply the big cities in firewood – Employment opportunities on plantations to be given to local communities first as much as possible. All casual labor must be given to local communities	–
		Risks	**Enhancement measures**	
		– Lack of establishment of woodlots for fuel wood	– Disseminate the importance and benefits of establishing woodlots in communities	–
		– Biodiversity threats under tree plantations	– Clearance of plantation plots will be sufficiently phased to reduce the impacts of vegetation removal on terrestrial flora and fauna – Avoid environmentally sensitive sites and unnecessary exposure access to sensitive habitat; Consult communities in site selection – Design planting to include both exotic and indigenous plants in the right proportions and positions	–

Explanation of terms

Conservation Cover - Establish and maintain perennial vegetative cover to protect soil and water resources on land retired from agricultural production.

Conservation Cropping - A sequence of crops designed to provide adequate organic residue for maintenance of soil tilth. This practice reduces erosion by increasing organic matter. It may also disrupt disease, insect and weed reproduction cycles thereby reducing the need for pesticides. This may include grasses and legumes planted in rotation.

Conservation tillage - Also known as reduced tillage, this is a planting system that maintains at least 30% of the soil surface covered by residue after planting. Erosion is reduced by providing soil cover. Runoff is reduced and infiltration into groundwater is increased. No-till, common in North America and Zimbabwe is a conservation tillage practice.

Contour farming - Ploughing, planting, and other management practices that are carried out along land contours, thereby reducing erosion and runoff.

Cover and green manure crop - A crop of close-growing grasses, legumes, or small grain grown primarily for seasonal protection and soil improvement. Usually it is grown for 1 year or less.

Crop residue use - Using plant residues to protect cultivated fields during critical erosion periods.

Terracing - Terraces are constructed earthen embankments that retard runoff and reduce erosion by breaking the slope into numerous flat surfaces separated by slopes that are protected with permanent vegetation or which are constructed from stone, etc. Terracing is carried out on very steep slopes, and on long gentle slopes where terraces are very broad.

9.4 Verified Carbon Standard

In conducting the assessment of the proposed REDD+ strategy options based on the VCS, we found that of the 5 strategy options (here we do not include sub-options for assessment), only 4 options fall under the VCS scenarios. The REDD+ strategy option 2 relating to "Increase access to alternative sources of biomass in urban areas and increase the efficiency of production and use of biomass energy", does not have correlation with any of the VCS scenarios. Of the 7 VCS scenarios, 5 scenarios have no correlation with any of the proposed REDD+ strategy options. The table below summarizes the correlation of the proposed REDD+ strategy options under the VCS scenarios, including the description of the likely environmental, social opportunities, impacts and mitigation measures.

Table 25 Potential Bio-Physical and Social Impacts of REDD+ Strategy Scenarios and Mitigation Measures

VCS Scenarios	REDD+ strategy options	Environmental Impact/Opportunity	Social Impact/Opportunity	Mitigation measures	Responsible Party
SCENARIO 1 – Illegal Deforestation of a Forest Authorized for Conversion. The land owner does not convert the land, and stops illegal deforestation on his property.		Conserve biodiversity, decrease erosion and chance of flash flooding, improve water quality through reduced sediment load, improve terrestrial and aquatic habitat, reduce GHGs	Loss of livelihood for subsistence farmers, increased economic and social pressures on families/individuals, health impacts from loss of reliable food source and economic and social stresses. Benefit – reduced air pollution and cleaner water.	Create alternate job opportunities, create agricultural co-ops of sustainable cash crops (cashews, peanuts, tobacco, etc) for community members (managed by women), create shared sustainable gardens for communities, create alternate sources of protein (e.g. stocked fishing ponds)	
SCENARIO 2 – New Highway Construction through a Remote Forest Area. NGOs lobby and stops the highway project, and associated immigration		Conserve biodiversity along road as well areas that would have become accessible to illegal hunting/poaching/collecting as well as deforestation and degradation because of the road (illegal logging, clearing land for settlements), eliminate potential for increased erosion and chance of flash flooding, eliminate potential for lower water quality associated with sediment load, conserve terrestrial and aquatic habitat, reduce GHGs	May affect the government's Millennium Development Goals (MDGs) of developing infrastructure and new settlements. Loss of jobs for highway construction. Potential settlement pressure elsewhere because new area is not opened for settlement.	Planned settlements and infrastructure in areas that are not forested to create jobs and provide suitable places for the growing population to live.	
SCENARIO 3 – Forest Conservation with the Introduction of Sustainable Forest Management. Project developer encourages sustainable land use activities (commercial timber production) and other food sources,	**SO1 SO3**	Commercial timber harvesting will result in a reduction in biodiversity through removal of the understory (loss of habitat etc) and reduction of preferred tree species for timber. Depending on the scale of the commercial timber production, bio-physical impacts may remain equivalent to slash & burn agriculture (e.g. tendency for erosion in cleared areas, sediment loading of surface waters, impacts	As a result of stopping slash & burn agriculture and modifying use of the forest, the project may result in loss of traditional use of natural resources including collecting branches and deadfalls for homes/fences and carvings, collecting medicinal plants, traditional use of forest	Provide flood control plans, erosion control plans for areas converted to commercial timber. Conduct biological survey to identify and avoid endangered or threatened species (flora or fauna/nesting/denning etc) in areas converted to commercial timber. Establish fund for biodiversity conservation	

rather than shifting agriculture.		to terrestrial and aquatic habitat).	resources by women. May have an adverse effect on community social structure, well-being of individuals through loss of alternate income (i.e. carving), loss of traditional knowledge, loss of sacred sites other cultural sites.	offsets that developer must contribute to, as a percentage of area of forest converted to commercial timber. Develop community forest management plans for controlled harvesting/collection of timber for houses, and wood for carvings. Potentially create area for growth and harvesting of species used for traditional carvings. Potentially create area for growth and harvesting of locally available medicinal plants. Create co-op or business where women are provided job opportunities to supplement their incomes, and are empowered with contributing to management of forest resources.	
SCENARIO 4 – Selective Illegal Logging on an Authorized Logging Concession. Concession holder improves enforcement of concession boundaries to prevent illegal logging.		Provide better management of the forest, and potentially minimize other adverse impacts associated with illegal logging: grading illegal roads, associated loss of biodiversity, increased erosion, oil & gas leakage, soil contamination, other illegal activities (e.g. poaching).	Reduced risk of potentially dangerous encounters of local community members with illegal loggers (increased safety); stop loss of revenue (local, provincial & national) of high valued trees to illegal trade.	After concession boundaries are secured, restore and rehabilitate illegally cleared roads to former vegetation/trees, clean-up contaminated soils, remove litter left behind by illegal loggers. Implement routine patrols of concession boundary by approved security, to reduce chance of illegal loggers returning.	
SCENARIO 6 – Degradation Preceding Deforestation. Forest protection is	**SO3**	Potential increase in biodiversity if any forest areas are rehabilitated, decrease erosion from land clearing and overgrazing, decrease chance of flash flooding, improve water	Potential risks to traditional farming and pastoralism. Potential impacts on women's traditional activities and opportunities	Develop a community driven pastoralism management plan where the community is actively engaged in how pastures are managed.	

implemented to help re-establish forest, and to improved pasture management and fast-growing fuel-wood plantations to reduce pressures from surrounding communities.	**SO4** **SO5**	quality through reduced sediment load, improve terrestrial and aquatic habitat, reduce GHGs	for independent incomes. Opportunities – other forms of income are provided by managed pastoralism and fuel-wood farms. More secure/sustainable pastoralism decreasing need for frequent migration to new grazing lands. Greater community stability and stability for children.	Combine traditional knowledge of pasture-regeneration with new technologies, methods of pasture management. Provide awareness raising programs on the importance of biodiversity to the country/region (biological as well as tourism) and to encourage communities to make use of fuel-wood plantations. Create job opportunities in tourism - potentially create area for growth and harvesting of species used for traditional carvings; tourism guide training, etc.	
SCENARIO 7 – Forest Conservation in a Well-protected Area. Application for carbon credits under continued conservation of a forest. The Project falls within the REDD+ category or UNFCCC and COP-16.		Continued conservation of biodiversity and the environment; continued contribution to reduced GHGs.	Continued use under existing scenario of conservation so no change to socio-economic situation.	No mitigation measures proposed, as no changes to forest land use are proposed.	

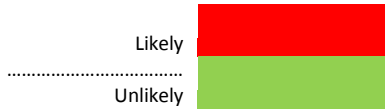
9.5 World Bank Safeguard Policies

This section presents the likelihood of the World Bank environmental and social safeguards to be triggered under the implementation of the REDD+ strategy in Mozambique. These results are based on the analysis conducted for Tasks 4 and 5 of this SESA: "ASSESSMENT AND ANALYSIS OF PROPOSED STRATEGY OPTIONS". The substrategies presented in this table are described under the Opportunity and Risk Assessment (Section 9.3), and listed below this table.

Table 26 Analysis against World Bank Safeguard Policies

No	World Bank Safeguard Policies	Potential for trigger under REDD proposed strategy options and sub-strategies											Comments
		SO1a	SO1b	SO1c	SO1d	SO2a	SO2b	SO2c	SO3a	SO4a	SO4b	SO5a	
01	**OP 4.01** Environmental Assessment												Triggered depending on size of project
02	**OP 4.04** Natural Habitats												
03	**OP 4.36** Forest												
04	**OP 4.09** Pest Management							[1]					Attention with species selection[1]
05	**OP 4.11** Physical Cultural Resources												Should be identified under OP 4.01 also
06	**OP 4.12** Involuntary Resettlement												
07	**OP 4.10** Indigenous People												N/A in Mozambique
08	**OP 4.37** Safety of Dams												
09	**OP 7.50** Projects on International Waters												
10	OP 7.60 Projects in Disputed Areas												

(SO1a): Promotion of Conservation Agriculture (CA); (SO1b): Introduction of perennial crops; (SO1c): Support the establishment of commercial agriculture in areas with no forest cover; (SO1d): Promoted best practices of livestock management; (SO2a): Promotion of forest plantation for energy purpose; (SO2b): Sustainable use of biomass through introduction of improved and efficient cookstoves; (SO2c): Promotion and adoption of other sources of renewable energy; (SO3a):Improve the management regime of protected areas of native forest (parks, reserves and game hunting reserves); (SO4a): Enhance sustainable forest management (forest concessions of native forest); (SO4b): Promote value chain development of non-timber forest products (NTFP); (SO5a): Promote small-scale woodlots for poles and fuel production in deforested and degraded areas or in areas with different cover other than forest



The table above shows when the safeguard policies may be triggered and so provides the basis for the preparation of the ESMF, which which will be developed as part of the SESA process to identify, avoid, minimize, mitigate, and/or compensate for the adverse effects of REDD+ policy changes and investments that might be undertaken in the future.

10 Consideration of Global Climate Change

Global climate change may impose constraints to the successful implementation of some REDD+ strategic options, including those that require irrigated water for commercial agriculture (food and non-food crops), managing indigenous and exotic tree plantations (especially during the initial establishment of the trees), and establishing trees for wind breaks and supplemental wood needed by communities (i.e., poles). . Thus this section provides a brief analysis of the region's vulnerability, expected impacts that may affect REDD and provides a few recommendations on how REDD should deal with risk and uncertainty associated with global climate change.

Mozambique is located at the downstream end of several major river basins in southern Africa-Zambeze, Púngoè and Búzi – all of which are projected to have diminishing runoff of 25- 40% (Arnell, 1999) over the next 100 years. Additionally, the dry season (June-August) is projected to get drier across Mozambique in the future (IPCC, 2007, 2012). At the same time cyclone activity in the Indian Ocean is expected to increase as a result of increased sea surface temperatures (Lal, 2001; McDonald et al., 2005), which tend to result in widespread flooding in northern Mozambique. As a result of changing temperature and precipitation patterns, Mozambique ranks high in the climate change index based on annual and seasonal indicators of temperature and precipitation (Baettig et al., 2007). REDD+ target areas, are vulnerable to the extreme events such as cyclones and floods. These events may damage irrigation and other hydraulic infrastructures developed to support commercial agriculture and tree plantations, and could easily damage planted trees and crops. Other effects that changing temperatures and precipitation patterns might bring to the whole area are: increased wildfire frequency, modification of pests and diseases patterns, crop failure from drought, among others.

While the existing and projected effects of climate change are clear at a larger scale, there are still uncertainties with regards to the specific impacts in the REDD+ project areas. This is due to a combination of factors including limited information on natural resources and the unpredictable nature of climatic change. In this context, UT-REDD needs to be prepared to deal with uncertainty and risk associated with climate change and work with other ministries and programs within the GoM to ensure coordinated efforts establishing flood control infrastructure, irrigation schemes and agro-forestry infrastructure to help deal with the unpredictable nature of climate change. It is also recommended to: (i) develop crop patterns suitable to climate change, (ii) reserve and store local crop varieties and establish a crop-seed bank, (iii) enhance the use of technological options to manage climate variability associated risks (e.g., improved crop cultivars), and (iv) promote public awareness.

In dealing with uncertainty and risk under climate change it is important to put efforts on training and capacity building and also environmental monitoring and auditing. With regards to the former, the focus should be on basics of climate change, its effects and associated risks and alternatives. For systematic environmental monitoring UT-REDD should liaise with a strong service provider that will conduct participatory monitoring. The objectives of that are two-fold: (i) suggest modifications to project's activities and (ii) train villagers and farmers in simple monitoring techniques.

11 Alternatives Analysis

The above analysis of strategy options indicates that each of the strategy options has the potential to have a beneficial impact on the socio-economic development of Mozambique, through the creation of alternate sources of income in rural areas, as well as a provision of means for communities to manage woodland resources and fuel resources sustainably. Implementation of the REDD+ strategy options would also potentially reduce health risks associated with charcoal production and burning, and contribute to an increase in quality of life and life expectancy of people living in rural Mozambique. However, it will be critical to adequately assess the potential socio-economic and socio-cultural impacts of individual REDD+ projects on communities, and identify and implement mitigation measures that minimize these impacts while creating alternate economic opportunities for community members, including women. Successful implementation of REDD+ projects has the potential to have benefical impacts on the bio-physical environment – with a reduction in slash and burn agriculture and charcoal production resulting in cleaner air and water, and if managed correctly will not result in a loss of biodiversity.

The framework for assessing the potential environmental and socio-economic, socio-cultural impacts of individual REDD+ projects and the mitigation and management measures to minimize these impacts will be presented in the Environmental Social Management Framework (ESMF) being prepared for the SESA.

11.1 Implications of not Introducing a REDD Program in Mozambique

The No-Action Alternative describes a scenario in which the REDD+ is not carried out in the region. A discussion of the no-action alternative involves an understanding of how the existing environment would change, should REDD+ not be implemented. Given the goal of the GoM to encourage economic development in the country, including foremost mining and commercial agriculture, the development of these types of activities in the absence of REDD+ would invariably result in unsustainable clearing of potentially vast tracts of woodlands, and diversion of natural water resources away from woodlands. Additionally, the provision of jobs in the mining industry and commercial agricultural industry would result in development of roads and other infrastructure to acces these newly developed areas, as well as the establishement of new towns and settlements near these industries. The corresponding pressure on woodlands and biodiversity is immesurable at this scale, but one could anticpate that people living in these new towns would exploit forest resources for fuelwood and charcoal production for personal use, as well as a supplemental income. Incidences of accidental fires may increase in the newly developed areas, as well as the potential for fires spreading as a result of brush clearling conducted for

construction of roads and other infrastructure. On-going population growth in Mozambique will continue to put pressure on all of the country's natural resources, and in the absence of a coordinated strategy to manage these resources in concert with economic development, biodiversity in the country will continue to diminish and lands to become increasingly deforested and degraded.

If recommendations from this SESA are taken into account, the REDD+ program puts emphasis on managing Miombo woodlands to optimize the use of wood resources and enhance regrowth through pruning, which would diminish pressure on this resource. It also emphasizes involving rural vilagers in entrepreneurial activities that complement managing tree concessions, such as weed control and pest control which would contribute to economic growth in the region. Fruit and nut tree nurseries, and cash crop nurseries, could also be established that are managed by female cooperatives, which would create an independent source of income for women. By encouraging the adoption of fuel efficient cookstoves, impacts of charcoal production and use on respiratory health will diminish, and the impact of GHG emissions on climate change will also be reduced.

12 General Recommendations

Our analysis concludes that REDD+ is designed to promote sustainable management of the forestry sector. However, several recommendations are given below in order to produce an optimal investment strategy for REDD+.

Weak coordination among different (sub-) sectors, intra-sectoral coordination within MITADER and external relationships with the mineral resources, industry and trade and environment sectors must be prioritized from the start of REDD+. The programme's communication strategy should focus considerable attention on designing an adequate mechanism for communication between sectors, agencies and ministries to facilitate national policy coherence and for shared interests to drive continued collaboration. In addition we recommend:

- Actively engage with the existing Provincial Governmental Forum of discussion;
- Define environmental and social values and their integration in all parts of the sectors involved with REDD+. This may imply varied processes of learning, dissemination and acceptance according to sector. To achieve this, REDD+ will take advantage of the ongoing exercise of environmental mainstreaming in major development sectors in the country;
- Promote public consultation, communication and opinion and information sharing at different levels, through for example radio, brochures, national forums, among others;
- To raise the visibility and intervention impact of sustainable forestry management at provincial and district levels, clarity on roles, responsibilities and accountability needs to be defined and scaled up. With a better structure at these levels relevant training can be planned for and carried out.
- Define a system of environmental and social information collection, process and dissemination. Improved capacity to carry out technical work is crucial for decision making, establishing norms, adjusting the monitoring and management plan and resolving conflicts between environmental and economic interests.
- Map stakeholders and their role in REDD+ program development and implementation. This will allow for a definition of the relationships to establish with stakeholders and define their responsibilities and roles;
- Promote an environmental and social dialogue among different sectors (government, private, civil society, and NGOs among others);

UT-REDD and other government departments responsible for the development and implementation of REDD+ should coordinate with the departments responsible for implementing the PROIRRI Sustainable Irrigation Development Project to ensure these groups are not working at cross-purposes in the development of sustainable agricultural practices. Further, these two groups should ensure adequate coordination with the government departments responsible for implementing Mozambique's Transfrontier Conservation Areas (TFCA) program. Coordination between these three groups would help ensure adequate consideration of forestry conservation as sustainable agricultural practices and forestry concessions are further developed in Mozambique. A coordinated plan should be developed to provide UT-REDD, PRIORRI and TFCA a framework with clear direction on how to support government officers, NGOs and villagers for the ultimate goal of ensuring sustainable forestry, sustainable agriculture and promotion of conservation in the country with the least environmental and socio-economic impacts.

Provincial and local land managers can be co-trained by the three programs, to provide clear targeting on forestry conservation and management, whilst also identifying relevant marketable crops and orientation towards irrigation issues that might have an adverse impact on sustainable forestry management.

13 References

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Annexure A:

Workshop participant list Pemba 8 May 2015

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LISTA DE PRESENÇAS

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LISTA DE PRESENÇAS

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Community engagement participant lists

Annexure B:

Additional requirements of VCS in applying for Carbon Credits for REDD+ and other projects

Additional requirements of VCS in applying for Carbon Credits for REDD+ and other projects

The VCS distinguishes between activities that are designed to stop or reduce "planned (designated and sanctioned) deforestation" and those that are designed to stop or reduce "unplanned (unsanctioned) deforestation and/or degradation" (VCS Agriculture, Forestry, and Other Land Use (AFOLU) Requirements). These activities are differentiated because how the land is used pre-project (the baseline land use) is different under each scenario.

Under planned deforestation, those responsible for deforestation and/or degradation ("baseline agents") can usually be identified through verifiable plans that clearly demonstrate authorization and intent to convert forest to a non-forest use in a determined timeframe.

In contrast, unplanned deforestation is usually identified through indirect evidence, such as the average number of hectares deforested per year in the area over the past 10 years. The criteria for unplanned deforestation also applies to planned deforestation where the baseline agent cannot be identified,

When assessing baseline conditions in a proposed REDD+ project area, these two types of activities must be analyzed separately (i.e. a baseline for unplanned deforestation cannot include planned deforestation). For example, if landowners decide to stop a previously planned and authorized project to convert forest to agricultural lands or other developed land use; this is considered an Avoiding Planned Deforestation (APD) activity[2]. Under this scenario, the baseline agent is required to demonstrate that the planned conversion of forest lands to agriculture, infrastructure, or other project was authorized and that they subsequently decided to stop the development and leave the forest lands intact. This is required to ensure that APD baselines are credible and not spuriously set to be self-serving (Shoch et al. 2011).

The methodology for assessing carbon credits and to evaluate potential environmental and social impacts and opportunities of APD projects is different than that applied to activities to avoid unplanned deforestation and degradation (AUDD). AUDD activities occur under different baseline conditions than APD activities and as such different methodologies are used to assess carbon credits, as well as to evaluate potential environmental and social impacts and opportunities. Unplanned deforestation and degradation typically occurs due to poor law enforcement or lack of property rights that result in piecemeal conversion of forest land to non-forest land (Shoch et al. 2011). Stopping illegal logging or reducing the expansion of shifting (slash & burn) agriculture are examples of AUDD activities.

AUDD projects are further classified on the basis of the spatial configuration of the deforestation/degradation. To determine baseline conditions, distinguishing between mosaic and frontier deforestation/degradation configurations depends on scale (e.g. at a very fine scale, mosaic looks like frontier). Mapping these configurations on satellite imagery and conducting spatial modelling

[2] It is important to note that activities that avoid "planned degradation", or a loss of carbon stocks due to a sanctioned timber harvest, are not considered APD activities, but rather, as Improved Forest Management (IFM) activities and should be accounted for using applicable, approved VCS IFM methodologies.

is generally required to distinguish these baseline conditions. The VCS establishes the following criteria for distinguish in mosaic and frontier configurations (Shoch et al 2011:8):

1. In the "mosaic" configuration, no patch of forest in a project area exceeds 1000 ha and the forest patches are surrounded by anthropogenically cleared land. Or 25 percent or more of the perimeter of the project area is within 120 meters of land that has been anthropogenically deforested within 10 years prior to the project start date.
2. In the "frontier" configuration, clearing generally occurs as discrete "fronts" that progress steadily across a large area of intact forest, usually following a pattern dictated by access routes (e.g. roads and rivers).

In addition to REDD, eligible Agriculture, Forestry, and Other Land Use (AFOLU) Project Categories include: Afforestation, Reforestation and Revegetation (ARR), Agricultural Land Management (ALM), Improved Forest Management (IFM), Peatland Rewetting and Conservation (PRC) and Avoided Conversion of Grasslands and Shrublands (AcoGS). These types of activities can be incorporated into a REDD Project Description and used to enhance the carbon credits obtained for the project. PRC is restricted to climates with a mean air temperature of -2 to 6^{o} C, and does not apply to Mozambique – the remaining categories, however, do apply.

According to the REDD Guidebook developed by Shoch et al (2011) a REDD project description (PD) may include multiple activities across a landscape, such as protecting the forest in one area and implementing management of improved agricultural activities in another. Many of these activities may be of an indirect nature in protecting forests, by addressing threats and reducing pressure on forests through fostering alternative livelihoods or improving productivity of existing ones. Rural development activities, for example, can both serve to reduce deforestation/degradation in a project area by decreasing reliance on the forest or land base there, and make up for the loss of resources that protection entails, and thereby reduce the displacement of activities outside the project area (i.e. leakage mitigation activities) (Shoch et al. 2011:8).

For REDD strategies that include agriculture and/or forestry often multiple strategies are combined:

1. Develop the project as a stand-alone REDD activity, accounting for any increases in emissions resulting from activities implemented outside the project area (unless deemed de Minimis - < 5% of GHGs: see definition);
2. Combine multiple activities under a single PD. Include any rural development activities designed to reduce degradation (e.g. ALM, ARR, or IFM) that are implemented outside the REDD project area and delineate each activity as a separate VCS. Each activity should be accounted independently, and then summed for the combined project; or

3. Each activity (E.g., REDD, ALM, ARR, or IFM) can be developed as a stand-alone project with a separate VCS PD, and accounted independently.

If multiple activities are combined under a single VCS PD, each activity must be segregated spatially (i.e. no overlap) to facilitate accounting by activity type using an activity-specific methodology.