PLAN VIVO PROJECT DESIGN DOCUMENT

Kurarama Kuthemba Muty “Kukumuty”

Community-led Miombo enrichment and agroforestry in Sofala, Mozambique

Version 3.0
17 May 2024

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Overview

Project Title:	Kurarama Kuthemba Muty ("Kukumuty"): Community-led Miombo enrichment and agroforestry in Sofala, Mozambique
Location:	Sofala, Mozambique, centred around and starting from Chibabava district
Version:	3.0
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Validation Date:	13/11/2023 - 17/11/2023
Project Intervention(s):	Ecosystem Restoration, Agroforestry
Project Participants:	The project works with rural households in the Mangunde Regulado (Chibabava District, Mozambique): 1394 people in Mangunde and 1550 people in Nhaumue. Most households rely on a combination of subsistence, cash crop production and seasonal labour migration. The project aims for continuous and organic growth by including more interested communities in and around Chibabava over time.
Project Area:	This project will enrich Miombo woodlands in and around Chibabava, Mozambique (300 ha in Nhaumue and 69 ha in Mangunde). It will also establish agroforestry nurseries and plots for growing horticultural and fuelwood species (0.5 ha to start). The project aims to upscale over time by including surrounding communities.
Project Period:	May 2022 – May 2052
Methodology:	The project follows the PM001 Agriculture and Forestry Carbon Benefit Assessment Methodology.

Expected Carbon Benefit:	74 390 tCO2e
Expected Ecosystem Benefit:	Boost for the floristic biodiversity (Shannon index) of the project Miombo woodlands within a broader agroecosystem mosaic.
Expected Livelihood Benefit:	Combination of fruit, nut, medicinal, and other useful native trees (e.g. Albizia, Papaya, Mango, Orange, Avocado, Moringa) with the sustainable collection of grasses, honey and Miombo fruits.

1. General Information

1.1 Project Interventions

The Miombo tropical woodland ecosystem covers roughly 10% of the African continent. It is rich in biodiversity with 8500 floristic species, more than half of which are endemic. Miombo is considered a plagioclimax community formed and maintained by continuous human activity for at least 12,000 years. In central and northern Mozambique, this complex agro-ecosystem mosaic supports nearly two-thirds of rural livelihoods and energy requirements. Changing climate patterns, combined with growing economic stress for rural households, has increased pressure on miombo woodland resources, tree cover, biodiversity and ecosystem services.

This project aims to pursue climate mitigation and adaptation strategies in the Chibabava District of central Mozambique. It uses a landscape approach for enrichment of Miombo woodlands and creation of climate-resilient agroecosystems and sustainable livelihood opportunities.

This ecosystem restoration intervention has four objectives:

(i) Build on the agroecosystem expertise of rural communities to understand changing climatic patterns and economic pressures affecting the surrounding woodland landscape, and apply this knowledge on a project area starting with 369 ha.

(ii) Facilitate woodland enrichment in community-identified areas through a combined strategy of soil and fire management and planting of Miombo species sourced from local and project-established nurseries. The project aims to increase floral diversity in the project areas, currently dominated by Combretum, by facilitating the establishment of more endemic Miombo species and significantly raising the Shannon Diversity Index over time ($p<0.05$).

(iii) Generate livelihood diversification opportunities for agricultural associations by establishing agroforestry lots with a combination of commercially viable fruit, nut, medicinal, and other useful native trees (e.g. Albizia, Papaya, Mango, Orange, Avocado, Moringa). Inside the Miombo enrichment areas, the project aims to promote the sustainable collection of grasses, honey and Miombo fruits.

(iv) Boost carbon sequestration in the project areas for long-term socio-environmental benefits and reinvestments by the communities. The project aims for a carbon sequestration rate of 7.7 tCO2e/ha/yr (excluding the risk buffer).

1.2 Management Rights

1.2.1 Project Boundaries

The maps (shapefiles) with the boundaries of the project region and initial project areas are available in Annex 1. For a description of the initial livelihood and ecosystem conditions in the project areas, we refer to sections 3.3.1 and 3.4.1.

1.2.2 Land and Carbon Rights

Table 1.2.2 describes the ownership, tenure and user rights of the project areas, and how these relate to the carbon rights of the project participants.

Table 1.2.2 Land and Carbon Rights

Project Area	Ownership and user rights status	Carbon rights	Evidence

Mangunde Area	Based on the 1997 Land Law (DUAT – Direito de Uso e Aproveitamento dos Terras), the customary rights of rural communities, usufruct rights and land use activities (FAO, 2002) are formally determined and recognized. Members of rural community associations can hold equal shares in a single co-owned title over the use rights of all their customary lands. Access and use rights within these areas can be determined by custom. The DUAT thus formally recognises the community land rights. The project will draft a DUAT for all project areas. See Annex 15.	The decree 23/2018 "Regulamento para Programas e Projectos Inerentes à Redução de Emissões por Desmatamento e Degradação Florestal Conservação e Aumento de Reservas de Carbono (REDD+)" (dd. 3 May 2018) outlines the procedures governing forest conservation and carbon sequestration projects in Mozambique. It is possible to delegate the carbon benefit rights to the stakeholders concerned. The project must register as a carbon project in line with the decree 23/2018. See Annex 15.	See DUAT + REDD+ Approval Letter + Document Nhaumue association
Nhaumue Area			
Agroforestry plots	Private land, agricultural association user rights		

2. Stakeholder Engagement

2.1 Stakeholder Analysis

2.1.1 Stakeholder Identification

Table 2.1.1 identifies and describes the main stakeholder groups that can influence or be affected by the project. We also explain the relationship of each stakeholder group to the project.

Stakeholders were identified through a participatory and transparent approach by project staff and community representatives. The Azada Verde staff spoke with the Regulado of Mangunde and traditional leaders of the communities and requested their permission to hold public meetings to provide information about the project and gauge community interest.

The first round of public community meetings had attendance of between 50 and 60 members of each community. Both meetings resulted in broad-based support expressed for the KKM project. Following this, the Azada Verde staff held a second round of open meetings in Nhaumue and Mangunde. During this meeting, the community members and leaders identified key stakeholders and gave their opinions on the different groups to be included in the project design and development.

Subsequent meetings with the KKM Project team were also conducted in an open manner, with community members choosing to participate in group interviews as per their interest and knowledge. This allowed for a more convivial identification of stakeholders who took up the opportunity to answer questions and voice their opinions and feelings about the project.

Stakeholder analysis was carried out based on the community responses to the group interview sessions. This process identified the Regulado, Chefes, Sagutas, dodas, retired elders, CGRN, farmers associations, women farmers, and young resident adults not engaged in farming. Please see Annex 18 for a glossary explaining these terms and acronyms.

Table 2.1.1 Stakeholder Analysis

Stakeholder Group	Stakeholder Type	Impact	Influence	Engagement
Community of Mangunde	Local stakeholder	Highly positively impacted by the project	High positive influence on the project	Involvement through project agreement, community meetings, trainings, benefit sharing, physical activities (e.g. labour), decision-making with Subcommittees and agroforestry.
Community of Nhaumue	Local stakeholder	Highly positively impacted by the project	High positive influence on the project	Involvement through project agreement, community meetings, trainings, benefit sharing, physical activities (e.g. labour), decision-making and agroforestry.
Members of the Nhaumue agricultural association	Local stakeholder	Highly positively impacted by the project	High positive influence on the project	Involvement through agroforestry, association meetings, trainings, benefit sharing
Members of the Mangunde agricultural association	Local stakeholder	Highly positively impacted by the project	High positive influence on the project	Involvement through agroforestry, association meetings, trainings, benefit sharing
Comité de Gestão dos Recursos Naturais (CGRN)	Local stakeholder	Highly positively impacted by the project	Moderate positive impact on the project	Involvement through project agreement, trainings, administrative and general support
Régulo, sagutas and community leaders	Secondary stakeholder	Limited impact by the project	Moderate positive impact on the project	Involvement through general support

Government institutions (at local, provincial and national level)	Secondary stakeholder	Limited impact by the project	Moderate positive impact on the project	Involvement through legal and regulatory processes

2.1.2 Indigenous Peoples and Local Communities

Table 2.1.2 identifies local communities that have statutory or customary rights to land or resources in the project areas.

Table 2.1.2: Indigenous Peoples and Local Communities

Indigenous Peoples or local communities.	**Rights to land or resources in the project area(s)**	**Governance structure**	**Involvement of women and marginalised groups**	**Engagement**
Community of Mangunde	See DUAT, Annex 15	Committee = "Subcomité de Gestão dos Recursos Naturais" (Subcommittee of the CGRN; see §2.4)	Quorum of more than 50% female participation during Subcommittee meetings	Involvement through FPIC (§2.6.2), DUAT, project agreement, community meetings, trainings, benefit sharing, physical activities (e.g. labour), decision-making and agroforestry.
Community of Nhaumue	See DUAT, Annex 15	Committee = "Subcomité de Gestão dos Recursos Naturais" (Subcommittee of the CGRN; see §2.4)	Quorum of more than 50% female participation during Subcommittee meetings	Involvement through FPIC (§2.6.2), DUAT, project agreement, community meetings, trainings, benefit sharing, physical activities (e.g. labour), decision-making and agroforestry.

2.1.3 Disputed Land or Resources

There are no past or ongoing disputes over land or resources in the project areas.

2.2 Project Coordination and Management

The project coordination and management functions of the three main parties are summarised in Table 2.2: Azada Verde (AV), Reseed Indico (RI) and Climate Lab (CL).

We refer to Part F of the approved PIN for an information sheet on the three main parties involved. We refer to Annex 2 for legal documentation.

Table 2.2 Responsibility for Project Coordination and Management Functions

Project Coordination and Management Function	**Responsible Party/Parties**
Stakeholder engagement during project development and implementation	AV/RI
Ensuring conformance with the Plan Vivo Standard and compliance with applicable policies, laws and regulations	CL/RI
Developing technical specifications, land management plans and project agreements with project participants	CL/RI/AV
Ensuring that the PDD is updated with any changes to the project	CL
Registration and recording of management plans, project agreements, monitoring results, and sales agreements	RI/CL/AV
Managing project finances and dispersal of income to project participants as described by the benefit sharing mechanism	AV
Managing Plan Vivo Certificates in the Plan Vivo Registry	CL
Preparing annual reports and coordinating validation and verification events	CL
Securing certificate sales and other means of funding the project	CL
Assisting Project Participants to secure any legal or regulatory permissions required to carry out the project	AV
Providing technical assistance and capacity building required for project participants to implement project interventions	RI
Monitoring progress indicators, livelihood indicators and ecosystem indicators and providing ongoing support to project participants	AV/RI/CL
Measurement, reporting and *Verification* of *Carbon Benefits*	CL

2.3 Project Participants

Table 2.3 identifies the initial project participants and their location of residence in relation to the project areas and project region; their use of land or natural resources within the project region; and their typical use of labour for land or natural resource management activities. See Annex 1 for maps showing the location of project participants in relation to the project areas and project region. The project does not include Type II participants.

All project partners have signed an ethical charter not to discriminate based on gender, age, ethnicity, religion or social status when selecting project participants. They have committed to

engage in community-driven landscape management to reduce potential for tensions or disputes within and between communities. The full list of initial project areas is provided in Annex 3.

Table 2.3: Project Participants (grouped by village, area or region)

Project Participant	Participant Type*	Location of Residence	Typical Land Holding	Land and Natural Resource Use
Community of Mangunde	Type I	Community resides near to the project area, and directly within the project region of Chibabava District	For a description of the typical land holding, we refer to §3.3.1.	For a description of the typical use of land and natural resources, we refer to §3.3.1.
Community of Nhaumue	Type I	Community resides near to the project area, and directly within the project region of Chibabava District	For a description of the typical land holding, we refer to §3.3.1.	For a description of the typical use of land and natural resources, we refer to §3.3.1.
Adult males residing further afield in cities (seasonal labour migrants)**	Type II	Husbands residing further afield in cities in Mozambique or South Africa	For a description of the typical land holding, we refer to §3.3.1.	For a description of the typical use of land and natural resources, we refer to §3.3.1.

* Type I = Project participants that do not meet the Type II definition; Type II = Project participants that are not resident within the project area, do not manage land or natural resources within the project area for small-scale production, or are structurally dependent on year-round hired labour for their land or natural resource management activities.

** Engagement mainly through information distribution rather than direct meeting.

2.4 Participatory Design

Existing community and governance structure

The Regulado of Mangunde is the traditional governance authority in the project area. This Regulado covers 11 communities, all within the District of Chibabava and including the initial project communities of Nhaumue and Mangunde. The recognised institution for overseeing the utilization of community lands in this area is the “Comité de Gestão de Recursos Naturais” (CGRN) or “Natural Resources Management Committee”. The CGRN includes representatives of all 11 communities but not with equal representation (there are 2 members for each community except for Mangunde that has 5 members). It is an incorporated body and is recognised at the provincial and national government levels. Consultation with communities and community leaders determined that the CGRN would be the best body to hold the titles for designated enrichment areas under the KKM project, but the communities hold the co-owned titles over the use rights of their customary lands under the DUAT.

Although titles are registered under the CGRN, project areas exist at the individual community level and are surveyed and determined by community leaders in conjunction with project staff. Knowledge of individual communities and families on the peripheries of project areas is essential to the selection of areas so that they do not impinge on community activities. This is a key action in mitigating the likelihood of potential conflict arising from the project.

Free, Prior and Informed Consent (FPIC)

Before any project areas are mapped, public forums, consultations and transect walks of proposed areas are undertaken with community members (see Annex 4). These actions are undertaken to ensure free, prior and informed consent (FPIC) is established at the community level before any physical activities take place. At the initial phase FPIC is undertaken through 4 key steps.

1. Initially a public meeting is held for all community members where project staff provide details about the overall project and Plan Vivo Approach, followed by meetings with smaller groups over a number of hours to hear concerns and provide details.

2. Transect walks through potential project areas are undertaken with community representatives and families and communities living amongst project areas are consulted and engaged. Questions about livelihood strategies, fire practices, intangible and tangible cultural landscape values, and land management and use of timber and non-timber forest resources are raised throughout this process. Recording of GPS coordinates is undertaken by project staff at this point.

3. Project staff use GPS coordinates to draw up potential project areas and to identify potential challenges and pilot areas. These areas are then surveyed again with the community, including representatives of CGRN.

4. When project areas are confirmed, a traditional ceremony is held and community members participate in the design of a “Plan Vivo”.

Establishment and role of Community Subcommittees

While the CGRN is a centralized committee (across 11 communities), the project areas and activities will be managed at the community level. Community Subcommittees will take the lead in participatory planning and decision-making because the project activities in designated areas will generate income from the sale of carbon credits. The income thus generated will be used for community benefit and to sustain and further expand project activities in the woodland areas belonging to the communities. This approach has been shaped by local staff and community consultation to:

1. Increase gender equity in decision making – While there is currently limited female representation on the CGRN, initial pilot activities in Nhaumue and Mangunde have demonstrated levels of female participation above 60%. To reflect this level of participation, community subcommittees have a mandated female representation of at least 50%.

2. Build collaboration and participation between project stakeholders – Although Azada Verde, the Regulado of Mangunde, and other administrative bodies already have well established relations, the greatest influence on project success will stem from active involvement of community members and families living adjacent to project areas. The establishment of community subcommittees open to all members of participating communities will allow for families and individuals involved in field activities to inform and influence project direction and sustainability, as well as directly benefit from employment opportunities arising from project interventions.

3. Encourage community engagement and awareness – Nomination of individuals to the community subcommittees took place at open community meetings and decisions taken at regular meetings. Discussions and decisions regarding the use and allocation of project funds will be made at annual community meetings. Annual meetings will be held in public meeting spaces where all aspects of the project can be freely discussed and individuals can be nominated to stand on Subcommittees. These actions are designed to increase engagement and ensure that community awareness is sustained throughout the life of the project.

2.5 Stakeholder Consultation

2.5.1 Design Phase Consultations

Project initiation

The preliminary design phase was initiated in April 2022. The Project Team held public community meetings in the Community of Mangunde and Nhaumue. All stakeholders listed in Section 2.1.1, namely, members of the Nhaumue and Mangunde agricultural associations, CGRN representatives, the Régulo and sagutas, and Chibabava District officials were invited to and attended these meetings. The Project Team explained the scope and logic of the project to all attendees of the communities. After extensive discussion and response to questions, all stakeholders, the community attendees, and representatives agreed that they were willing to be involved in the project. Potential areas for forest revitalisation were identified but the dimensions of project areas were to be finalised after further rounds of community consultations and agreement.

The project design was further developed through preliminary fieldwork by the Project Team in May 2022. This included community level interviews of social, economic, climatic, and ecological issues, pressures, and changes affecting agricultural production, market access, livelihood opportunities and natural resource availability in the locality, nearby towns, and district. Community-level interviews involved around 250 people residing in the settlements of Nhaumue and Mangunde

The local Comité Gestão do Recursos Naturais (CGRN: Committee for Management of Natural Resources) was involved in discussions regarding collective use and management of woodland areas and transect walks in potential sites for implementing the project. Meetings were held with officials of Chibabava District and Sofala Province Environment Department to clarify legal and regulatory processes for establishing the project in communal areas and obtaining approvals from relevant government agencies and traditional authorities.

Stakeholder feedback and inputs

After completing the preliminary field surveys, field staff continued working with local communities to inform and answer any doubts or questions regarding the project scope and inputs for refining project design. Based on discussions with CGRN and community representatives, the team reassessed the project areas which were initially identified and redefined the site areas for woodland enrichment. After combining ground-truthing and biogeographical assessments with local community representative consultations, some originally identified project areas were considered less appropriate for ecosystem restoration and new areas were selected.

Specifically regarding women's feedback during the stakeholder consultation process, it can be noted that:

- Representation of women in consultation groups was over 50%;
- Labour representation of women in all activities has also been over 50%;
- When the initial consultations groups were divided into different themes, women were represented in each of the theme discussions;
- Follow-up stakeholder consultations were conducted in community areas by two female members of the Azada Verde team. Some consultations included group interviews with exclusively female members focusing on agriculture and burning.

2.5.2 Stakeholder Engagement Plan

The KKM project takes an approach of assessing social and environmental impacts through participatory planning, collaborative action and shared reflection. The Project Team functions on the principle that high levels of community engagement lead to better decisions being made for the project and all of the communities involved.

During the project's initial stages all community leaders were invited and consulted on the project concept and aims. Through this process communities have had the opportunity to put forward areas which can be included in the project.

The process of area nomination involves a number of important steps including an open community consultation, transect walks across nominated areas, and a final survey of areas during which neighbouring families are engaged and informed about the project alongside community leaders.

Once the woodland enrichment areas are established, each community is facilitated to develop a "Subommittee" that will make decisions about the management of the designated areas on their community lands in conjunction with Azada Verde and the CGRN. Subcommittees (SCs) have been elected by the whole community at open gatherings to which all community members are invited. Subcommittees will also include non-voting representatives of the CGRN and Azada Verde. To ensure transparency between key stakeholders, the decisions and actions of the subcommittee will be fully minuted and shared in public spaces and notice boards outside administrative offices, the Mangude Mission and church. All key stakeholders will be advised of the dates and places of meetings in the month prior to the meeting taking place.

Stakeholder engagement will consist of campaigns for general community awareness which will include the sharing of pamphlets and construction of small billboards in high traffic areas which are adjacent to community restoration areas under KKM. This information and publicity will help all visitors and community members to be aware of the project and project areas even if they are not a member of a participating community or a resident living adjacent to a restoration zone.

The SCs , facilitated by Azada Verde, will meet at least three times per year including one general meeting. Between these meetings the subcommittee members will be responsible for engaging key groups and segments of the population in activities relating to the project. Through this engagement, the voice of community members will be heard in the project and community representatives will play a role in improving participation in decision making.

Finally, the project aims to involve, to the best of its ability, disabled people from the communities in project activities (e.g. working with seeds).

2.6 Free, Prior and Informed Consent (FPIC)

2.6.1 FPIC Legislation

Table 2.6.1 identifies national legislation and legal obligations under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) , International Labour Organization Indigenous and Tribal Peoples Convention 169 (ILO 169) , and other FPIC legislation applicable to the project region.

Table 2.6.1: National Legislation and International Standards on FPIC

Legislation/Standard	Relevance to Project	Compliance Measures
Direito de Uso e Aproveitamento dos Terras (DUAT)	This 1997 Land Law formally recognises community land rights. It recognises the customary rights of rural communities, their usufruct rights and land use activities. Members of rural community associations can hold equal shares in a single co-owned title over the use rights of all their customary lands. Access and use rights within these areas are determined by custom.	The project will follow the process outlined by the DUAT to obtain agreement from community members for using sections of their community land for Miombo woodland enrichment. The DUAT agreement will be formally registered with the relevant government departments.
UNDRIP	Article 8.2. One shall provide effective mechanisms for prevention of, and redress for: […] (b) Any action which has the aim or effect of dispossessing them of their lands, territories or resources; (c) Any form of forced population transfer which has the aim or effect of violating or undermining any of their rights	The project recognizes that the participant communities have the right to the project lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. The communities have the right to own, use, develop and control the project lands, territories and carbon benefits in line with the project agreements
ILO 169	Article 6.1. In applying the provisions of this Convention, one shall: (a) consult the peoples concerned, through appropriate procedures and in particular through their representative institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly; (b) establish means by which these peoples can freely	The project recognizes that the participant communities have the right to the project lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. The communities have the right to own, use, develop and control the project lands, territories and carbon benefits in line with the project agreements.

	participate, to at least the same extent as other sectors of the population, at all levels of decision-making in elective institutions and administrative and other bodies responsible for policies and programmes which concern them; (c) establish means for the full development of these peoples' own institutions and initiatives, and in appropriate cases provide the resources necessary for this purpose.	All consultations carried out are undertaken in good faith and in a form appropriate to the circumstances, with the objective of achieving agreement or consent to the project. Community control of decision-making and institutions is ensured through the Subcommittees freely established through community processes.

2.6.2 FPIC Process

In Plan Vivo Projects, the term FPIC is used to describe the principles for the negotiation of conditions under which a Project is designed, implemented, monitored, and evaluated:

▶ Free = consent is given voluntarily and without coercion, intimidation, or manipulation.

▶ Prior = consent is sought sufficiently in advance of any authorization or commencement of activities to allow time to understand, access, and analyse information on the proposed activity.

▶ Informed = information provided prior to seeking consent is accessible, objective, and complete.

▶ Consent = a collective decision ("Yes", "No", or "Yes with conditions") made by the rights-holders following their own timelines and decision-making processes with the option to reconsider if the proposed activities change or if new information relevant to the proposed activities emerges.

As explained in §2.5, all local stakeholders have been provided with full information on the project concept and consulted from the initiation of the project. Participation of all local stakeholders has been voluntary and based on fully informed understanding of the project scope and design. FPIC, and in particular, community consent, is safeguarded and formalized through the DUAT procedure. Community agreement regarding the areas to be allocated for the project is necessary prior to applying for the DUAT authorization.

In order to receive the DUAT authorization, the following steps are required:

i. A duly completed form from the Cadastre Services

ii. Statutes

iii. Map of the location of the areas to be used for the purpose intended (ecosystem enrichment) by the applicant

iv. Project description

v. Full minutes of the consultation with local communities, including consent and/or vetoes

vi. Environmental License

vii. Copy of the public notice.

Prior to the provisional authorization period, the state authorities conducted an inspection (dd. 10/03/2023) to verify the proposed development and project design for the designated areas and ensure that the FPIC principles, community rights and environmental health are secured. Following this verification, the state authorities issued the DUAT title and formal authorization for the proposed land use of the project.

2.6.3 Initial FPIC

We refer to §2.5.1 and the DUAT title process. In short, the first phase FPIC process that was followed for the initial project areas can be summarized as follows:

- The project team organised an initial meeting with the regulo;
- The sagutas organized the first community meetings;
- During the first meetings, there was a representation of at least 20 people;
- The meetings discussed on the history of the land, the types of land use in the region, the key natural resources and the dynamics of fire during the dry season;
- First community mapping was undertaken at this meeting;
- Subsequently, a smaller group of people was nominated by the community to perform transect walks;
- During the walks, resolution of initial concerns and mapping of the area was undertaken by AV staff alongside the nominated community members;
- The final maps were presented at the next community meeting.

3. Project Design

Baselines

3.1 Baseline Scenario

The most likely future land use and land management scenario of the project areas, in the absence of project interventions, is fully described in Annex 7 (based on AR-TOOL02 v1.0: “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”).

3.2 Carbon Baseline

Table 3.2 provides a summary of net-greenhouse gas evolution from all initial project areas under the baseline scenario for each year of the first crediting period; the table is presented in Annex 7. For details of the calculations, see Annex 7.

Table 3.2 Total net-greenhouse gas evolution under the baseline scenario

Year	Baseline (t CO2e) Nhaumue	Baseline ($t CO_2e$) Mangunde
0	136.38	190.52
1-30	136.38	190.52

3.3 Livelihood Baseline

3.3.1 Initial Livelihood Status

Communities of Mangunde and Nhaumue

The Mangunde Regulado comprises 11 communities, including Mangunde and Nhaumue. The total population of Mangunde is estimated at 1394, with 729 women (52%) and 665 men (48%). The number of households is 269 with an average household size of 5.18. The total population of Nhaumue is estimated at 1873, with 1016 women (54%) and 857 men (46%). The number of households in Nhaumue is 362 with an average household size of 5.17. Around 50% of the total population in both communities are estimated to be below the age of 16 (Mozambican Census 2017).

All households in Mangunde and Nhaumue are primarily engaged in subsistence agriculture, combined with some market crop production and seasonal labour migration. There are no industrial or other formal employment opportunities available for working age individuals within the communities or in Chibabava district. In many cases, adult males travel to cities such as Beira, Chimoio or Maputo, or to neighbouring countries such as South Africa and Zimbabwe, for seasonal or longer-term work and send remittances to support their households. Most of the farming work is carried out by women, retired older men, and youth (Community Surveys, May 2022).

Both Nhaumue and Mangunde settlements are located along the eastern flank of the Buzi River. Houses are well above the high flood level of the river, though flooding has occasionally inundated Mangunde Mission. Cultivation occurs in the low-lying areas closer to the riverbank and in upland areas. The average farming plot size per household in both communities is between 1 and 2.5 ha which is allotted between riverine and upland areas. Plots near the Buzi river are usually under 1 ha, and plots in the upland areas may range between 1 and 2 ha, depending on the terrain, soil, and rainfall conditions. Households generally cultivate vegetable crops in the river irrigated plots (matoros) and maize, sorghum and beans in the rainfed upland plots (machambas). Cash crops such as sesame and pigeon pea are also cultivated as market crops in the upland plots. Most households also maintain small livestock such as chicken, sheep, pigs and goats. Cattle ownership is limited to very few households and is usually an indicator of relative wealth within their communities (Community Surveys, May 2022).

Income differentiation is minimal in Nhaumue and Mangunde and mainly influenced by the extent of remittances. A rough estimate of annual per capita income for these settlements is between US $185 and $245. In current exchange rate terms, this is between 11,470 and 15,190 MZN. To put this in comparative perspective, the 2021 estimate of per capita GDP for Mozambique was US$ 500. This estimate obscures substantial differences in income and economic opportunity between regions and provinces of the country. The highest GDP per capita is for Maputo province (where the country's capital is located) which is estimated at roughly $1139, while that of Sofala province is around $615. The population in the rural districts of Sofala Province are far poorer and their annual per capita income is 30 to 40% less than the per capita GDP average for Sofala Province.

The total area of the Mangunde community is 2752 ha and that of Nhaumue is 2237 ha. While all land and natural resources are owned by the Mozambican state, the 1997 Land Law (DUAT) formally bestows customary rights of usufruct and land use on rural communities. Access and use rights of land and natural resources in these communities are determined according to custom by traditional authorities. The community areas of Mangunde and Nhaumue extend from the Buzi River to the uplands which encompass Miombo woodlands. As per custom, traditional authorities allocate machamba plots, extraction of stone and timber for household or community building construction, clay for pottery, non-timber forest products for subsistence and artisanal production in the woodland areas. Machamba plots are not allowed to be located adjacent to watercourses due to customary belief that doing so will result in guardian water spirits abandoning the channels. Hunting of

herbivores is permitted in the woodlands during the dry season and hunters are required to deliver the breast of the animal to their traditional leader (Community Surveys, May 2022).

Both Mangunde and Nhaumue fall under the traditional authority of the Mangunde Regulado. The Mangunde Regulado comprises 11 communities in total within the locality of Toronga in Chibabava District. The traditional leadership structure is made up of three levels, with the Régulo of Mangunde Regulado being the highest level for all 11 communities, the Chefes at the second level representing groups of villages under each community, and Sagutas at the third level representing village settlements. The sagutas may also perform the role of Dodas who serve as counsellors for traditional governance within each village. The sagutas and dodas have detailed knowledge of the land boundaries between settlements, and are responsible for plot allocation, resolution of land conflicts and other social issues within their village.

The Régulo of Mangunde Regulado resides in the Mangunde community. In addition, there is one Chefe for the community and three sagutas representing the villages of Chingüoni, Nhamapondoro, and Tchigodi which make up the Mangunde community. The Nhaumue community has one Chefe and three sagutas representing the villages of Nhazvitundu, Mucuetcha, and Chinguone. They are centrally involved in all decisions regarding the project area, boundary determination, and conformity with customary rights and practices.

The CGRN (Natural Resources Management Committee) operates as a grassroots governance structure dedicated to the management of natural resources in the Mangunde Regulado. It works in partnership with the Mangunde traditional leadership structure and the district government agencies. The CGRN has a formal governing structure with members from all 11 communities of Mangunde Regulado and elected office-bearers of President, Vice-President, Secretary, Treasurer and ex-officio members.

The KuKuMuty Project will be managed by Community Subcommittees responsible for their designated project areas (SC). The membership of the SCs is explained in Section 2.5.2. The SCs will be set up for decision-making regarding the membership and gender balance in project design, area, rules for participation, and utilisation of future carbon revenues for social benefit of Mangunde and Nhaumue communities (and others as the project grows). The Project mandates 50% or greater membership of women in the SCs.

The Mangunde and Nhaumue communities each have an agricultural association comprising male and female farmers residing in their respective villages. These agricultural associations are also formally organised with their respective office-bearers. The associations enable farmers to collectively invest labour and coordinate cultivation in plots near the Buzi River. The associations also work with the assistance provided by Azada Verde for solar-based pumped irrigation to cultivate vegetable crops for household consumption and market sale. Nhaumue and Mangunde agricultural associations will be represented on their respective SCs. The Project's agroforestry activities and revenue generation will be overseen by a special working group created from participating households in Nhaumue and Mangunde communities and include both non-members and members of the agricultural associations. The working group will operate under and report to their respective SCs.

3.3.2 Expected Livelihood Change

The populations of Mangunde and Nhaumue can be largely considered as economically marginalized and politically disadvantaged in relation to those working in urban centres of Sofala and Maputo provinces. Within these populations, women and youth-headed households are particularly

vulnerable because of their reliance on subsistence cultivation and very limited income generation opportunities in the area. Under the baseline scenario, there is little likelihood of their socio-economic conditions improving in the short- or medium term. Their share of the annual per capita GDP is less than half of that of the national average of US $500 and is unlikely to improve under the present national economic policies for rural areas in central and northern Mozambique. In addition, the increased likelihood of extreme weather events and greater variability in seasonal rainfall due to climate change can further contribute to decline in agricultural production and overall livelihood security. All the stakeholders identified in Section 2.1.1 are likely to experience further income deterioration and distress under the prevailing baseline scenario.

3.4 Ecosystem Baseline

3.4.1 Initial Ecological Conditions

Chibabava district experiences a tropical monsoon climate, ranging from dry semi-arid tropical in the inland areas to humid tropical near the coast. Average temperatures are above 24°C, with temperatures reaching up to 35°C during summer. The district is watered by the Búzi, Revue, Lucito and other seasonal rivers. The annual wet season occurs between November and April, and a dry season between May and October. Average annual rainfall ranges between 800 and 1000 mm, and average daytime temperatures vary between 30°C in the wet season and 18°C in the dry season.

The Mangunde and Nhaumue communities are situated on relatively gentle undulating landscapes, although there are steeper river terraces carved by floods along the banks of the Buzi River. The geology consists of a Precambrian granitoid and gneiss basement complex, sometimes expressing inselbergs and kopjes, flattened along erosion surfaces. Altitude along the floodplain of the Buzi River ranges between 80 and 90m above sea level. In some areas the flood plain narrows dramatically, but in most areas it ranges between 1.2 and 2km in width. Settlement areas are concentrated along the e astern flank of the Buzi River with almost all settlements occurring within 4km and well above the high flood level of 90m.

Soils include a mixture of acidic soils, consisting of ferrasols and acrisols, and ferruginous soils made up of lixisols and cambisols. These are highly acidic, low in cation exchange capacity, low total exchangeable bases and low in available phosphorus. The soils are formed by a catenary sequence of deeply weathered soils in higher elevations, a narrow zone of sandy colluvial soils along the foot slopes, and poorly drained alluvium along rivers. Generally, the soils in the area have low levels of organic matter due to abundant termite activities and frequent incidence of fire (Chidumayo, 1997). Soils in the project areas are mostly sandy loams (organic content between 0.5-3.1%), varying significantly from upslope to downslope areas. The lowest quantities of soil organic matter are found in the sandy lowlands, closer to creeks and gullies.

The district is characterised by the distinctive Miombo-related woodlands ecosystem prevalent across southern and south-eastern Africa. Miombo woodlands are dominant in the central African plateau (Cole 1986) and can be seen as a transitional system between the closed rainforests in central Africa and the open semi-arid savannas of southern Africa (Vinya 2010). This tropical dry forest formation is critical for biodiversity and for the livelihoods of millions. The woodlands have been modified by settled and swidden farming practiced over millennia to create a complex agroecosystem mosaic (Ribeiro et al. 2020a). In fact, Miombo woodlands can be regarded as socio-ecological systems maintained by humans over a long period of time (Ribeiro et al. 2020b).

Miombo woodlands hold a “significant portion of the world’s tropical dry forests and house one of the last remnants of megafauna worldwide” (Mittermeier et al. 2003). They can be defined as “deciduous woodlands composed of broad-leaved trees of the legume subfamily Detarioidae, well-developed grass layer, high level of endemism and habitat of charismatic megafauna” (Ribeiro et al., 2020). Vegetation is adapted to the occurrence of fire. Nearly 55% of the 8500 floristic species in the Miombo ecosystem are endemic and about 80 percent of the largest terrestrial mammals of Mozambique are found in Miombo woodlands (FAO, 2021). Because of its structural characteristics, the Miombo vegetation constitutes an excellent habitat for a variety of wild herbivores and large predators such as inhacozo (Kobus ellipsiprymus), bushbuck (Tragelaphus scriptus), eland (Taurotragus oryx), sable (Hippotragus niger), gondonga (A. litchensteini) and carnivores such as lions (P. leo), leopards (P. pardus) and necrophages (e.g. hyenas, vultures).

Miombo woodlands generally occur under a unimodal rainfall pattern characterised by distinct and prolonged dry seasons, coupled with leached and weathered soils. Three key factors shaping the Miombo socio-ecological system are (i) climate variability, (ii) nutrient availability of soils, and (iii) occurrence of fire (Ribeiro et al., 2020).

Ribeiro et al. (2020) classify the Southern African woodlands along seven vegetation categories: (1) Hymenocardia/Uapaca miombo, (2) Diplorhynchus miombo, (3) Combretum miombo, (4) Baikiaea, (5) Mopane (Colophospermum), (6) Acacia (Vachellia / Senegalia) and (7) Androstachys. Our field surveys (see Annex 7) indicated that the project areas fit within the class of Combretum woodland, although Diplorhynchus is also commonly present. For sake of convenience, we refer to the project woodland areas as “Miombo woodlands”.

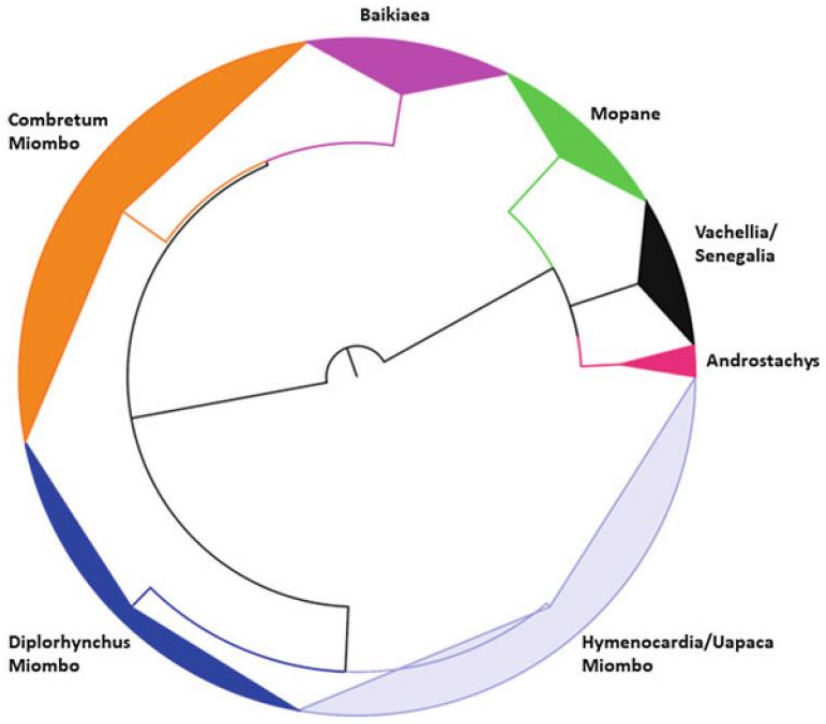


Figure 3.4.1. Classification of Southern African woodlands in seven vegetation categories (Ribeiro et al., 2020).

3.4.2 Expected Ecosystem Change

Miombo woodlands are complex socio-ecological systems maintained by humans through cycles of clearing, cultivation, abandonment, and fire over millennia (Ribeiro et al. 2020b). Based on an

analysis of remote sensing imagery and interviews on Miombo dynamics in Mozambique, Silva et al. (2009) show that shifting cultivation in the Miombo biome creates a complex agroecosystem mosaic in which change may occur simultaneously in many directions and at different rates. According to the authors, such dynamics are best explained by multiple causes and driving forces rather than by single-factor causation. This is in line with the review of Geist & Lambin (2002), indicating that land-use cover change in Southern Africa is driven by a variety of economic, cultural/socio-political, demographic, technological but also institutional/policy factors.

Across much of the rural development and biodiversity conservation literature, however, there is little acknowledgement of the Miombo woodlands as a complex agroecosystem mosaic. The dominant narrative is that charcoal production, timber harvesting, and slash and burn agriculture contribute to massive loss of Miombo ecosystems (Mather and Needle 2000; Brown 2001) and that reforestation projects must consequently protect Miombo from interference by local communities. Although Syampungani et al. (2016) relate Miombo cover loss with three main activities: (i) charcoal production, (ii) slash and burn agriculture and (iii) timber harvesting, they also state that Miombo woodland on sites abandoned after different traditional use and agricultural practices can recover to good health. Some authors argue that charcoal production and slash and burn agriculture may even be necessary disturbances that enhance the establishment and development of the regeneration pool of the Miombo plagioclimax (Luoga et al. 2002). Miombo woodland can recover easily on a timescale of about 20 to 25 years, under the condition that regeneration is not inhibited by late dry season fires (Chidumayo, 2019). Monfort et al. (2021) infer a high woodland regeneration capacity in terms of woody species diversity and soil properties but also find that disturbances and light conditions have a long-term effect on species composition and stand structure, underlining another condition of integrated landscape management.

Field observations of areas near the project sites in Mangunde and Nhaumue show the occurrence of slash and burn agriculture, timber harvesting (Figure 3.4.2), and occasional instances of charcoal production. However, the project sites are neither located on abandoned formerly machambas nor used as grazing lands. They are on higher topography which have more eroded sois and are frequently affected by uncontrolled late dry season fires. The late dry season fires can contribute to increased erosion and impoverishment of soils and thus inhibit woodland enrichment. As outlined in the abovementioned literature findings, the field observations do not indicate massive losses of biomass due to slash and burn agriculture, timber harvesting, or charcoal production, but one can expect a metastable biomass baseline scenario. This most likely future land use and land management scenario of the project areas, in the absence of project interventions, is fully described in Annex 7 (based on AR-TOOL02 v1.0: “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”).

Figure 3.4.2. Observations of (left) a cleared dryland machamba with Sorghum cultivation near the Mangunde project zone, (middle) charcoaling near the Nhaumue project zone and (right) timber harvesting near the Nhaumue project zone.

Theory of Change

3.5 Project Logic

Table 3.5 provides a summary of the causal links between project activities and expected outcomes and key assumptions.

Regarding risks we refer to §Risk Management.

Table 3.5 Project Logic

Aim To use an integrated landscape management strategy for enrichment of Miombo woodlands and creation of climate resilient agroecosystems for sustainable livelihood opportunities in Chibabava District, Sofala Province, Mozambique.		
	Description	**Assumptions/Risks**
Outcomes		
Carbon Benefit	~ 369 ha community managed woodlands are enriched by increase in soil organic carbon and Miombo species biomass The project expands to adjacent areas and involves neighbouring communities to scale-up the impact.	R1: Uncontrolled fires could continue to affect the project areas. A1: The project establishes mulching zones and fire breaks to protect enriching Miombo lands against uncontrolled annual fires. R2: Community could be uninterested to participate in the project. A2: Strong role of stakeholder communities as project designers and involvement of neighbouring

		households in project activities will build a strong project support base.
Livelihood Benefit	Agroforestry nursery providing additional livelihood benefits to participating households of Mangunde and Nhaumue. Socio-ecological challenges are tackled by community decisions using re-investments. Protection of ecosystem services and non-timber forest products	R3: A focus on Miombo restoration alone could be insufficient to create significant community benefits. A3: Intensive agroforestry planting improves soil fertility and provides useful trees for participating households. R4: Project benefits could be insufficient to attract strong community interest. A4: Plan Vivo re-investments are used to improve the well-being of communities.
Ecosystem Benefit	The floristic biodiversity of the Miombo ecosystem is supported through the enrichment, conservation, and improved management of 369 ha community-managed woodland. The project will also contribute to regional habitat diversity for endemic fauna. The project expands to adjacent areas and involves neighbouring communities to scale-up the impact.	R5: The project team itself could be too small to perform all restoration activities alone. A5: The Miombo restoration areas are enriched, protected, and expanded by community members.
Outputs and activities		
Output 1	**Indigenous mulching techniques successfully applied as mosaic patches across the project areas**	R6: The local soils may be too poor to allow strong Miombo enrichment. A6: Local soil management techniques are key to the successful enrichment of Miombo woodlands R7: The project team itself could be too small to perform all mulching activities alone. A7: Active and broad-based involvement of communities as project designers and project
Activity 1.1	Assessing community knowledge on grasses and soil fertility, and making "soil fertility maps"	
Activity 1.2	Identify good locations in project area for mulching and develop mulching strategy with community participants	
Activity 1.3	Annual mulching activities in project subareas	

Activity 1.4	Construction of water-retaining swales or other soil and water conservation (SWC) structures in project areas	partners will build a strong project support base. R8: Drought and soil infertility may hamper vegetation growth. A8: Implementing soil enrichment and landscape water harvesting (mulching and building SWC structures) will speed up the growth of the biomass.
Activity 1.5	Community-led soil strategy evaluation	
Activity 1.6	Community liaison regarding soil fertility improvement techniques	
Output 2	**Firebreaks installed and maintained around the project areas**	R9: Banning all fire would not be smart since fire is an integral part of the ecological integrity and ecosystem function of miombo woodlands A9: The project is not 'anti-fire' but rather about managing the occurrence and frequency of uncontrolled fires in the project areas. According to Ribeiro et al. (2021), an (alternatingly cold and hot) fire return interval of ~3 (to 5 years) is beneficial for the Miombo ecosystem. Community-based management will establish mulching zones and fire breaks to protect and enrich project areas from uncontrolled annual fires. The project establishes fire experimental plots to gain detailed understanding of the effect of fire frequency and intensity on biomass. R10: The project team itself could be too small to perform all fire management activities alone. A10: Active and broad-based involvement of communities as project designers and project partners will build a strong project support base.
Activity 2.1	Assessing community knowledge of fire regime in project areas, and making an "uncontrolled fire exposure" map	
Activity 2.2	Develop fire(break) strategy for project sites and discuss it with the community	
Activity 2.3	Establish firebreaks (minimum 10m wide) at project sites, with community members, and at least 1 month before the start of the fire season	
Activity 2.4	Community-led fire strategy evaluation	
Activity 2.5	Community liaison regarding uncontrolled fire reduction through mulching and firebreak techniques	
Output 3	**Native Miombo species planted across the project areas**	R11: A regeneration approach alone (without extra planting) could be
Activity 3.1	Biomass and soil plot measurements	

Activity 3.2	Community-led identification of the use of tree species and the timing for seed harvesting for making a "tree species distribution map"	insufficient to enrich certain bare subzones. A11: Enrichment planting of native Miombo seedlings can only take place when soil and fire management strategies are in place. R12: Non-native species could become invasive. A12: Seeds are harvested from local trees (in Chibabava district), based on community knowledge on best timing for seed harvestingR13: Meteorological data in Chibabava may still be scant. A13: Next to nutrient availability of soils, and occurrence of fire, Miombo trees are highly dependent on climate variability – so it is important to gather local climatic data
Activity 3.3	Develop strategy on planting different tree species and discuss it with the community	
Activity 3.4	Enrichment planting in project areas, during the first rainy months to maximize the plant survival rate and adaptation	
Activity 3.5	Continuous monitoring of temperature, rainfall, fire occurrence and seasonal plant behaviour	
Activity 3.6	Regular community liaison	
Output 4	**Agroforestry systems applied by the participants of the Project's Agroforestry Work Group**	R14: It may be difficult to find high-quality seedlings to supply the project. A14: High-quality river-irrigated local nurseries are constructed since these are crucial to supply the necessary seedlings for Miombo enrichment and agroforestry cultivation R15: It may be technically difficult to implement the agroforestry component. A15: The project selects agroforestry species that are best suited for the local socioecological circumstances and conditions R16: The agroforestry benefits may be insufficiently attractive. A16: Fruits and other products from agroforestry can be effectively sold at local markets
Activity 4.1	Training project team members in agroforestry nursery, strategies and processes	
Activity 4.2	Setting up nurseries and nursery irrigation system, and engage nursery labourers	
Activity 4.3	Planting and supporting replanting and long-term maintenance of the agroforestry system with the Project Agroforestry Work Group	
Activity 4.4	Community and association liaison	
Activity 4.5	Distribution of agroforestry crop benefits	

Technical Specification

The technical specification template for each project intervention is available in Annex 7. Two different technical specification have been developed (Annex 7.1 and 7.2):

- The Miombo Enrichment Specifications are based on the PM001 Agriculture and Forestry Carbon Benefit Assessment Methodology.
- The Agroforestry Specifications will be added as a separate document later.

3.6 Project Activities

Table 3.6 provides a summary of the main project activities and inputs for the project interventions. Also see Table 3.5 and the separate technical specifications provided in Annex 7.

Table 3.6 Project Activity Summary

Project Intervention	Project Task	Project Activities	Inputs
Ecosystem Restoration	Implementing Miombo Soil Strategy	Assessing community knowledge on grasses and soil quality, and making a "soil fertility map"	Community interviews, participatory mapping
		Identify good locations in project area for mulching and develop mulching strategy and discuss it with community	Community interviews and community meetings
		Annually mulching in project subareas	Daily labour
		Construction of swales in project areas (or other SWC structures)	Daily labour and regular monitoring
		Community-led soil strategy evaluation	Community interviews and community meetings
		Community liaison	Regular community interviews
	Implementing Miombo Fire Strategy	Assessing community knowledge of fire regime in project areas, and make an "uncontrolled fire exposure map"	Community interviews, participatory mapping
		Develop fire(break) strategy for project sites and discuss it with the community	Community interviews and community meetings
		Establish firebreaks at project sites, with community members	Daily labour and regular monitoring

		Community-led fire strategy evaluation	Community interviews and community meetings
		Community liaison	Regular community interviews
	Implementing Miombo Enrichment Strategy	Biomass and soil plot measurements	Monitoring plots
		Community-led identification of the use of tree species and the timing for seed harvesting, and make "tree distribution map"	Community interviews, participatory mapping
		Develop strategy for planting tree species and discuss it with the community	Community interviews and community meetings
		Enrichment planting in project areas	Local nurseries, daily labour and monitoring
		Continuous monitoring of temperature, rainfall, fire occurrence and seasonal plant behaviour	Thermometer, pluviometry, regular community interviews
		Community liaison	Regular community interviews
Agroforestry	Implementing Agroforestry Strategy	Training project team members in agroforestry strategies and processes	Training sessions
		Setting up nurseries and nursery irrigation, and engage nursery labourers	Nursery investments, water infrastructure, nursery labour
		Planting with the Project's Agroforestry Work Group	Available communal or private lands close to nursery and river irrigation
		Community and association liaison	Regular community interviews and interviews with association members

3.7 Additionality

Table 3.7 provides a summary of the main barriers to project implementation and how they will be overcome for each project intervention. Full details of the additionality assessment, following an approved methodology, are provided in Annex 7.

Table 3.7 Additionality Assessment Summary

Ecosystem Restoration	Main Barriers	Activities to Overcome Barriers
Financial	1. Limited funds 2. Other priorities 3. Limited private credit availabilities	Start-up capital secured by Government of Flanders (Belgium) funds to initiate the project; benefit sharing scheme supported by Plan Vivo; funding for soil and fire management, wages and enrichment planting
Technical	Although biodiversity conservation projects are being pursued in other parts of Sofala Province, these are mainly targeted for wildlife parks. There is limited focus on enrichment of Miombo woodlands in rural community areas in conjunction with agroforestry activities Limited land availability for agroforestry plantings	Skilled local coordinator with understanding of local agroecosystems for enriching Miombo woodlands; inputs of environmental scientists and researchers linked to three universities; construction of plant nurseries for miombo enrichment and agroforestry plantings Collaboration with ESMABAMA for use of Mangunde Agricultural Training Centre and lands for agroforestry activities
Institutional /Social	4. "Top-down approach" adopted by government officials, with limited room for local decision-making and grassroots initiatives	- Bottom-up approach with first consultation rounds, continued workshops and benefit sharing for participating communities, and insertion of project within local community associations such as CGRN.

3.8 Carbon Benefits

Tables 3.8a and 3.8b provides a summary of the expected carbon benefits from each project intervention over the first crediting period. We provide these tables with full details of our procedures for estimating carbon benefits, following an approved methodology, in Annex 7.

Risk Management

3.9 Environmental and Social Safeguards

3.9.1 Exclusion List

The project does not include any activities listed in the Plan Vivo Exclusion List (see Annex 8).

3.9.2 Environmental and Social Screening

Table 3.9.2 provides a summary of the potential risks and impacts identified in the environmental and social risk screening. Please see §3.9.3 for the environmental and social assessment, and §3.9.4 for the environmental and social management planning.

The focal areas identified in the environmental and social risk screening are related with the potential leakage from displacing fire.

The complete environmental and social screening report is included in Annex 9.

Table 3.9.2 Environmental and Social Risks

Risk Area	**Likelihood (1-5)**	**Magnitude (1-5)**	**Significance** **(low, moderate, severe, high)**
Vulnerable Groups	3	3	Moderate, potential risks mainly related with perpetuation of income-related inequality
Gender Equality	3	3	Moderate, potential risks mainly related with perpetuation of gender-related inequality
Human Rights	2	3	Moderate, potential risks mainly related with individuals not being present during Subcomité meetings
Community, Health, Safety & Security	3	3	Moderate, Mozambican Civil War ended in 1992, thereafter relative peace prevailed
Labour and Working Conditions	1	3	Low, as the project will at all times align with regional/national labour laws
Resource Efficiency, Pollution, Wastes, Chemicals and GHG emissions	1	3	Low, as no pollutants are used, and project GHG emissions are negligible
Access Restrictions and Livelihoods	3	3	Moderate, potential risks mainly related with displacement in the in cases of uncontrolled fire events
Cultural Heritage	1	2	Low, no registered cultural heritage within the project areas; community subcommittees to ensure culturally significant sites are properly identified and not affected by project interventions
Indigenous Peoples	3	3	Moderate, the majority of all inhabitants in the project region are Ndau
Biodiversity and Sustainable Use of Natural Resources	1	3	Low, project activities promote biodiversity enhancement; no non-native trees will be planted in woodlands
Land Tenure Conflicts	3	3	Moderate, potential risks mainly related with fire outbreaks that may occur adjacent to the project areas

Risk of Not Accounting for Climate Change	1	3	Low, potential risks mainly related with cyclones and increased frequency of extreme weather events
Other – e.g. Cumulative Impacts	2	3	Moderate, potential risks mainly related with the potential spread of uncontrolled fire outbreaks

3.9.3 Environmental and Social Assessment

See Annex 10 for the environmental and social assessment report.

3.9.4 Environmental and Social Management Plan

Table 3.9.4 describes the mitigation measures in place to address the main environmental and social risk identified in Sections 3.9.2 and 3.9.3.

Table 3.9.4 Environmental and Social Risk and Impact Mitigation Measures

Risk/Impact	**Mitigation Measures**	**Project Activity**
Potential risk related with spread of uncontrolled fire outbreaks	The neighbouring Miombo zones must be included in the participatory zonation maps and in the monitoring program. Community Subcommittees (SC) will organise regular meetings to discuss strategies and be prepared to act swiftly in cases of fire outbreaks; SCs ensure that community members are involved in fire monitoring around project areas. The Miombo restoration zones and nurseries will always be repaired, replenished and rehabilitated after any occurrence of uncontrolled fire, or any other extreme weather events such as high temperatures, low rainfall, or cyclones .	Activity 2.1 to Activity 2.5
Potential risk of disproportionate labour demands for mulching or planting activities falling on women.	This could increase female workloads during specific phases of cultivation during the wet and dry seasons. The project aims to mitigate these negative social risks by ensuring 50 % or more representation of women in the Subcommittees so that they can determine how to distribute the labour demands according to women's household needs and circumstances.	Activity 1.1 to Activity 4.5
Potential risk of local elite capture	To include all community members, it is suggested to decentralise invitations (i.e. not only by the leader, but also by the project team) and to communicate earlier on upcoming project activities so the news can spread.	Activity 1.3 and 1.4 Activity 2.3

	The project should keep records of community members participating in project activities and use a smart rotation system to achieve broad inclusion of the community in the project.	
Potential risk of high opportunity costs	Freely distributing tree seedlings and/or seeds for direct seeding of important timber wood species to be planted in individual or communal woodlots. Grass cut-and-carry system (see further) Valorising non-timber forest products and particularly supporting honey production in the Miombo project areas. Established bee-hives in the project area would provide livelihood benefits and function as natural defenders of the area. Sensibilization and dissemination of project objectives and benefits to strengthen community ownership of the project.	Activity 2.3 and 3.4 Activity 4.1 to 4.5

3.9.5 Native Species

All trees planted in the Miombo woodland project areas are native; no non-native tree species are planted or introduced by the project (see: https://powo.science.kew.org/). Agroforestry areas will be located in the lowland areas closer to the river and will have a mix of useful trees and crops that are suited to the local agricultural economy and non-invasive in the surrounding environment.

Table 3.9.5: Non-Native Species Overview

Project Intervention	Non-Native Species Planted/ Introduced	Justification	Risk Assessment and Management
Agroforestry	Moringa oleifera	Moringa leifera is widely established right across Mozambique and is a useful plant to many communities who use the leaves as a source of food especially during wet months. It is not an invasive species, although it can be easily germinated in nursery conditions using cuttings or seeds. Bigger branches are also useful for construction purposes.	Low risk species – little chance of self propagation. Will be used in agroforestry areas only, both in upland and lowland areas due to lack of invasive threat. Already naturalised in Mozambique.
Agroforestry	Mangifera indica	Mango is widely established and naturalised right across Mozambique.	Slight risk of spreading but will be planted amongst indigenous and more

		It is an important food source, especially around December and January. It will only be used in Agroforestry plots with some grafted and improved varieties to be trialled. It can be moderately invasive but is a useful plant already present in the area and provides economic and environmental benefit.	proliferous species. Will be used in agroforestry areas only, both in upland and lowland areas. Already naturalised in Mozambique.

Note: During the first project year, when performing a first Miombo planting trial, the project planted a few Erythrophleum suaveolens and Khaya anthotheca seedlings derived from the Mezembite nursery. Erythrophleum suaveolens is native to Mozambique and Khaya anthotheca is naturalized, but these species are not very well adapted to the Miombo conditions of Sofala. The project will not plant these species again. Tamarindus indica is a popular tree that is native to Madagascar and naturalized to Mozambique. The project will consider planting Tamarindus in the future, but not before adjusting the PDD (including risk assessment).

3.10 Achievement of Carbon Benefits

All trees planted in the Miombo woodland project areas are native; no non-native tree species are planted or introduced by the project (see: https://powo.science.kew.org/). Agroforestry areas will be located in the lowland areas closer to the river and will have a mix of useful trees and crops that are suited to the local agricultural economy and non-invasive in the surrounding environment.

3.11 Reversal of Carbon Benefits

Table 3.11 describes the impact and likelihood of risks to the long-term maintenance of Carbon Benefits from the project. In the Score column, we multiplied Impact and Likelihood scores to give a total score between 0 and 9.

Table 3.11 Risk of Reversals

Risk Factor	**Impact**	**Likelihood**	**Mitigation Measures***	**Score****
Social				
Land tenure and/or rights to climate benefits are disputed	2: Climate benefits would not be issued for affected project area, but the project geographical spread across different project areas would limit the total impact	2: Tenure is secure and agreements and DUAT are in place	Project agreements agreed and signed by relevant stakeholders, DUAT in place	4

Political or social instability	2: Political instability would impact the project although physical fighting is highly unlikely	2: Mozambican Civil War ended in 1992, and relative peace has since prevailed	To work closely with the different levels of government, i.e. at District, Province and National level	4
Community support for the project is not maintained	3: Potential impact would be important, although the project communities have shown strong support for the project	1: The project is community-driven and communities receive the bulk of the benefits	Project agreements agreed and signed by relevant stakeholders, benefit sharing mechanism included, DUAT in place	3
Economic				
Insufficient finance secured to support project activities	3: There would be insufficient incentive to support project activities, although that situation would be temporary	1: The project coordinators are well-established organisations, Government of Flanders (Belgium) funds allow the project to start in the absence of carbon benefits	Financial plan developed	3
Alternative land uses become more attractive to the local community	2: Climate benefits would not be issued for affected project area, but the project geographical spread across different project areas would limit the total impact	1: Benefit sharing mechanism ensures attractive benefit delivery to the project participants	Project agreements agreed and signed by relevant stakeholders. Diversification of income opportunities from agroforestry reduces attractiveness of alternative land uses in Miombo enrichment areas	2
External parties carry out activities that reverse climate benefits	2: Climate benefits would not be issued for affected project area, but the project geographical spread across different project areas would limit the total impact	2: Tenure is secure and agreements and contracts are in place	The project agreement discusses procedures to handle disputes arising in relation to project areas. Community subcommittees have monitoring in project areas to prevent theft or damage of trees by outsiders	4
Environmental				

Fire	1: After an unexpected runaway fire, the affected project areas will receive extra project attention and enrichment planting.	3: Fires are common, although well studied by the project team, and fire breaks are in place	Meetings to discuss fire practices and seasonal burning strategies are regularly organised; community members are involved in creating fire breaks	3
Pest and disease attacks	2: After an outbreak, the affected project areas will receive extra project attention and enrichment planting.	1: Seedling planting involves a biodiverse mix of different native species (see §3.9.5)	Biodiversity will be monitored (see monitoring section) with special attention to potential pest outbreaks.	2
Extreme weather or geological events	2: After an unexpected environmental shock, the affected project areas will receive extra project attention and enrichment planting.	2: Cyclones may impact infrastructure but communities are experienced and adapted	Potential cyclone damage in the project areas will be mitigated by planting a range of native species that are adapted to different levels of disturbance	4
Administrative				
Capacity of the project coordinator to support the project is not maintained	3: Potential impact would be important but there are three organisations involved and the communities could take over some responsibilities	1: The project coordinators are well-established organisations, Government of Flanders (Belgium) funds allow the project to start in the absence of carbon benefits	Financial plan developed with Community Subcommittees and CGRN to ensure long-term stability in project coordination	3
Technical capacity to implement project activities is not maintained	3: Potential impact would be important but the communities could take over some responsibilities	1: The project coordinators are well-established organisations, capable to provide support even in the absence of carbon benefits	Financial plan developed, technical specifications developed; project employees and Community Subcommittee participants are given ongoing technical training to expand local capacity	3

* Generally applicable for Activities 1.1 to 3.3

** If the score is greater than 4 for any risk factor (quod non), additional mitigation measures are required to reduce the risk to an acceptable level.

3.12 Leakage

We describe the risk of leakage (outside the project areas), the estimation and monitoring of leakage and leakage mitigation measures in Annex 7 (leakage sections), based on an approved methodology.

Table 3.12 Leakage Risk Mitigation

Project Intervention	Leakage Risk	Mitigation Measures*
Ecosystem Restoration	Displaced grazing	Implementing grass cut-and-carry system (see Livelihood Indicator L6) and monitoring grazing pressure (see Ecosystem Indicator E2)
	Displaced timber harvesting and charcoaling	Compensating households with extra trees, see Livelihood Indicator L1

* Cross reference activities from Section 3.5 (e.g. Activity 1.1.1)

3.13 Double Counting

There are no other greenhouse gas emission reduction and removal projects, programmes or initiatives that overlap with the project areas or that would generate transferable emission reduction or removal credits from carbon pools or emission sources already included in this project.

Carbon benefits achieved by the project will not be included in any other form of greenhouse gas emissions trading.

In every annual report, the project will check emerging regulations that relate to trading carbon credits and REDD+ in Mozambique and state how compliance will be organized (if applicable).

Table 3.13 GHG Emission Reduction and Removal Projects and Programmes in the Project Region

Project, Programme or Initiative	Scope	Carbon Credit Generation	Risk Mitigation
No other GHG emission reduction/removal project programmes or initiatives overlap with the project region	-	-	-

Agreements

3.14 Land Management Plans

As a basis for land management, Plan Vivo Maps were drawn on sandy ground by the community members and then copied on paper by the project field staff in the presence of community (at the same gathering). It was done in a participatory and collaborative manner where members of the community were able to fact check and correct what was sketched by fellow community members and the paper drawings by the project team. Roughly 15 to 20 community members including the sagutas participated in the exercise for each village.

The Subcommittees were not formed when the mapping took place. However, many of the members involved in the community mapping process are now active members of the Subcommittees. As the project moves forward, Subcommittees will be responsible for redrawing and updating these maps through a participatory process (at least every 10 years) to carry out project activities and regenerative strategies. These mapping and strategy documents will be recorded and maintained by the project team.

During the establishment of 'plan vivo maps', team members were present and provided logistical support (paper, pens) but they did not steer the 'plan vivo' development. The community groups had full freedom to add any element they preferred on the 'plan vivos'. The community members developed a map of the present situation, and a map of the desired situation. Maps were developed in the language Ndau. After mapping, the local coordinator assessed the cartographic quality of the plan vivos (correct area delimitation, legend) and possibly invited the participating members to make cartographic corrections. The coordinator also conducted a final discussion to ensure that the maps are fully understood and agreed to by the project participants, while providing a first estimation of carbon benefits. The plan vivos are stored in the office of Azada Verde in Mangunde, and scans are stored on the shared drive.

For every site, plan vivo maps were designed during these meetings. Thus, these plan vivos are handwritten spatial land management plans, voluntarily produced and owned by the community or community sub-group, which form the basis of a project agreement. This voluntary and participatory mapping/planning process addressed the following local socio-ecological needs and priorities:

- Local livelihood needs and opportunities to improve or diversify livelihoods and incomes
- Reduce extraction of trees from the surrounding miombo woodland areas
- Land availability and land tenure
- Food security
- Practical and resource implications for participation of women
- Application of agroforestry
- Opportunities for soil and fire management and planting native species

We provide example land management plans in Annex 11.

3.15 Crediting Period

The initial crediting period is from 1 May 2022 to 1 May 2052, which may be extended when necessary and/or for project areas that are added to the project after 2022.

3.16 Benefit Sharing Mechanism

Benefits shared from the sales of Plan Vivo Certificates are spent following a community consultation (coordinated by the Community Subcommittees). Payments are indirectly linked to environmental management performance, as the income from the sales of the certificates from any designated project area depends on the performance (see project agreement for monitoring responsibilities, targets and corrective actions) and is allocated for investment in the associated community area. It is agreed that shared benefits will be used for investments in social or environmental activities that

benefit the local community, preferably in line with future plans for the designated project areas which are developed by the communities themselves.

The Subcommittees have discussed and developed a system whereby each community gets an equal amount of income from the sale of PVCs, plus an amount proportional to the size of land that they manage. This way, communities with less land still get a significant amount of income from the project, while communities who manage a larger area of land are also rewarded. We refer to the project agreement that presents the formula to allocate the funds to the communities.

Payments will only be withheld if there is clear evidence for fraud, or a clear violation of the project agreement (see project agreement for details).

Once a Community Subcommittee agrees on a certain social or environmental investment, it will provide a budget estimate and call for tenders if a contractor is required. The winning tender will be given the contract and direct payments will be made in two to three instalments to the contractor on satisfactory delivery of each phase outlined in the contract. Direct transfer of funds in instalments is preferred for minimizing risk of funding leakage, reducing transaction costs, and maximizing transparency of deliverable outcomes. Investments will be subject to standard contracting practice, allowing fair competition for contractors from the locality or surrounding region. All contracts are overseen by the project coordinators, who guarantee that at least 60% of the income from the sales of the certificates (after payment of any charges, taxes or similar fees levied by the host country) will directly benefit project participants and other local stakeholders. The disbursements are transparently reported in the annual reports. For activities that do not require a contractor, e.g. firebreak maintenance, the Subcommittee will employ local community members directly to conduct the work, giving preference to people living adjacent to the intervention areas.

3.17 Grievance Mechanism

Any complaints and suggestions that are raised during community and subcommittee meetings or walks around the project areas are recorded by the project coordinator in a “complaints and suggestions logbook”. Note that these walks are conducted twice a year by members of the Subcommittee with representatives of the CGRN and the project team. In addition, walks are conducted when enrichment activities are being undertaken in the project areas.

The logbook is regularly updated and scans are stored on the shared drive. Where possible, remediating actions – following complaints and suggestions – are taken. The project coordinators are responsible to organise extra consultation rounds, if required, and to implement remediation actions. We refer to the project agreement for actions in case of dispute.

The régulo of Mangunde will be responsible for mediating resolution of any grievances that cannot otherwise be resolved, as per community norms.

3.18 Project Agreements

If a community wants to enter into a project agreement, several initial community meetings are organised (see §2.4), to discuss the basic project logic and get initial feedback. Thereafter, the process of establishing plan vivos can start. Only then, a project agreement can be signed.

Project agreements do not remove, diminish or threaten project participant’s rights to land and/or resources. The agreements are valid for 30 years, which is in line with the crediting period and

carbon benefit estimation. A representative of Azada Verde will visit the communities on a regular basis during this period, to ensure that rights and obligations are met.

Annex 12 provides an example of a project agreement.

4. Monitoring and Reporting

Indicators

4.1 Progress Indicators

We completed Table 4.1 with the relevant project progress indicators.

Table 4.1 Progress Indicators

Output/Activity		**Indicator**	**Means of Verification**
Output 1	**Indigenous mulching techniques successfully applied in mosaic patches across the project areas**	P1: # hectares of mulching applied per year	Reporting of mulching activities; photographic evidence and map of areas covered in Annual Report
Activity 1.1	Assessing community knowledge on grasses and soil quality, and make "soil fertility map"	P2: % of participating communities having soil fertility maps	Participatory fertility maps
Activity 1.2	Identify good locations in project area for mulching and develop mulching strategy and discuss it with community	P3: % of participating communities having mulching strategy	Mulching strategy document
Activity 1.3	Annual mulching activities in project subareas	P4: # mosaic blocs of mulching applied per year	Reporting of mulching activities; photographic evidence and map of areas covered in Annual Report
Activity 1.4	Construction of swales in project area (or other SWC structures)	P5: # SWC constructed and/or maintained	Photographic evidence in Annual Report
Activity 1.5	Community-led soil strategy evaluation	P6: # mulching-related evaluation sessions per year	Evaluation note
Activity 1.6	Community liaison	P7: # soil-related meetings per community per year	Monthly community reports
Output 2	**Firebreaks installed and maintained around the project area**	P8: Meters of firebreaks installed and maintained	Reporting of firebreak activities; photographic evidence and map of areas covered in Annual Report

Activity 2.1	Assessing community knowledge of fire regime in project areas, and make “uncontrolled fire exposure map”	P9: % of participating communities having uncontrolled fire exposure maps	Participatory fire maps
Activity 2.2	Develop fire strategy for project sites and discuss it with the community	P10: % of participating communities having fire strategy	Fire strategy document
Activity 2.3	Establish firebreaks at project sites and prune low-hanging tree branches to reduce fire spread into the canopy with community members when necessary	P8: Meters of firebreaks installed and maintained	Reporting of firebreak activities; photographic evidence and map of areas covered in Annual Report
Activity 2.4	Community-led fire strategy evaluation	P11: # fire-related evaluation sessions per year	Evaluation note
Activity 2.5	Community liaison	P12: # fire-related meetings per community per year	Monthly community reports
Output 3	**Native Miombo species planted across the project area**	P13: Number of Miombo seedlings planted	Reporting of planting activities; photographic evidence and map of areas covered in Annual Report
Activity 3.1	Biomass and soil plot measurements	P14: Number of survey plots per project area	Reported in Annex 7 of the PDD
Activity 3.2	Community-led identification of the use of tree species and the timing for seed harvesting, and make “tree distribution map”	P15: % of participating communities having tree maps	Participatory tree distribution maps
Activity 3.3	Develop strategy on planting species and discuss it with the community	P16: % of participating communities having planting strategy	Planting strategy document
Activity 3.4	Enrichment planting in project areas (i.e. specific patches that require extra planting)	P13: Number of Miombo seedlings planted	Reporting of planting activities; photographic evidence and map of areas covered in Annual Report
Activity 3.5	Continuous monitoring of temperature, rainfall, fire occurrence and seasonal plant behaviour	P17: Number of measurements per year	Daily results reported in Annual Report

Activity 3.6	Regular community liaison	P18: # plant-related meetings per community per year	Monthly community reports
Output 4	Agroforestry system applied by the Project's Agroforestry Work Groups	P19: # hectare agroforestry applied by participating agricultural associations	Reporting of agroforestry activities; photographic evidence and map of area and species planted in Annual Report
Activity 4.1	Training project team members in agroforestry nursery, strategies and processes	P20: # team members trained at Mezembite Training Center	Report of training
Activity 4.2	Setting up nurseries and nursery irrigation system, and engage nursery labourers	P21: # seedlings produced per nursery	Nursery counting, reported in Annual Report
Activity 4.3	Agroforestry planting with association members	P22: # seedlings planted per nursery	Planting activities reported in Annual Report
Activity 4.4	Community and association liaison	P23: # agroforestry-related meetings per community and/or association per year	Monthly community reports
Activity 4.5	Distribution of agroforestry crop benefits	P24: # participants and/or annual income generated from different agroforestry crops	Report of per capita benefits

4.2 Carbon Indicators

Table 4.2 provides a summary of the carbon indicators that are monitored for each project intervention.

Project Intervention	**Carbon Indicator**	**Means of Verification**
Ecosystem Restoration	C1: Number of Miombo seedlings planted across the ecosystem restoration areas	Registration of tree seedlings leaving the nurseries for enrichment planting across the restoration areas and photographs of planting activities by the project team.
	C2: Survival rate of seedlings planted in the Miombo project areas	Monitoring of survival rate of seedlings planted at the end of each rainy season.

	C3: Above Ground Biomass and SOC conditions in the monitoring plots	Systematic vegetation and soil survey in nested plots (see tech spec). Survey to be repeated every 5 years.
	C4: Miombo tree density	Systematic vegetation and soil survey in nested plots (see tech spec). Survey to be repeated every 5 years.

4.3 Livelihood Indicators

Table 4.3 describes the indicators that are used to monitor the livelihood status of project participants and other local stakeholders, and risks of negative social impacts. The livelihood indicators were defined according to the concerns and questions raised by community members in the public meetings and focus group discussions. The potential income generating activities from agroforestry including income from labour for firebreaks, mulching, seed collection, planting and swale building in project areas were of greatest interest for women and men. Women's representation in the Subcommittees and female participation in community meetings was seen as demonstrating sustained interest in the project and engagement in decision making regarding socioenvironmental investments for the benefit of the whole village.

Livelihood Indicator	**Means of Verification**
L1: # of trees allocated for timber harvesting and charcoal making from agroforestry cultivation	Registration of agroforestry trees allocated for harvesting and charcoal making
L2: % female participation during the Subcommittee meetings per project area	Reporting and photographic evidence in Annual Report
L3: Formal training in agroforestry and landscape water harvesting techniques	Reporting and photographic evidence of trainings in Annual Report
L4: Metical spent on socioenvironmental reinvestments	Financial reporting included in Annual Report
L5: Annual cash income generated from agroforestry and/or honey activities	Financial statements of the Agroforestry Work Group
L6: Amount of grass allocated for cut-and-carry	Reporting and photographic evidence in Annual Report
L7: Metical spent on activities (firebreaks, mulching, swales)	Financial reporting in Annual Report

4.4 Ecosystem Indicators

Table 4.4 describes the indicators that are used to monitor ecological conditions and possible risks of negative environmental impacts in the project region.

Ecosystem Indicator	**Means of Verification**
E1: Miombo tree-species Richness in the project areas	Based on the vegetation survey (every 5 years), the total number of species in the tree community (richness S), as well as the proportion of species i relative to the total number of species (p_i) can be calculated. We use the Shannon's diversity index as a robust indicator for biodiversity status in the project areas. The evolution of the Shannon index will be reported every 5 years.
E2: Number of observations of uncontrolled fires, timber harvesting and charcoal making in the miombo enrichment project areas	Registration of observations (written reports and on maps) by project staff and/or mentioned during the four-monthly Community Subcommittee public meetings.
E3: Miombo understory Richness in the project area	Based on the vegetation survey (every 5 years), the total number of species in the understory community (richness S), as well as the proportion of species i relative to the total number of species (p_i) can be calculated. We use the Shannon's diversity index as a robust indicator for understory biodiversity status in the project areas. The evolution of the Shannon index will be reported every 5 years.

Monitoring

4.5 Monitoring Plan

Overall, as rPVC are issued based on the expected carbon benefits, annual progress reports will present activity-based indicators to determine whether the project activities are being carried out as needed to achieve the expected benefits. rPVCs will transform into vPVCs after every verification audit.

In parallel, every 5 years (at minimum), a full-scale carbon monitoring round will be organised to recalibrate the carbon benefit calculations.

We refer to the monitoring plan in Annex 13 for more details on specific monitoring and verification activities.

4.6 Progress Monitoring

The milestones or targets of the progress monitoring indicators are listed below (Table 4.6.1). The targets are subdivided in three categories: full, partial and missed target.

There are the following consequences for certificate issuance and corrective actions that will be implemented if the performance targets are not met (mitigation actions):

(i) If the values for all indicators meet or exceed their performance target, the full issuance is received;

(ii) If one or more of the indicator values are below its performance target for one monitoring period, the full issuance is received but corrective actions must be implemented by the next year;

(iii) If one or more of the indicator values are partially achieved for two consecutive monitoring periods, the full issuance is received but corrective actions must be implemented.

(iv) If one or more of the indicator values are missed for two consecutive monitoring periods, or partially achieved for three consecutive monitoring periods, certificate issuance of the project area concerned is withheld until corrective actions have been implemented and the performance target(s) have been reached.

In addition, in Table 4.6.2 we summarize the performance tracking of the project piloting activities. These are pilot activities/targets that are not contributing to overall PVC issuance at this stage. These project activities are in addition to those generating Plan Vivo Certificates.

Table 4.6.1	**Activity Indicator P1 to P24 (measure annually)**	**Performance Targets**		
		Full Target Achievement	**Partial Target Achievement**	**Missed Target**
Miombo enrichment activities	Project area undergoing mulching activities	≥10 ha/yr	-	<10 ha/yr
	Area of each project area surrounded by firebreak or otherwise protected against annual fire	>80%	50-80%	<50%
	Number of SWC in project area (swales or other) installed and/or maintained	6 / yr	4-6 / yr	<4 / yr
	% of participating communities having soil fertility maps, a defined mulching strategy, uncontrolled fire exposure maps, a defined fire strategy, tree maps	100%	-	<100%

	and a defined planting strategy			
Tree Planting	Number of Miombo seedlings planted	>1500 seedlings/yr	1000-1500 / yr	<1000 seedlings / yr
	Survival Rate	>60%	30-60%	<30%
Community Subcommittee meetings	Number of meetings per project area	3 per year	1-2 per year	0 per year
	Female participation	>50%	30-50%	<30%
Risk mitigation Activities	Index of uncontrolled fires, woodcutting and charcoal making in the project zones, per project zone per year	<4 per year	4-10 per year	>10 per year

Table 4.6.2 Monitoring for piloting activities

Piloting Activity	Activity Tracker	Ambition	Piloting purpose
Activity 3.1	P14 (Number of survey plots per project area)	>80 plots	Understanding biomass and soil dynamics in the PA
Activity 3.5	P17 (Number of measurements per year)	Weekly measurements (where possible: daily)	Better understanding effect of temperature and rainfall on fire occurrence and seasonal plant behaviour
Activity 4.3 / Output 4	P19 (# hectare agroforestry applied by participating agricultural associations)	>0.5ha during piloting phase	Experimenting with agroforestry activities and understanding the farmers' interest
Activity 4.2, 4.3	P21 (# seedlings nurtured) P22 (# seedlings planted)	>750 /yr	Experimenting with agroforestry activities and understanding the farmers' interest
Activity 4.1, 4.4	P20, P23 (Organised training sessions or sensitizing events on agroforestry techniques)	>1 per year	Experimenting with agroforestry activities and understanding the farmers' interest
Activity 4.5	P24 (participants and/or annual income generated from different agroforestry crops)	1 association during piloting phase	Experimenting with agroforestry activities and understanding the farmers' interest

4.7 Carbon Monitoring

The carbon monitoring scheme follows a double time track:

- Activity based performance indicators are reported annually to underpin the carbon estimation as described in §4.6.

- C1 and C2: The project aims for >1500 Miombo seedlings planted per year with an average Survival Rate >50%.

- C3: Biomass (AGB) and soil survey (SOC) rounds are organized every 5 years. This allows recalibration of the carbon model to fit the measured carbon sequestration rates based on the reality (field measurements). The project is thus verified every five years. We aim for a statistically significant increase every five years, in line with the estimations.

We follow AR-TOOL14 vs 4.2, section 6.2, on the direct estimation of change by re-measurement of sample plots during every five-years monitoring round; see also §4.8.2.

4.8 Livelihood and Ecosystem Monitoring

4.8.1 Livelihood Monitoring

The focus group sessions at the community meetings provided baseline data related to household needs, activities and income at a collective level. These were collectively determined and checked by open discussion within groups. These data will be used as baseline for assessing livelihood improvements during subsequent phases of the project.

For each of the livelihood indicators listed in Section 4.3, we identified targets for each period of 5-years (or less) throughout the crediting period:

- L1: 3-5% of agroforestry tree species allocated for timber harvest and charcoal production over 5 years;

- L2: 50% female participation during all Community Subcommittee meetings for each project area;

- L3: 1 organised training session for Agroforestry Work Groups each year;

- L4: Amount spent on socioenvironmental reinvestments from the sales of the PV certificates (60% of net income, after payment of any charges, taxes or similar fees levied by Mozambique)

- L5: Significant increase ($p<0.05$) of annual cash income, ceteris paribus, of all participating households in the Agroforestry Work Groups (according to statistical test and weighted for inflation).

- L6: Amount of grass allocated for cut-and-carry: significant increase ($p<0.05$) after baseline year.

- L7: Metical spent on activities (firebreaks, mulching, swales): significant increase ($p<0.05$) after baseline year.

4.8.2 Ecosystem Monitoring

For each of the ecosystem indicators listed in Section 4.4, we identify targets for each period of 5-years throughout the crediting period.

We follow AR-TOOL14 vs 4.2, section 6.2, on the direct estimation of change by re-measurement of sample plots during every five-years monitoring round.

Ecosystem indicators **(section 4.3)**	**5-year target**
E1: Miombo-species tree Richness in the project areas	Significant increase ($p<0.05$ as compared to the baseline) of tree-species richness, based on the Shannon diversity index. Since this is a paired testing over time in fixed plots, a paired samples Wilcoxon test is to be used since the Shannon indices are paired over time, while not normally distributed.
E2: Number of observations of uncontrolled fires, timber harvesting and charcoal making in the project zones	Significantly reduced ($p<0.05$) number of observations (ceteris paribus)
E3: Miombo understory Richness in the project area	Significant increase ($p<0.05$ as compared to the baseline) of understory richness, based on the Shannon diversity index. Since this is a paired testing over time in fixed plots, a paired samples Wilcoxon test is to be used since the Shannon indices are paired over time, while not normally distributed.

4.8.3 Sharing Monitoring Results

Relevant ecosystem and livelihood monitoring results are discussed on the annual Subcommittee meetings. This allows for direct feedback from the community members and to adjust the project design if any issues arise.

In parallel, the project will disseminate monitoring results via leaflets at district offices and public events across Chibabava District and Sofala Province government departments. It will also collaborate with ESMABAMA to inspire interest among other communities in Chibabava District and within the Buzi River watershed.

In addition, monitoring results will be shared alongside the 5-year verification reporting, transparently published on the website of Plan Vivo. Summaries of the 5-year verification reports will also be lodged with the relevant government departments at the district, province and national levels.

Reporting

4.9 Annual Report

The project annual cycle runs from May to May. Project activities started on 1 May 2022. We aim to submit draft Annual Reports by April of each calendar year.

Monitoring rounds are organised in 2022, 2027, 2032, 2037,2042, 2047 and 2052 (end of the project).

4.10 Record Keeping

All project data are stored on a shared project drive with limited access (Dropbox). The project data (technical data, financial data, monitoring data) are updated on the drive at least once per month.

In Annex 14, an overview of the general database architecture is included. Note that this a dynamic environment, subject to changes over time. The following first-level folders are listed:

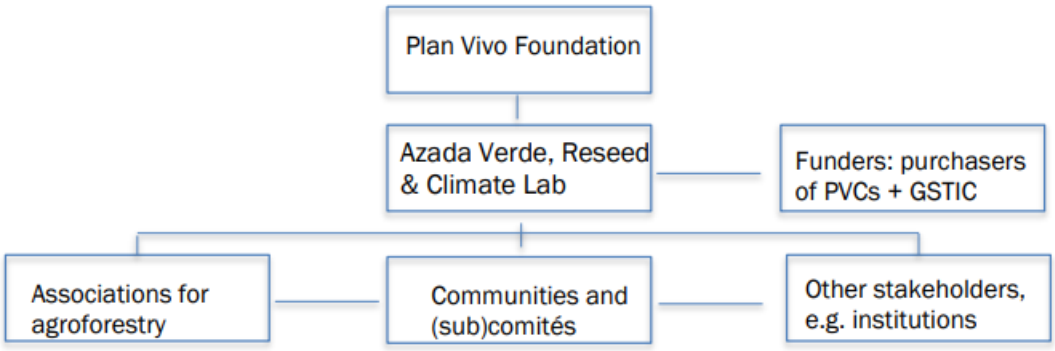
1. Example Plan Vivo projects
2. Azada Verde information
3. Climate Lab information
4. KKM Project meeting notes
5. Collaboration documents
6. Relevant Articles
7. Relevant reports and information (REDD+ etc)
8. Summaries and External communications
9. Maps and potential enrichment areas
10. Project Idea Note and PDD
11. Grants and Funding
12. Internal reports and research
13. Logo and design ideas
14. Government of Flanders (Belgium) funds document (successful)
15. Miombo woodlands articles
16. Agroforestry and Nursery planning
17. Photos
18. Budgets and Finances (reporting)
19. Human Resources
20. Local environmental research
21. Social research and community interviews

5. Governance and Administration

5.1 Governance Structure

Project Governance is structured through the Community Subcommittees comprising individuals or household representatives from the Mangunde and Nhaumue communities where the project areas are located. The Community Subcommittees will also include ex-officio members from the CGRN and from Azada Verde as representative of the Project Coordinators (See Annex 2). The Community Subcommittees will represent the key stakeholders of the project, including the Regulado, CGRN, participating communities and individuals and families of those communities, and Azada Verde (acting as the lead partner of the overall KKM Project).

Each participating community will form its own subcommittee to oversee and govern project activities on designated community lands. Each committee will have up to 15 members including one representative from Azada Verde, two representatives from the CGRN. Women will comprise at least 50% of the community subcommittee membership.



The Community Subcommittee (SC) is responsible for working with the Project team to ensure legitimate decision-making, equitable participation in implementation and benefit sharing in the project activities. Each SC will oversee the miombo enrichment activities in the project areas and the agroforestry activities in the areas allocated by the Chefes of both communities (Mangunde and Nhaumue) and new committees for new community project areas will do the same (with the input of the Mangunde Régulado). It will set up a special agroforestry working group for each community and include additional members from the community through an open and transparent consultation process. Each SC will hold at least three meetings annually (once every four months) to discuss matters related to the project. It will liaise with the Project Team to determine seasonal labour needs for creating firebreaks, mulching, building swales, tree planting. The seasonal labour needs for agroforestry activities will be determined between the Project Team, SCs and their respective working groups. It was agreed that two members of the agroforestry systems working group will participate in the Subcommittees. One member has to be from the agricultural association and other from outside of the agricultural association.

SCs will address grievances and dispute resolution according to the rules set out in the Statutes for Community Subcommittees. See Annex 17.

5.2 Equal Opportunities

The project partners signed an ethical charter not to discriminate based on gender, age, ethnicity, religion or social status when selecting project participants or employing staff members. Applicable labour laws are always adhered to – these also forbid all forms of discrimination.

Community Subcommittees will ensure that stakeholder participation is embedded in the design phase consultations at the very beginning of the project. The SCs will create opportunities for project participants to build capacity and gain experience in Miombo enrichment and agroforestry practices Each SC will ensure proper representation of different groups and 50% or more representation and participation of women in all meetings and decision-making processes.

Our field interviews and social research indicate that although women are the main contributors of labour in agriculture and natural resources, they have marginal representation in the CGRN. The Community Subcommittees have been set up with the aim of offsetting this imbalance without disrupting or undermining the established systems of functioning of the CGRN. The SC structure ensures that gender equity is not only present in meeting attendance and labour contribution but also in decision-making:

- The KKM field project team will hold consultation and participatory decision-making sessions with Subcommittees for designing equitable access for training workshops.

- Availability of household members at different periods of the cultivation seasons will determine when they can participate in Miombo enrichment activities.

- Capacity building for miombo enrichment will be targeted for households living adjacent to the project areas and enrichment activity zones

- Subcommittees will ensure that there is representative and equitable access to labour in miombo enrichment activities spread over the year.

Further, stakeholder identification, baseline research and pilot activities for the project indicate that most participants engaging in labour for the enrichment area activities are women (approximately 60%). In contrast, all the traditional community leaders of the Mangunde Regulado and the CGRN are men. Due to this gender imbalance in labour and power, the Subcommittees overseeing the project areas in Nhaumue and Mangunde will have 50% or more women members, and all work for enrichment activities will be on a paid basis. This approach has been taken to ensure that additional work does not fall on women and there is balanced decision-making which does not disadvantage women.

Young girls and boys of school going age will not be involved in any direct project activity. However, they may be invited to take part in awareness campaigns for project activities, practical classes and learning activities through the Mangunde Mission School. They may also receive horticultural training and skill development as part of their school program at the project nursery.

5.3 Legal and Regulatory Compliance

Table 5.3 identifies national and international policies, laws and regulations that may affect the project. The project will operate in full compliance with these. We refer to Annex 15 for the letter of approval, DUAT and full text of Decree 23/2018 that stipulates the legal procedures.

Table 5.3: Legal and Regulatory Compliance

Policy, Law or Regulation	Date	Relevance	Com-pliance Measures
2013-2025 National Strategy for Climate Change (ENMC)	25/ 12/ 2010	The National Climate Change Strategy aims to reduce vulnerability to climate change and improve the living conditions of the Mozambican people. It proposes climate change adaptation and disaster risk reduction measures and also focuses on mitigation by targeting low carbon development. The ENMC is structured around three core themes: (i) adaptation and climate risk management; (ii) mitigation and low carbon development (iii) cross cutting issues. These include institutional and legal reform for climate change, research on climate change, and training and technology transfer. Covering the period 2013-2025, the implementation of the ENMC is planned in three phases. The first phases focus on improving the response of local communities to climate change, reducing poverty, planning adaptation measures, as well as identifying opportunities for the development of low-carbon economy in local communities. The Strategy also proposes the establishment of a Centre of Knowledge on Climate Change (CGC) within the Ministry of Science and Technology. The primary	-

		objective of the centre should be to collect, manage and disseminate scientific knowledge on climate change, providing crucial information for the development of policies and plans.	
National Environ-mental Policy	03/ 08/ 1995	The National Environmental Policy was adopted by the Council of Ministers as a part of the implementation of the Five-Year Government Plan (1995-1999). The Policy provides guidance for the establishment of national environment plans and legislations, aiming at conciliating development with environment protection. Under this broad scope, the 1995 National Policy proposes a set of activities in the short and long term in the field of the environment. The Policy suggests the adoption of an Environment Law and regulations, followed by the creation of a Ministry for Coordination of Environmental Action, and an Environmental Monitoring Centre. The Policy acts on the following issues: marine and coastal area protection; engagement of the private sector in environmental management; development of databases and research activities; investments in environmental education projects; the engagement of civil society with environmental protection; waste management; and international cooperation.	-
Decree No. 6/2016 creating the National Fund for Sustainable Develop-ment (FNDS)	24/ 03/ 2016	The decree creates the National Fund for Sustainable Development (FNDS) which aims to promote and finance programmes and projects that ensure sustainable, harmonious and inclusive development. Main objectives include: (i) mobilising financial resources in actions leading to sustainable development, (ii) promote and support strategies, programs and projects that contribute to rural development, (iii)promote scientific research programs and actions in the field of sustainable development, (iv) fund programs for environmental adaptation and mitigation of climate change, sustainable management of forests, conservation of biodiversity, land administration and land use planning, (v) finance programs for transferring technologies that contribute to sustainable development in rural areas, (vi) carry out investment projects and financial applications that promote sustainable development, (vii) create and participate in the capital of companies or institutions whose object competes for integrated and sustainable development, (viii) finance institutional development activities.	FNDS as a key partner
Mozam-bique NDC operatio-nalization plan for 2020-2025	11/ 12/ 2018	This plan was approved by the Council of Ministers at its 38th Session, held on 11 December 2018. It has identified Mozambique's updated NDC, however no further documentation is available.	-
Green Economy Action Plan	25/ 12/ 2013	This plan notably seeks to favour low-carbon growth in the country, and to increase resilience to adverse effects of	-

		climate change in a number of sectors, including agriculture, transport and infrastructure.	
Governmental five-year program	25/ 12/ 2020	This document notably aims to increase the resilience of the country's infrastructure and population to adverse effects of climate change.	-
National develop-ment strategy 2015-2035	01/ 07/ 2014	This document notably identifies climate change as a purveyor of disasters and thus a major risk for the long term resilience of a range of sectors including agriculture, infrastructure and energy supply. It also aims to develop alternative sources of energy.	-
Decree No. 23/2018	03/ 05/ 2018	This Decree approves the Regulation for the Implementation of Projects to Reduce Emissions from Deforestation and Forest Degradation, Conservation and Increase of Carbon Reserves (REDD+ Regulation). It aims to regulate, define principles and standards for the implementation of the above mentioned Programmes and Projects, defining the institutional framework and competencies. This Regulation applies to REDD+ Programmes and Projects to be implemented in any area of the national territory. The legitimacy and ownership of the State in the creation, generation, emission, validation, verification and withdrawal of emission reductions and corresponding titles must be respected. The compatibility of REDD+ activities with the conservation of natural environments, biological diversity and scientific research that support the sustainable use of forest resources, must also be respected. The purpose of this Regulation is to: (i) Define rules for REDD+ Programmes and Projects in the national territory; (ii) promote the conservation and restoration of degraded natural ecosystems and enhance their ecosystem and environmental services; (iii) Define rules for generation, transfer, transaction and withdrawal of emission reduction titles; (iv) Ensure the monitoring and transparency of information on REDD+ emissions and removals at the national, provincial and district levels; (v) Promote the adoption of good practices in sustainable forest management.	Annex 15

5.4 Financial Plan

See Annex 16.

5.5 Financial Management

Once a Community Subcommittee agrees on a certain social or environmental investment it will provide a budget estimate and call for tenders. The winning tender will be given the contract and direct payments will be made in two to three instalments to the contractor on satisfactory delivery of each phase outlined in the contract. Direct transfer of funds in instalments is preferred for minimizing risk of funding leakage, reducing transaction costs, and maximizing transparency of deliverable outcomes. Investments will be subject to standard contracting practice, allowing fair competition for contractors from the locality or surrounding region. All contracts are overseen by the

project coordinators, who guarantee that at least 60% of the income from the sales of the certificates (after payment of any charges, taxes or similar fees levied by the host country) will directly benefit project participants and other local stakeholders. The disbursements are transparently reported in the annual reports.

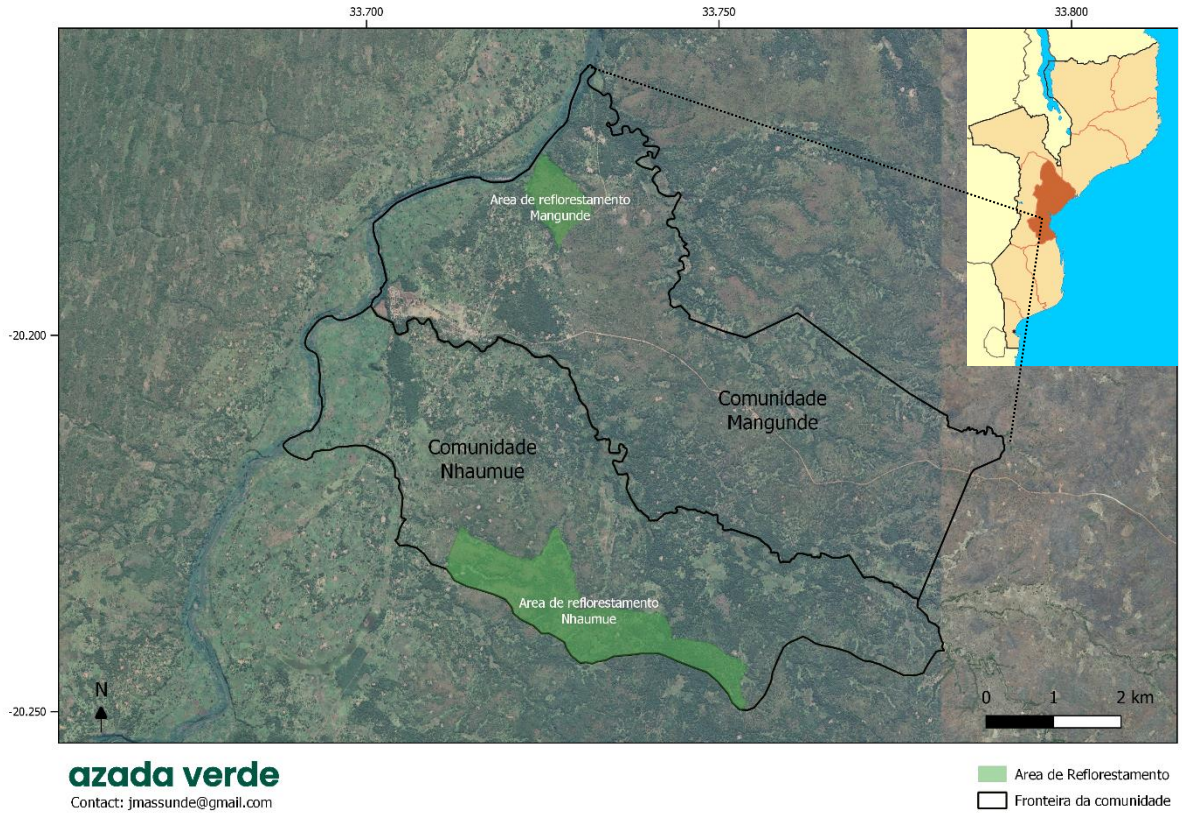
The responsible accountant is Vandelanotte Accountants, an approved legal entity by the ITAA – (Institute for Tax Advisors and Accountants), with ITAA number 50792735.

Vandelanotte performs an annual audit and submits the annual accounts to the Belgian national bank.

6. Annexes

Annex 1 – Project Boundaries

See digital shapefiles and summary map below.



Map source: GoogleSat (2023) (WGS84)

Annex 2 –Registration Certificate and Partner Agreements

The following documents have been made available to the Plan Vivo Foundation, and are available upon request:

- Registration certificates Azada Verde, Reseed Indico, Climate Lab

- Signed agreement between partner organisations

Annex 3 – Initial Project Areas

See Table below.

Initial Project Area	Nhaumue	Mangunde
Name of project participant	Subcommittee of Nhaumue	Subcommittee of Mangunde
Location	Community of Nhaumue, see Annex 1	Community of Mangunde, see Annex 1
Project Intervention	Ecosystem Restoration	Ecosystem Restoration
Extent of project area	300 ha	69 ha
Project Agreement Reference	1	2
Start date	1 May 2022	1 May 2022
Project Requirements 2.3.1 and 2.3.2 met?	Yes	Yes

Annex 4 –Participatory Design

See examples below

Initial participatory sessions in May 2022, with a community group of Mangunde village (left) and an agricultural association of Massane village (right).

Involvement of both the traditional chiefs (regulo and sagutas) as well as the administrative leadership (leader of Localidade Toronga, administrator of the District Chibabava and members of two Provincial institutes of Sofala) in a traditional ceremony to bless the project.

Example of a first workshop while practicing plan vivo mapping in the sand.

Annex 5 – Initial FPIC

See below:

1. Acta da reuniao Comunitaria Nhaumue [minutes of Nhaumue community meeting]

2. Relatorio da reuniao Comunitaria de Nhaumue [report on Nhaumue community meeting]

3. Acta da reuniao Comunitaria Mangunde [minutes of Mangunde community meeting]

4. Relatorio da reuniao Comunitaria de Mangunde [report on Mangunde community meeting]

Summary of the meeting of the community Nhaumue

On the 14th oday of July a 2.20pm a meeting was held with 11 members of the community amongs whom were the leaders of the three neigbouring communities. Also present were three representatives of Azada Verde

The meeting had the following agenda

Development of map

The meeting moderator welcomed everyone and outlined the program of the meeting. The topic of the development of the map was commenced and there were a range of comments about boundaries and there were various conflicts between the communities of Nhaumue and Manguenhe on this issue.

During this meeting it was possible to overcome issues around points, J, K, L, M on the map. Community representatives concluded that they would sit down to resolve any further conflicts around boundaries.

Once these points were resolved there was nothing further to discuss . The meeting was closed at 5.10pm

Notes were taken by Josefina A Manuel, the meeting was chaired by Joao A Massunde. Minutes were signed by community representative Paulo Joao Simango, Mateus Manuel and Mateus Jose.

Summary of the meeting of the community of Mangunde

On the Thirteenth day of the month of July 2022 at the time of 2.16pm a meeting we held with the community of Mangunde with 41 people in attendance, 20 women and 21 men.

Among this group were the leaders of the community including the President of the Committee for the management of Natural resources (comite de gestao de recursos naturais – CGRN) and other local community members

The agenda for the meeting was:

- Description of the historical profile of the communities
- Social organization of the community
- Use of natural resources

- Geography and spatial chartacteristics
- Map outline
- Identification of conflicts
- Mechanisms for the resolution of conflicts

Summary

A brief history of Mangunde was provided by the leader of the community and president of CGRN

The structure of the community – the head of the community is the ‘regulo’, followed by ‘chefe’, followed by ‘saguta’, followed by ‘madoda’

All natural resources belong to the community and are overseen by the ‘regulo’ on their behalf.

All of the community lands are considered occupied lands apart from sacred places

Leaders worked together to develop the map so everyone present would know the boundaries of the residences, pasture area, fields and areas of the project

Threats to the community were considered to be crocodiles in the river, hippopotamuses and fires both in the fields and forests. To reduce these risks the president of the CGRN has down awareness raising about how to avoid threats and manager fires.

Minutes by Josefina A Manuel, Chair of the meeting was Joao Massunde

Annex 6 – Carbon Calculations Spreadsheet

Carbon calculation spreadsheets (Excel) are available upon request

Annex 7 – Technical Specifications

Project Intervention:	Miombo enrichment (ecosystem restoration)
Version:	1.0
Date Approved:	08/03/2024
Methodology:	PM001 Agriculture and Forestry Carbon Benefit Assessment Methodology
Modules/Tools:	Module PU001
Certificate Type(s):	rPVC and vPVC

Applicability conditions

We refer to §3.3.1 for a description of the project areas and to the sections below for a description of the baseline scenario.

Near the project areas, field observations showed the occurrence of runaway fires, grazing, timber harvesting, slash-and-burn and charcoal production. Inside the project areas, field observations showed the occurrence of burning, and to a limited extent some grazing, timber harvesting and charcoaling. The project areas should not be located on machambas (croplands) and not be used as grazing lands. They are located at higher topography on highly eroded soils, which are not part of existing landscape management projects. These upland areas are particularly affected by frequent uncontrolled late dry season fires inhibiting ecosystem enrichment.

Consequently, the applicability conditions for the project zones and potential expansion zones are:

(i) Project zones cannot be located on machambas/croplands, nor on designated grazing lands.

(ii) Observations of cyclones, grazing, fire occurrence, tree cutting and charcoaling in the project zones must be reported by project staff and community members, and must be discussed and recorded during the regular meetings with the communities.

(iii) Project zones must be located within the Sofala province.

Additionality

Below we describe the most likely land use scenario in the absence of project interventions and the additionality of the project interventions using AR-TOOL02 v1.0: "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities".

We follow the following steps:

STEP 0. Preliminary screening based on the starting date of the project activity

The starting date of the activity was 1 May 2022. By then, the incentive from the planned plan vivo project was seriously considered in the decision to proceed with the project activity: at that month, the baseline measurement campaign was organized.

STEP 1. Identification of alternative land use scenarios to the proposed project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed project activity

Based on the socioecological survey (see §3.3.1), we identify the following land use scenarios to be credible:

• Continuation of the pre-project ”pressure-as-usual” (combination of burning, grazing, timber harvesting and charcoaling), pushed by increased drought conditions;

• Hypothetical forestation of the land within the project boundary performed without being registered as a plan vivo credit generating project activity;

Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

Both alternative land use scenarios are in compliance with mandatory legislation and regulations taking into account their enforcement in the Sofala and Mozambique. Continuation of the status quo is in agreement with laws and regulations, while forestation is obviously also a land cover type that is allowed by applicable regulations.

STEP 2. Barrier analysis

Sub-step 2a. Identification of barriers that would prevent the implementation of at least one alternative land use scenarios

No financial, technical, institutional nor social barriers would plausibly hamper the continuation of the pressure-as-usual scenario. Continuation of the status-quo requires no investments, technical knowledge nor legal efforts: the project areas are regularly affected by runaway fires, grazing and (to a limited extent) timber harvesting and charcoaling (see further). As will be shown further from Landsat imaginary, pressure-as-usual resulted in limited net forest loss in Nhaumue and net stability in Mangunde, over the past two decades. However, hypothetical forestation without extra (plan vivo) funding is not a plausible scenario, given the significant amount of funding required and the lack of nurseries in the area. The District confirmed this in writing: besides both project nurseries, there are currently no other nurseries in the entire district (except for two private cashew monoculture plantation nurseries). There are thus no nurseries for Miombo forest species and fruit species to support forestation without the project intervention.

Sub-step 2b. Elimination of land use scenarios that are prevented by the identified barriers

We eliminate the scenario of forestation without extra plan vivo funding, since it is not a plausible future land cover scenario, given the significant amount of funding required for mulching, planting, rainwater harvesting and firebreaks, and the lack of nurseries in the area. It remains a hypothetical scenario (there are no known Miombo projects or nurseries in Mangunde). We also refer to the financial plan (Annex 16).

Sub-step 2c. Determination of baseline scenario (if allowed by the barrier analysis)

Forestation without being registered as a plan vivo project is not included in the list of land use scenarios that are not prevented by any barrier. Consequently, only one land use scenario remains (pressure-as-usual scenario), so according to the tool, this scenario is the baseline scenario. We continue with Step 4: Common practice test.

STEP 4. Common practice analysis

There are no similar previous or ongoing forestation activities in or near the project zones, not even remotely similar to this proposed plan vivo project. Consequently, the plan vivo project activity is not the baseline scenario and, hence, it is additional.

Finally, below we present a summary of the basic barriers the project activities are to overcome.

Table A7.1: Main barriers for the project activities to overcome.

Ecosystem Restoration	Main Barriers	Activities to Overcome Barriers
Financial	- Limited funds - Other priorities (e.g. subsistence agriculture in this region with per capita GDP of between US $185 and $245) - Limited private credit availabilities	Start-up capital secured by GSTIC; benefit sharing scheme supported by Plan Vivo; funding for soil and fire management, wages and enrichment planting
Technical	Although natural resources conservation is quite well established in Sofala, there is ample opportunity to enrich Miombo woodlands and to launch agroforestry activities	Skilled local coordinator; academic input of environmental scientists; link with three universities; installation of (agroforestry) nurseries
Institutional /Social	"Top-down approach", although room is given for local initiatives	Bottom-up approach with first consultation rounds, continued workshops and benefit sharing for participating communities

Project activities

For a summary of project activities and input needed to implement the project intervention, including species selection, establishment, and long-term management, we refer to the Table A7.2 below. For a summary of the trees to be planted inside the Miombo project areas, we refer to Table A7.3.

Table A7.2: Project framework

Aim To use an integrated landscape management strategy for enrichment of Miombo woodlands and creation of climate resilient agroecosystems for sustainable livelihood opportunities in Chibabava District, Sofala Province, Mozambique.		
	Description	**Assumptions/Risks**
Outcomes		

Carbon Benefit	~ 369 ha community managed woodlands are enriched by increase in soil organic carbon and Miombo species biomass The project expands to adjacent areas and involves neighbouring communities to scale-up the impact.	R1: Uncontrolled fires could continue to affect the project areas. A1: The project establishes mulching zones and fire breaks to protect enriching Miombo lands against uncontrolled annual fires. R2: Community could be uninterested to participate in the project. A2: Strong role of stakeholder communities as project designers and involvement of neighbouring households in project activities will build a strong project support base.
Livelihood Benefit	Agroforestry nursery providing additional livelihood benefits to participating households of Mangunde and Nhaumue. Socio-ecological challenges are tackled by community decisions using re-investments. Protection of ecosystem services and non-timber forest products	R3: A focus on Miombo restoration alone could be insufficient to create significant community benefits. A3: Intensive agroforestry planting improves soil fertility and provides useful trees for participating households. R4: Project benefits could be insufficient to attract strong community interest. A4: Plan Vivo re-investments are used to improve the well-being of communities.
Ecosystem Benefit	The floristic biodiversity of the Miombo ecosystem is supported through the enrichment, conservation, and improved management of 369 ha community-managed woodland. The project will also contribute to regional habitat diversity for endemic fauna. The project expands to adjacent areas and involves neighbouring communities to scale-up the impact.	R5: The project team itself could be too small to perform all restoration activities alone. A5: The Miombo restoration areas are enriched, protected, and expanded by community members.
Outputs and activities		

Output 1	**Indigenous mulching techniques successfully applied as mosaic patches across the project areas**	R6: The local soils may be too poor to allow strong Miombo enrichment. A6: Local soil management techniques are key to the successful enrichment of Miombo woodlands R7: The project team itself could be too small to perform all mulching activities alone. A7: Active and broad-based involvement of communities as project designers and project partners will build a strong project support base. R8: Drought and soil infertility may hamper vegetation growth. A8: Implementing soil enrichment and landscape water harvesting (mulching and building SWC structures) will speed up the growth of the biomass.
Activity 1.1	Assessing community knowledge on grasses and soil fertility, and making "soil fertility maps"	
Activity 1.2	Identify good locations in project area for mulching and develop mulching strategy with community participants	
Activity 1.3	Annual mulching activities in project subareas	
Activity 1.4	Construction of water-retaining swales or other soil and water conservation (SWC) structures in project areas	
Activity 1.5	Community-led soil strategy evaluation	
Activity 1.6	Community liaison regarding soil fertility improvement techniques	
Output 2	**Firebreaks installed and maintained around the project areas**	R9: Banning all fire would not be smart since fire is an integral part of the ecological integrity and ecosystem function of miombo woodlands A9: The project is not 'anti-fire' but rather about reducing the occurrence and frequency of uncontrolled fires in the project areas. According to Ribeiro et al. (2021), an (alternatingly cold and hot) fire return interval of ~3 (to 5 years) is beneficial for the Miombo ecosystem. Community-based management will establish mulching zones and fire breaks to protect and enrich project areas from uncontrolled annual fires. R10: The project team itself could be too small to perform all fire management activities alone. A10: Active and broad-based involvement of communities as project designers and project
Activity 2.1	Assessing community knowledge of fire regime in project areas, and making an "uncontrolled fire exposure" map	
Activity 2.2	Develop fire(break) strategy for project sites and discuss it with the community	
Activity 2.3	Establish firebreaks at project sites, with community members	
Activity 2.4	Community-led fire strategy evaluation	
Activity 2.5	Community liaison regarding uncontrolled fire reduction through mulching and firebreak techniques	

		partners will build a strong project support base.
Output 3	**Native Miombo species planted across the project areas**	R11: A regeneration approach alone (without extra planting) could be insufficient to enrich certain bare subzones. A11: Enrichment planting of native Miombo seedlings can only take place when soil and fire management strategies are in place. R12: Non-native species could become invasive. A12: Seeds are harvested from local trees (in Chibabava district), based on community knowledge on best timing for seed harvestingR13: Meteorological data in Chibabava may still be scant. A13: Next to nutrient availability of soils, and occurrence of fire, Miombo trees are highly dependent on climate variability – so it is important to gather local climatic data
Activity 3.1	Biomass and soil plot measurements	
Activity 3.2	Community-led identification of the use of tree species and the timing for seed harvesting for making a “tree species distribution map”	
Activity 3.3	Develop strategy on planting different tree species and discuss it with the community	
Activity 3.4	Enrichment planting in project areas	
Activity 3.5	Continuous monitoring of temperature, rainfall, fire occurrence and seasonal plant behaviour	
Activity 3.6	Regular community liaison	
Output 4	**Agroforestry systems applied by the participants of the Project’s Agroforestry Work Group**	R14: It may be difficult to find high-quality seedlings to supply the project. A14: High-quality river-irrigated local nurseries are constructed since these are crucial to supply the necessary seedlings for Miombo enrichment and agroforestry cultivation R15: It may be technically difficult to implement the agroforestry component. A15: The project selects agroforestry species that are best suited for the local socioecological circumstances and conditions
Activity 4.1	Training project team members in agroforestry nursery, strategies and processes	
Activity 4.2	Setting up nurseries and nursery irrigation system, and engage nursery labourers	
Activity 4.3	Planting and supporting replanting and long-term maintenance of the agroforestry system with the Project Agroforestry Work Group	
Activity 4.4	Community and association liaison	
Activity 4.5	Distribution of agroforestry crop benefits	

		R16: The agroforestry benefits may be insufficiently attractive. A16: Fruits and other products from agroforestry can be effectively sold at local markets

Table A7.3: Miombo species targeted for planting inside the project areas

Species targeted for planting	**Other common name**	**Native to Mozambique (POWO, Kew Gardens, 2023)***	**Tolerance to local conditions: preferential zones for planting**
Millettia stuhlmannii	Lonchocarpus mossambicensis	Yes	Sandy areas and stony/rocky
Afzelia quanzensis	Intsia quanzensis (Welw.)	Yes	Low lying areas
Tamarindus indica	Tamarind	Native to Madagascar, naturalized in Mozambique	Near termite mounds
Millettia mossambicensis	-	Yes	Medium topography
Xeroderris stuhlmannii	Aganope stuhlmannii	Yes	
Cassia abbreviata	Cassia abbreviata Oliv.	Yes	
Albizia anthelmintica	Worm-bark false-thorn	Yes	
Philenoptera violacea	Rain tree	Yes	
Kigelia africana	Bignonia africana Lam.	Yes	
Acacia robusta subsp. usambarensis	Vachellia robusta subsp. usambarensis	Yes	

*https://powo.science.kew.org/

Carbon benefits

Crediting Period

The project start date was 1 May 2022 (i.e. the date of the first employee hired). The period of time over which the climate benefits will be quantified will be 30 years. This is an estimation of the period during which a stable state of ecosystem carbon can be reached under a certain type of management. Indeed, there will be a slowdown in carbon storage after maturity will be reached. We refer to the study of Chidumayo (2019) who showed that Miombo woodland can recover fairly easily on a timescale of about 2 to 3 decades, under the condition that regeneration is not inhibited by late dry season fires. This is corroborated by the study by Williams et al. (2007) in their study of regrowing Miombo woodlands after 20–30 years. A project period of 30 years is thus applicable

because this is the timeframe during which a stable enriched Miombo ecosystem can be reached under integrated landscape management.

Carbon Pools and Emission Sources

Below, we list the carbon pools and emission sources included in the estimation of carbon benefits with the justification for any excluded carbon pools or emission sources.

Table A7.3 Carbon pools and emissions sources that are included or excluded in the quantification.

Pools or emission sources	Type of pool or emission source	Included?
Carbon pools	Soil organic carbon	Yes: soil organic carbon is an important pool for carbon sequestration in Miombo woodlands (calculated from AR-TOOL16 Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities, Version 1.1)
	Above-ground biomass	Yes: above-ground biomass (trees, shrubs) is a major pool for carbon sequestration, to be considered and quantified
	Below-ground biomass	Yes: this is a potentially significant pool to be considered for tree planting
	Non-tree biomass	No: Non-tree biomass and grasses are not included as carbon pools in the above-ground biomass estimations
	Dead wood and litter	No: conservatively excluded
	Wood products	No: conservatively excluded
Emission sources	Grassland cutting and burning Project gasoline use	No: the effect is negligible

Baseline Emissions/Removals

Satellite images show how the landscape has changed in the project areas. We could compare Landsat 7 images (2000-2022) using the datasets of Hansen et al. (2013), in combination with images of the years 2013, and 2018 using Google Earth history and Planet Explorer time series of satellite images between 2016 and 2022.

We estimated tree cover change in the project area for the period 2000-2022, using the datasets of Hansen et al. (2013). The layers are built with Landsat 7 images, with a resolution of 30 x 30m. The first layer represents forest cover in 2000, which is defined as “canopy closure for all vegetation taller than 5m”. Every pixel has a value between 0 and 100, representing the percentage of forest cover. The Hansen et al. (2013) dataset derives forest cover changes from both the annual decline or incline in the percentage of tree cover, and the NDVI during the minimum growing season.

The dataset of Hansen et al. (2013) was loaded in Google Earth Engine to determine the annual percentage change of tree cover over time. Subsequently, the forest cover loss and forest cover gains were calculated year by year.

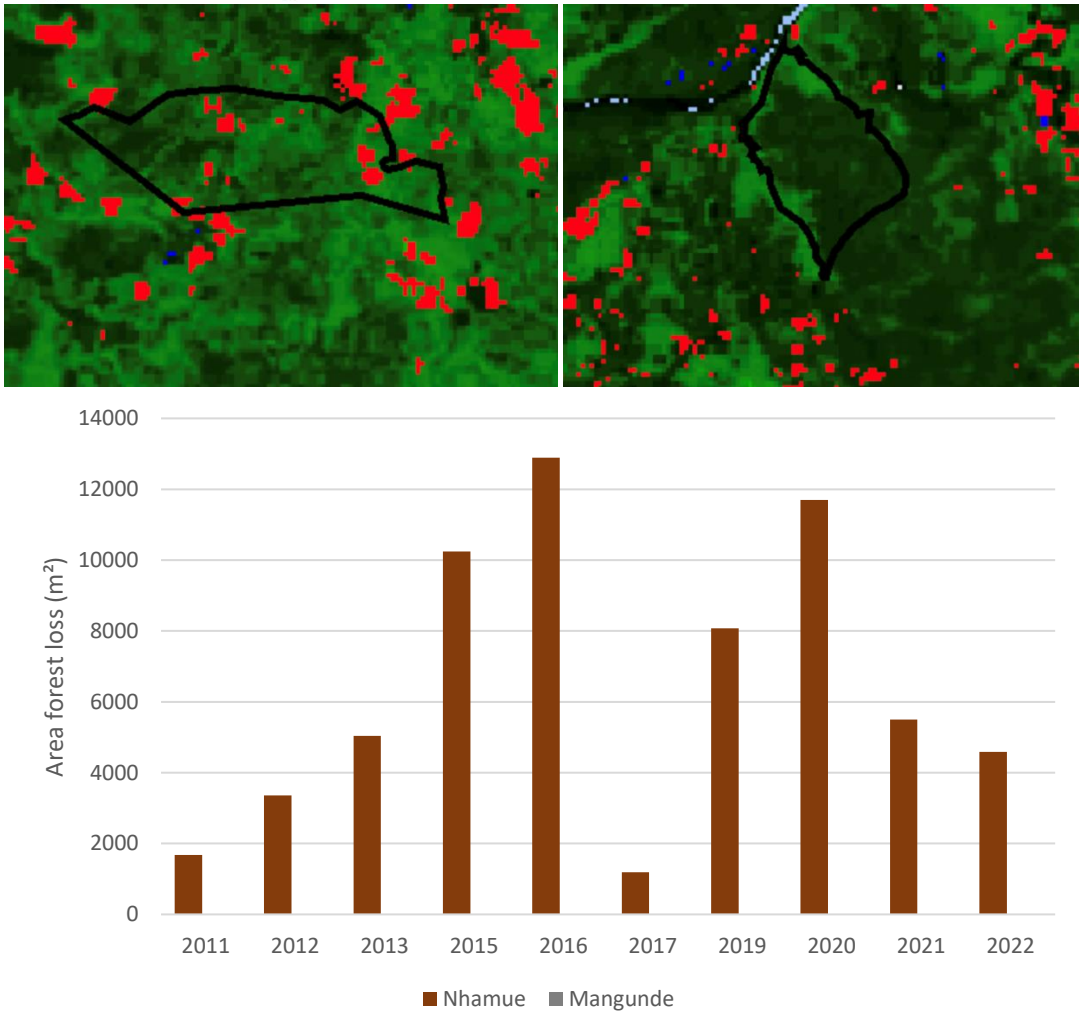


Figure A7.0: Forest cover change in the project areas for the period 2000-2022 (with forest losses indicated in red, and forest gains in blue, while greenish colors indicating stability): (above, left) Nhamue project area (demarcated with a black polygon); (above, right) Mangunde project area (demarcated with a black polygon); (below) Histogram of net forest cover loss in the project areas during the period 2000-2022. In Nhamue (brown bars), the net forest cover loss is equivalent to ~5% of the initial total forest cover. In Mangunde (grey bars), forest cover remains stable as there are no indications of net forest loss, nor net forest gains.

A visual assessment of remote sensing imagery from Google Earth satellite images provides more contextual background on baseline landscape conditions between 2013 and 2018. A comparison of the Mangunde project area over time indicates a metastable landscape over 5 years. The indicative forest boundary in 2013 following the river channel is almost unchanged in 2018. Inside the area, there are some signs of oscillations between degradation and recovery in the landscape, although forest cover remains stable as there are no indications of net forest loss, nor net forest gains. The metastable landscape conditions are also confirmed by a time series of Planet Explorer satellite images between 2016 and 2022 (annex A7A). This time-series includes subsequent April and September images, respectively representing the seasonal variability between typical rainy and dry season images.

Figure A7.1: Google Earth images of Mangunde project area (in yellow). Left: satellite image of June 2013; right: satellite image of June 2018. On both images the forest boundary of 2013 is plotted indicatively in white.

Also for the Nhaumue project area, a comparison was made between Google Earth Images of 2013 and 2018. The visual comparison indicates that clear bareland patches increased over the five year period within the landscape. This is in line with the limited net forest cover loss calculated from the Landsat 7 images (above). The Planet Explorer time series of satellite images between 2016 and 2022 (Annex A7A) also confirms that the project area has seen some degradation dynamics.

Figure A7.2: Google Earth images of Nhaumue project area (in yellow). Left: satellite image of June 2013; right: satellite image of June 2018. On both images clear bareland patches are indicatively plotted in red.

The results of the quantitative estimate of change (using Landsat 7) and the contextual background provided by images from GoogleEarth and Planet support the metastability of the baseline pressure-as-usual scenario. For both project areas, there is no evidence for a significant amelioration or regeneration of Miombo vegetation over the past decade. It is clear that the Miombo landscape remained metastable over the years (or is even under increasing pressure in Nhaumue). We can reasonably conclude that the areas are not naturally regenerating over the course of the last decade. Ecosystem enrichment will most probably not happen without the project intervention. This is corroborated by the generally low values of typical Miombo parameters that were measured during the baselining (see §Monitoring for the methodology), as compared with more healthy Miombo habitat conditions reported by Ribeiro et al. (2010). In general, the project areas currently have a very low basal area, no typical Miombo indicator species, a low tree density, a low Shannon biodiversity index and a small share of “regenerating” intermediate trees (Table A7.4) (all averages for the project areas):

- Basal Area = 8.7 m²/ha

- Presence of Miombo indicator species (Brachystegia spp., Julbernardia globiflora) < 1%

- Number of intermediate trees (10 < dbh <30) as percentage of total = 21%

- Shannon diversity index = 2.78

- Current canopy cover in project areas = 36%

Note that the project areas are currently dominated by Combretum instead of Brachystegia spp., Julbernardia globiflora.

Table A7.4: Miombo parameters measured during the baselining (see §Monitoring for the methodology), as compared with more healthy Miombo habitat conditions reported by Ribeiro et al. (2010)

MIOMBO ECOLOGY PARAMETERS	**BASELINE**		**Ribeiro et al. (2020)**
METRICS	*Mangunde*	*Nhaumue*	*"Healty Miombo"*
Basal Area (m^2/ha)	7.8	9.5	>20
Miombo Indicator species	0	0	>110
Tree density (dbh =>5dbh)	630	662	>1000
Diversity of the layer structure: Number of Intermediate trees (10>=dbh<30) - greater than 20% of total	16%	25%	>50%
Shannon diversity	2.75	2.81	>3.5

Figure A7.3: Photographs of project zones (Nhaumue-Daca on the left and Mangunde on the right), showing a domination by grasses (fuel load), lots of fire marks and a small density of standing trees.

Without the project taking place, in the pressure-as-usual scenario, the baseline ecology situation would remain metastable or even decreasing, as the existing trees are old enough to resist the fires. At the same time, woody biomass would not increase either, since the continued fires would kill off the young trees and continue the old trees to dry out and finally these will burn as well. Even when it rains a lot, there will be more grass as fuel load, and the late dry season fires will be stronger.

We can thus expect the change in carbon stock in the project zones to be stable in the baseline scenario, under continued or even increasing pressures. Images and photographs testify to the metastable, degraded status in 2022. Overall, we can reasonably assume that there is no change in carbon stock in the baseline pressure-as-usual scenario over time, as compared to the initial carbon stock: $\Delta C_{baseline} = 0$.

We here follow the Methodology PM001 (Agriculture and Forestry Carbon Benefit Assessment Methodology): The change in carbon stocks expected under the baseline scenario for each project area is calculated with Module PU001 (P6). Module PU001 requires "no change in woody biomass carbon stocks if the conditions in AR-TOOL14 v4.2 section 5 are met" (§5.1.2).

AR-TOOL14 vs 4.2 states in section 5: "Changes in carbon stocks in trees and shrubs in the baseline may be accounted as zero for those lands for which the project participants can demonstrate, through documentary evidence or through participatory rural appraisal (PRA), that one or more of the following indicators apply (underlined if applicable in the project area):

i. Observed reduction in topsoil depth (e.g. as shown by root exposure, presence of pedestals, exposed sub-soil horizons)

ii. Presence of gully, sheet or rill erosion; or landslides, or other forms of mass movement erosion;

iii. Presence of plant species locally known to be indicators of infertile land;

iv. Land comprises of bare sand dunes, or other bare lands;

v. Land contains contaminated soils, mine spoils, or highly alkaline or saline soils;

vi. Land is subjected to periodic cycles (e.g. slash-and-burn, or clearing regrowing cycles [or regular uncontrolled fires]) so that the biomass oscillates between a minimum and a maximum value in the baseline;

Module PU001 also requires "removals in soil organic carbon under the baseline scenario are zero for afforestation, reforestation and agroforestry activities that meet the applicability criteria in AR-ACM0003 v2.0 and/or if it can be demonstrated that soil organic carbon stocks are expected to decline under the baseline scenario" (§5.5.1). The applicability criteria in AR-ACM0003 v2.0 indeed apply:

(i) The land subject to the project activity does not fall in wetland category;

(ii) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary (quod non): Land containing organic soils; Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 1 and 2 to this methodology.

In conclusion, the changes in carbon stocks in trees, shrubs and soil in the baseline pressure-as-usual scenario of the project zones may conservatively be accounted as zero.

Expected Project Emissions/Removals

Expected changes in carbon are calculated PU001 through AR-TOOL14: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities, Version 4.2.

At project start, expected project removals in woody biomass must be estimated through the modelling of tree growth development following the procedures in AR-TOOL14 v4.2 Section 8.2. That method is used for ex-ante estimation (initial projection) of carbon stock in tree biomass. One must select a fitting model to predict the development of the tree stand over time, and a fitting model to predict the growth of trees. In our case, we use the age-dependent growth model of Williams et al.

(2007) and the allometric model of Ryan et al. (2011), both calibrated in Miombo woodlands of Sofala, Mozambique.

Age-dependent growth model of Williams et al. (2007)

Through planting and regeneration, basal area is expected to be boosted by ~12 m²/ha (comparing the baseline densities in Mangunde and Nhaumue with the healthy Miombo habitat conditions reported by Ribeiro et al., 2010). This is corroborated by the strong Miombo age-BA relationship derived from the study of Williams et al. (2007) (see Figure A7.4), indicating that it would indeed take about 28 years to attain such a boost in basal area. Thus, we use the strong age-BA relationship calibrated by Williams et al. (2007) ($P < 0.001$ and $R^2 = 0.68$) to simulate the development of the basal area increase over time.

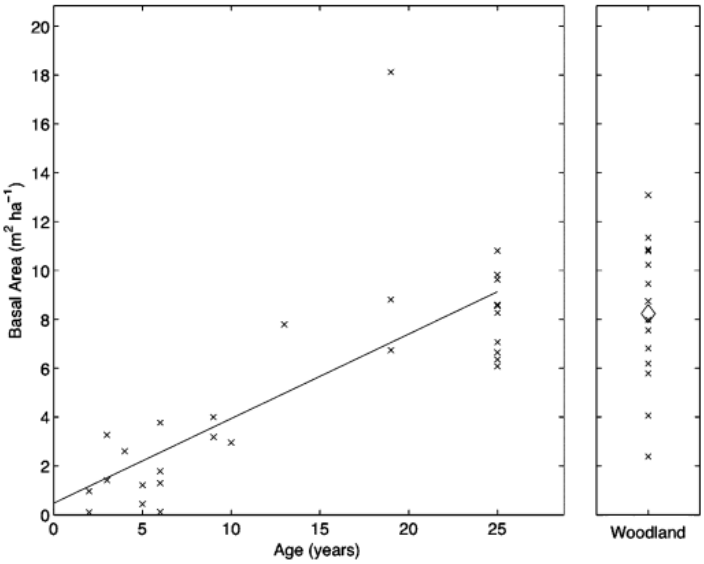


Figure A7.4: Miombo age-BA relationship calibrated by Williams et al. (2007): y = 0.47x - 0.41; (whereby $P < 0.001$ and $R^2 = 0.68$).

Allometric model of Ryan et al. (2011)

As shown by Ryan et al. (2011), basal area BA (m²/ha) can be used as an excellent predictor of Miombo total woody carbon stock:

$Bt = 3.972\ BA$

($R^2 = 0.76$, RMSE = 7.82 tC/ha, n = 58, Bt is total (above- and belowground) tree carbon stock).

Ryan et al. (2011) employed a destructive harvest of 29 trees combined with an inventory of 12,733 trees, specifically in Miombo woodlands in Sofala Province, Mozambique, to calibrate this relationship (Figure A7.5).

Based on both models, the intervention model was calculated and presented in Annex 6. A summary of the Expected Project Emissions/Removals and Net Carbon Benefits is provided below.

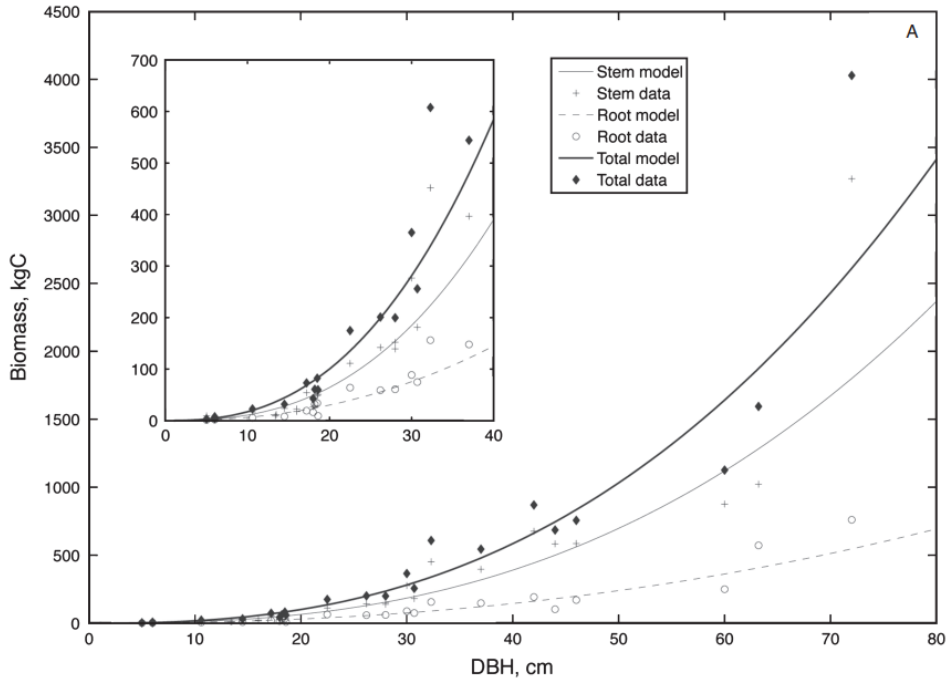


Figure A7.5: Example of one of the allometric relationships developed by Ryan et al. (2011) in Sofala (Mozambique).

SOC changes

SOC changes are calculated using AR-TOOL16: Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities,5 Version 1.1. Based on §11 of the tool, considering uncertainties and inherent limitation of the precision of a factor-based estimation, the value of the rate of change of SOC stock is not accounted as more than 0.8 tC/ha/yr. Note that in a Miombo setting, based on the field survey of Ryan et al. (2011), 69% of all Miombo carbon content in Sofala is stored in the soil pool, showing that a soil sequestration rate of 0.8 tC/ha/yr is extremely conservative.

Potential Leakage

Leakage is defined as a reduction in carbon stocks or increase in greenhouse gas emissions outside the project area, as a result of project activities. The main potential source of leakage would come from displaced grazing, i.e. grazing pressure displaced towards other nearby areas because grazing is no longer possible inside the project areas. Besides displaced grazing, other smaller potential sources of leakage would be displaced timber harvesting and displaced charcoal production. The project directly mitigates such leakage by providing trees from the nursery, allocated for timber harvesting and charcoal making in the project communities, and monitor these in line with livelihood indicator (L1). Overall, the project targets to allocate 3-5% of all nursery seedlings for timber harvest and charcoal production.

Regarding displaced grazing, this technical specification uses AR-TOOL15 version 2.0 to estimate leakage significance: A/R Methodological tool – Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity. The tool states under §10: “Leakage emission attributable to the displacement of grazing activities under the

following conditions is considered insignificant and hence accounted as zero (applicable conditions are underlined):

(a) Animals are displaced to existing grazing land and the total number of animals in the receiving grazing land (displaced and existing) does not exceed the carrying capacity of the grazing land;

(b) Animals are displaced to existing non-grazing grassland and the total number of animals displaced does not exceed the carrying capacity of the receiving grassland;

(c) Animals are displaced to cropland that has been abandoned within the last five years;

(d) Animals are displaced to forested lands, and no clearance of trees, or decrease in crown cover of trees and shrubs, occurs due to the displaced animals;

(e) Animals are displaced to zero-grazing system.

To further reduce possible leakage, extra applicability conditions are included (excluding designated grazing lands as project areas and including observations of grazing in the monitoring scheme).

In theory, displaced timber harvesting and displaced charcoaling would be two other potential sources of leakage. During a baseline survey inside the Nhaumue and Mangunde project areas in 2022, all trees that were cut for timber or charcoaling were counted. The total number of trees cut (n = 210) is very small in this area of 369 ha. It equals to less than 0.1% of the baseline stem density that is impacted by timber harvesting and displaced charcoaling. In line with AR-TOOL04 Tool for testing significance of GHG emissions in A/R CDM project activities, Version 1.0, which is applicable under PU004, the sum of decreases in carbon pools and increases in emissions may be neglected if it is less than 5% of the total decreases in carbon pools and increases in emissions, or less than 5% of net anthropogenic removals by sinks, whichever is lower.

Leakage Risk Mitigation

Project Intervention	**Leakage Risk**	**Mitigation Measures***
Ecosystem Restoration	Displaced grazing	Implementing grass cut-and-carry system (see Livelihood Indicator L6) and monitoring grazing pressure (see Ecosystem Indicator E2)
	Displaced timber harvesting and charcoaling	Compensating households with extra trees, see Livelihood Indicator L1

Uncertainty

We refer to AR-Tool14, which states in §8.2: “Ex-ante estimation (projection) of carbon stock in tree biomass is not subjected to uncertainty control, although the project participants should use the best available data and models that apply to the project site and the tree species”. It is therefore not necessary to control for uncertainty estimation as described in PU005.

Besides, the comparison of the quantifications here with real-world field data corroborates the conservativeness of our approach. Indeed, our estimations (9.6 tCO2e/ha/yr but only 6.7 tCO2e/ha/yr after correction of all buffers) are on the lower side of other values estimated by Plan Vivo projects in nearby African countries (Kenya, Uganda). The Mikoko Pamoja Project in Kenya for instance estimated a sequestration rate (areas 1 and 2) of 16.6-18.0 tCO2 per hectare per year. Trees for Global Benefits in Uganda estimated a sequestration rate of 10.0 tCO2 per hectare per year (woodlot projects).

Finally, our estimations are also on the lower side of other values from Miombo carbon inventories in Sofala, focussing on mature Miombo woodlands and restoring Miombo woodlands after ~28 years regrowth (Ryan et al., 2011; Williams et al., 2007). Our results are less than the carbon storage in a mature Miombo system in Sofala, as sampled by Ryan et al. (2011), which totalled 403.33 tCO2e/ha (or 110 tC/ha). Thus, the climax predictions are in line with (but much more conservative than) the real-world mature Miombo, which corroborates the usefulness of the intervention model in the project areas.

Despite the conservativeness of our approach, every 5 years, a carbon recalibration and verification will take place. This will allow a continuous evaluation of the carbon estimations over the course of the project.

Expected Carbon Benefits

We refer to the Tables below; see Annex 6 for the calculations.

Expected Carbon Benefits Summary (derived from aboveground and belowground biomass and soil organic carbon)

Project Intervention	Initial carbon stock (tCO2e/ha)*	Baseline Emissions (t CO_2e/ ha)	Project Emission (t CO_2e/ha)	Leakage Emissions (t CO_2e/ha)	Carbon Benefit (see Annex 6) (t CO_2e/ha)
Nhaumue Miombo enrichment	136	0	-288	0%	-288
Mangunde Miombo enrichment	191	0	-288	0%	-288

**See Annex A7B for calculation of the initial carbon stock*

Plan Vivo Certificate Potential

Project Intervention	Carbon Benefit (t CO_2e/ha)	Project Area (ha)	Total Carbon Benefit (t CO_2e)	Risk Buffer (t CO_2e/ha)	Achievement Reserve	Potential PVCs (t CO_2e)
Nhaumue Project Area	288	300	86 400	20%	10%	60 480
Mangunde Project Area	288	69	19 872	20%	10%	13 910

TOTAL	288	369	106 272	20%	10%	**74 390**

Monitoring

1. Sampling strategy

Sampling is performed on the basis of fixed plots of 400m², along North-South oriented vertical transects perpendicularly crossing the project areas. Each plot is 20m by 20m in size, within the plots tree and shrub species density and diameter at breast height for trees are recorded. The project thus uses a stratified random sampling approach, in line with §8.1.1 of AR Tool 14 (version 4.2). Under this method, random sample plots are installed under systematic sampling with a random start.

The corners and center points of all plots are marked using paint. At the same time, the central coordinates are stored on the shared drive. At all times, at least 4 team members are trained in the sampling methodology. This ensures a smooth transfer of knowledge (when changes would occur in the team).

The assembly of the plot is started at a point "A" as the arrival point, and it is followed in an Eastern direction covering 20m until the point "B", then in a Northern direction covering 20m until the point "C", then it is followed in Western direction covering 20m until the Point "D" and finally closed in a Southern direction until the Arrival point "A".

The vertical and horizontal distance between successive plots is 200m, all taken along the North-South oriented transects. As a result, in total 104 plots have been measured in the project areas. The minimal requirement is calculated by the Winrock sample plot calculator (based on: CDM A/R Methodological Tool “Calculation of the number of sample plots for measurements within A/R CDM project activities” Version 2.1.0).

For the identification and counting of the species present, the techniques of direct observation, comparison of specimens and literature review were employed, interacting with botanical scientists with extensive experience in the identification of forest species in southern Africa as well as with national and international herbaria, such as the Herbarium of the Instituto de Investigação Agrária de Moçambique (IIAM).

Measurement of diameter at breast height (DBH) (at 1.3m height) with respective botanical identification was performed within the plots of 400m². Diameters were derived from circumferences measured in the field. Saplings or shrubs with dbh < 1cm were not included in the circumference recordings. However, the project does record their botanical identification and the number of saplings/shrubs per specie per plot.

A composite soil sample was created within every plot by mixing 5 soil samples taken in the corners of a central 5m subsquare. The soil was collected in the center of the plot at points shaped like a cross and thus collected at the 4 corners of the cross as well as in the center of the cross. Samples were taken by augering in the top 0.3 m depth.

For expansion areas, the project will calculate the required number of samples based on the Winrock calculator.

2. Aboveground and belowground biomass

Aboveground and belowground biomass was quantified for all trees based on the allometric equations of Ryan et al. (2011) for Miombo woodlands in Sofala, Mozambique. The equations and root-stem ratio have been developed based on a destructive harvest of 29 Miombo trees combined with an inventory of 12,733 trees on 58 plots.

Tree biomass allometric equations. B_{dest} *is the destructively sampled tree stem biomass (s), tree coarse root biomass (r) and total tree biomass (t, i.e. stem+root), all in kg C.* dbh_{dest} *is diameter at breast height in cm. log is the natural log.* $R{:}S_{dest}$ *is the root stem ratio.*

Equation	r^2	RMSE	N
$\log(B_{dest,s}) = 2.601 \log(dbh_{dest}) - 3.629$	0.93	0.52 log(kg C)	29
$\log(B_{dest,r}) = 2.262 \log(dbh_{dest}) - 3.370$	0.94	0.43 log(kg C)	23
$\log(B_{dest,t}) = 2.545 \log(dbh_{dest}) - 3.018$	0.98	0.30 log(kg C)	23
$(R{:}S_{dest}) = -0.2671 \log(dbh_{dest}) + 1.334$	0.36	0.27	23

3. Soil organic carbon

The method of Walkley-Black (Walkley and Black, 1934) was used for soil organic carbon determination (in %C) of the composite soil samples. Analysis was performed in the Kvuno laboratory for soil analysis, Chimoio, after transport in a frigobox. The method of Walkley-Black is a reliable and standard chromic acid wet oxidation method. Oxidisable matter in the soil is oxidised by potassium bichromate solution. There is heat generation when sulfuric acid is mixed with the dichromate. The remaining dichromate is titrated with ferrous sulphate. The titre is inversely related to the amount of C present in the soil sample. Soil organic carbon content (SOC, in ton C/ha) was calculated using the following equations (Hoff et al., 2002):

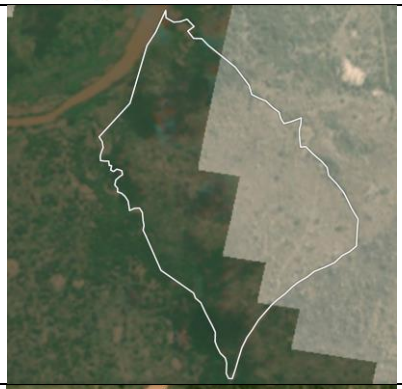
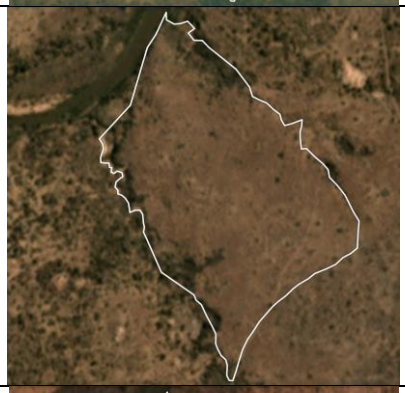
Where Bd is the bulk density (ton/m³), D is the thickness of the top soil (0.2m), and α is 10.000 m²/ha. Bulk density was derived from the same study by Ryan et al. (2011) (averaged at 1.35 ton/m³).

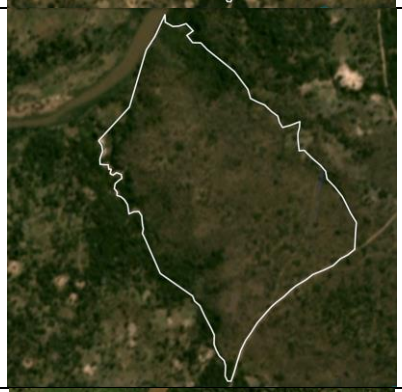
4. Monitoring scheme

All results are presented in Annex 6 (b and c) together with a summary in Annex A7B. The measurement protocol detailed above will be replicated every 5 years, at the same fixed plots (GPS locations), to recalibrate the initial carbon model predictions. This is in line with AR-TOOL14, § 6.2: Direct estimation of change by re-measurement of sample plots.

Annex A7A: Planet time series

Annex A7A	April	September

2016		
2017		
2018		
2019		

2020		
2021		
2022		

	April	September
2016		

2017		
2018		
2019		
2020		

2021		
2022		

VEGETATION CHANGE
2016-2022

	MANGUNDE	
	2016/2017	2022
M sep		
M apr		
	NHAUMUE	
	2016/2017	2022
N sep		
N apr		

Annex A7B: Results of the baseline measurements

(to be resampled every 5 years to recalibrate the initial carbon sequestration predictions)

Parameters	Nhaumue baseline		Mangunde baseline	
Results & uncertainty	**Results**	**Stdev**	**Results**	**Stdev**
Total woody biomass per plot (both above ground and below ground, kg)	1318.70	164.54	1018.35	112.88
Total woody biomass (ton per ha)	32.97	4.11	25.46	2.82
Woody kgC per plot	619.79	77.33	478.63	53.06
Woody tC per ha	15.49	1.93	11.97	1.33
Average DBH (cm)	8.44	7.04	7.76	6.44
Number of trees sampled	2699	-	549	-
Number of sample plots	67	-	14	-
SOC (%)	0.80	0.59	1.48	0.53
SOC (tC/ha)	21.70	15.80	39.99	14.27
Total carbon content (woody & soil) (tC/ha)	37.19	17.73	51.96	15.60
Total carbon content (woody & soil) (tCO2e/ha)	136.38	65.01	190.52	57.25

Annex A7C: Relevant literature

Chimayo, E. 1997. Effects of accidental and prescribed fires on miombo woodland, Zambia. Commonwealth Forestry Review 76 (4): 268-272.

Chidumayo, E. 2019. "Is charcoal production in Brachystegia-Julbernardia woodlands of Zambia sustainable?." Biomass and Bioenergy 125 (2019): 1-7.

Desanker, P.V., Frost, P.G.H., Justice, C., Scholes, R.J. 1997. The Miombo network: framework for a terrestrial transect study of land-use and land-cover change in the Miombo ecosystems of central Africa. IGBP Report 41, IGBP, Stockholm, Sweden.

Ribeiro, N.S., Silva de Miranda, P., Timberlake, J. 2020a. Biogeography and Ecology of Miombo Woodlands. In: Ribeiro, N.S., Katerere, Y., Chirwa, P.W., Grundy, I.M. (eds) Miombo Woodlands in a Changing Environment: Securing the Resilience and Sustainability of People and Woodlands. Springer, Cham. https://doi.org/10.1007/978-3-030-50104-4_2

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Ryan, Casey M., Mathew Williams, and John Grace. "Above-and belowground carbon stocks in a miombo woodland landscape of Mozambique." Biotropica 43.4 (2011): 423-432.

Waterhouse, R., Vijfhuizen, C. 2001. Strategic Women, Gainful Men: Gender, Land and Natural Resources in Different Rural Contexts in Mozambique. Nucleo de Estudos de Terra, Faculty of Agronomy and Forestry Engineering, University of Eduardo Mondlane, 2001.

Williams, M. R. C. M., et al. 2008. Carbon sequestration and biodiversity of re-growing miombo woodlands in Mozambique. Forest Ecology and management 254.2: 145-155.

Walkley, Aldous, and I. Armstrong Black. 1934. "An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method." Soil science 37.1 (1934): 29-38.

Annex A7D: Dictionaries to calculation sheets in Annex 6

Dictionary for Annex 6a Calculation Sheet Kukumuty

Year	Project years
Increase in basal area (m^2/ha)	Increase in basal area based on the growth model of William et al. (2008)
Increase in Btotal (tCO2e/ha)	Increase in biomass carbon based on the allometric model of Ryan et al. (2011)
Increase in SOC (tCO2e/ha)	Increase in SOC based on AR-TOOL16
Total Sequestration (tCO2e/ha)	Total sequestration as sum of Btotal and SOC

Dictionary for Annex 6b&c Mangunde & Nhaumue Baseline data

Nome cientifico	Scientific name
Nome local	Local “common” name
Circunferência (cm)	Measured circumference at breast height
Diâmetro (cm)	Diameter at Breast Height (DBH) derived from circumference
Número de parcela	Plot number
Total Woody Biomass (kg)	Woody biomass (including below ground biomass), derived from DBH using the allometric equation of Ryan et al. (2011)
Above and belowground biomass carbon (kgC)	Aboveground and belowground biomass carbon, based Ryan et al. (2011). Since percentage C values are not different (two-tailedt-test, P = 0.366) between trunk and branch subsamples, the mean (47%) was used for all conversions to carbon mass.
Basal Area	Basal area derived from the Diameter at breast height
Summary table	Derived summary values for Annex A7B parameters: kg total woody biomass per plot; ton total woody biomass per ha; kgC per plot; tC per ha; trees/ha; average DBH and standard deviations for all parameters.

Annex 8 – Exclusion List

We completed the exclusion list by responding 'Yes' if the activity is included in the project and 'No' if the project does not include the activity.

Activities	**Included in Project ('Yes' or 'No')**
Any project activities leading to or requiring the destruction [1] of critical habitat [2] or any forestry project which does not implement a plan for improvement and/or sustainable management.	No
Any activity which could be associated with the significant impairment of areas particularly worthy of protection of cultural heritage (without adequate compensation in accordance with international standards).	No
Trade in animals, plants or any natural products not complying with the provisions of the CITES/Washington convention [3].	No
Destructive fishing methods or drift net fishing with a net more than 2.5 km in length, explosives and/or poison.	No
Large-scale commercial logging operations for use in primary tropical moist forest.	No
Production or trade in wood or other forestry products other than from sustainably managed forests [4].	No
Exploitation of diamond mines and marketing of diamonds where the host country has not adhered to the Kimberley Process.	No
Activities involving harmful or exploitative forms of forced labour [5] or harmful child labour [6].	No
Projects that include involuntary physical displacement and/or forced eviction.	No
Production or activities that encroach on lands owned, or claimed or occupied by Indigenous Peoples, without full documented consent of such peoples.	No
Production, use, sale or trade of pharmaceuticals, pesticides/herbicides, ozone layer depleting substances [7], and other toxic [8] or dangerous materials such as asbestos or products containing PCB's [9], wildlife or products regulated under CITES, including all products that are banned or are being progressively phased out internationally	No
Production or trade of arms, ammunition, weaponry, controversial weapons, or components thereof (e.g., nuclear weapons and radioactive ammunition, biological and chemical weapons of mass destruction, cluster bombs, anti - personnel mines, enriched uranium).	No
Procurement and use of firearms.	No
Provision of finances to military institutions involved in conservation or security activities.	No

Production or trade of strong alcohol intended for human consumption or other alcoholic beverages (excluding beer and wine).	No
Production or trade of tobacco and other drugs	No
Gambling, gaming establishments, casinos or any equivalent enterprises and undertaking [10].	No
Any trade related to pornography or prostitution.	No
Production or trade in radioactive material. This does not apply to the procurement of medical equipment, quality control equipment or other application for which the radioactive source is insignificant and/or adequately shielded	No
Production or trade in unbound asbestos. This does not apply to the purchase or use of cement linings with bound asbestos and an asbestos content of less than 20%.	No
Production, trade, storage, or transport of significant volumes of hazardous chemicals, or commercial scale usage of hazardous chemicals. Hazardous chemicals include gasoline, kerosene, and other petroleum products.	No
Transboundary trade in wastes, except for those accepted by the Basel Convention and its underlying regulations [11].	No
Any activity leading to an irreversible modification or significant displacement of an element of culturally critical heritage [12].	No
Production and distribution, or investment in, media that are racist, antidemocratic or that advocate discrimination against a part of the population.	No
Projects involving the planting or introduction of invasive species	No
Projects that increase the dependency of primary participants and other stakeholders on fossil fuels.	No

Notes:

[1] Destruction means (1) the elimination or severe reduction in the integrity of a habitat/area caused by a major and long-term/prolonged change in land-use or water resources or (2) the modification of a habitat such that this habitat's ability to fulfil its function/ role is lost.

[2] The term critical habitat encompasses natural and modified habitats that deserve particular attention. This term includes (1) spaces with high biodiversity value as defined in the IUCN's classification criteria, including, in particular, habitats required for the survival of endangered species as defined by the IUCN's red list of threatened species or by any national legislation; (2) spaces with a particular importance for endemic species or whose geographical range is limited; (3) critical sites for the survival of migratory species; (4) spaces welcoming a significant number of individuals from congregatory species; (5) spaces presenting unique assemblages of species or containing species which are associated according to key evolution processes or which fulfil key ecosystem services; (6)

and territories with socially, economically or culturally significant biodiversity for local communities. Primary forests or high conservation value forests must also be considered as critical habitats

[3] https://cites.org/eng/disc/text.php

[4] Sustainably managed forests are forests managed in a way that balances ecological, economic and socio-cultural needs.

[5] Forced labour means all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

[6] Harmful child labour means the employment of children that is economically exploitive, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health, or physical, mental, spiritual, moral, or social development. Employees must be at least 14 years of age, as defined in the ILO's Declaration on the Fundamental Principles and Rights at Work (C138 – Minimum Age Convention, Article 2), unless local laws require compulsory school attendance or a minimum working age. In such circumstances, the highest age requirement must be used.

[7] Any chemical component which reacts with, and destroys, the stratospheric ozone layer leading to the formation of holes in this layer. The Montreal Protocol lists Ozone Depleting Substances (ODS), their reduction targets and deadlines for phasing them out

[8] Including substances included under the Rotterdam Convention, Stockholm Convention and WHO "Pharmaceuticals: Restrictions in Use and Availability".

[9] PCBs (polychlorinated biphenyls) are a group of highly toxic chemical products that may be found in oil-filled electrical transformers, capacitors and switchgear dating from 1950 to 1985.

[10] Any direct financing of these projects or activities involving them (for example, a hotel including a casino). Urban improvement plans which could subsequently incorporate such projects are not affected.

[11] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal (1989).

[12] "Critical cultural heritage" is considered as any heritage element recognised internationally or nationally as being of historical, social and/or cultural interest.

Annex 9- Environmental and Social Screening

Topic	Risk Questions	Project Coordinator Response	E&S review
Environmental and Social Risks			
Vulnerable Groups	Are there vulnerable or disadvantaged groups or individuals, including people with disabilities (consider also landless groups, lower income groups less able to cope with livelihood shocks/ stresses) in the project area, and are their livelihood conditions well understood by the project?	The populations of Mangunde and Nhaumue can be largely considered as economically marginalized and politically disadvantaged in relation to those working in urban centres of Sofala and Maputo provinces. Within these populations, women and youth-headed households are particularly vulnerable because of their reliance on subsistence cultivation and very limited income generation opportunities in the area. Livelihood conditions are surveyed via interview sessions.	Agree
	Is there a risk that project activities disproportionately affect vulnerable groups, due to their vulnerability status?	Possibly, if these lower income groups would be underrepresented during decision-making events at Subcomité meetings,	Agree
	Is there a risk that the project discriminates against vulnerable groups, for example regarding access to project services or benefits and decision-making?	No, vulnerable groups are included in the participatory consultations (§2.5 of the PDD).	Agree
Gender equality	Is there a risk of adverse gender impacts due to the project/ project activities, including for example discrimination or creation/exacerbation or perpetuation of gender-related inequalities?	Possibly, if a perpetuation of gender-related inequality occurs, e.g. when women would be underrepresented during decision-making events at Subcomité meetings.	Agree
	Is there a risk that project activities will result in adverse impacts on the situation of women or girls, including their rights and livelihoods? Consider for example where access restrictions disproportionately affect	No, women are included in the participatory consultations and gender parity is safeguarded during Subcomité decisions (§2.5 of the PDD)	Agree

	women and girls due to their roles and positions in accessing environmental goods and services?		
	Is there a risk that project activities could cause or contribute to gender-based violence, including risks of sexual exploitation, sexual abuse or sexual harassment (SEAH)? Consider partner and collaborating partner organizations and policies they have in place. Please describe.	No, project partners follow the Mozambican law and signed an ethical charter that is based on respecting the Charter of Fundamental Rights (ratified 7 December 2000)	Agree
Human Rights	Is there a risk that the project prevents peoples from fulfilling their economic or social rights, such as the right to life, the right to self-determination, cultural survival, health, work, water and adequate standard of living?	No, project partners follow the Mozambican law and signed an ethical charter that is based on respecting the Charter of Fundamental Rights (ratified 7 December 2000)	Agree
	Is there a risk that the project prevents peoples from enjoying their procedural rights, for example through exclusion of individuals or groups from participating in decisions affecting them?	Possibly, if vulnerable individuals would not be present during decision-making by Subcomité meetings	Agree
	Are you aware of any severe human rights violations linked to project partners in the last 5 years?	No, project partners follow the Mozambican law and signed an ethical charter that is based on respecting the Charter of Fundamental Rights (ratified 7 December 2000)	Check at validation
Community, Health, Safety & Security	Is there a risk of exacerbating existing social and stakeholder conflicts through the implementation of project activities? Consider for example existing conflicts over land or natural resources, between communities and the state.	There is a risk of conflicts arising within and between communities regarding restriction of hunting, agricultural, pastoral or harvesting activities in the project areas – although such risk of potential conflicts regarding land tenure is low if a DUAT is in place.	Agree
	Does the project provide support (technical, material,	No, the project does not work with law enforcers.	Agree

	financial) to law enforcement activities? Consider support to government agencies and to Community Rangers or members conducting monitoring and patrolling. If so, is there a risk that these activities will harm communities or personnel involved in monitoring and patrolling?		
	Are there any other activities that could adversely affect community health and safety? Consider for example exacerbating human-wildlife conflict, affecting provisioning ecosystem services, and transmission of diseases.	No, the project does not work with law enforcers.	Agree
Labour and working conditions	Is there a risk that the project, including project partners, would lead to working conditions for project workers[1] that are not aligned with national labour laws or the International Labor Organization's (ILO) Declaration on the Fundamental Principles and Rights at Work (discriminatory working conditions, lack of equal opportunity, lack of clear employment terms, failure to prevent harassment or exploitation, failure to ensure freedom of association etc.)?	No risk, as the project will at all times align with national labour laws	Agree
	Is there an occupational health and safety risk to project workers while completing project activities?	No, project partners follow the Mozambican law and signed an ethical charter that is based on respecting the Charter of Fundamental Rights (ratified 7 December 2000)	Agree
	Is there a risk that the project support or be linked to forced labour, harmful child labour,	No, project partners follow the Mozambican law and signed an ethical charter that is based on respecting	Agree

[1] Project workers include project coordinator staff, staff of other project partners, third party groups fulfilling core functions of the project, and community volunteers or contracted workers.

	or any other damaging forms of labour?	the Charter of Fundamental Rights (ratified 7 December 2000)	
Resource efficiency, pollution, wastes, chemicals and GHG emissions	Is there a risk that project activities might lead to releasing pollutants to the environment, cause significant amounts of waste or hazardous waste or materials?	No risk, as no pollutants are used	Agree
	Is there a risk that the project will lead to significant consumption of energy, water or other resources, or lead to significant increases of greenhouse gases?	No, project GHG emissions are negligible	Agree
Access restrictions and livelihoods	Will the project include activities that could restrict peoples' access to land or natural resources where they have recognised rights (customary, and legal). Consider projects that introduce new access restrictions (eg. creation of a community forest), reinforce existing access restrictions (eg. improve management effectiveness and patrolling of a community forest) , or alter the way that land and natural resource access restrictions are decided (eg. through introducing formal management such as co-management).	There is a risk of conflicts arising within and between communities regarding restriction of hunting, agricultural, pastoral or harvesting activities in the project areas – although such risk of potential conflicts regarding land tenure is low if a DUAT is in place.	Agree
	Is there a risk that the access restrictions introduced /reinforced/altered by the project will negatively affect peoples' livelihoods?	There is a risk of conflicts arising within and between communities regarding restriction of hunting, agricultural, pastoral or harvesting activities in the project areas – although such risk of potential conflicts regarding land tenure is low if a DUAT is in place.	Agree
	Have strategies to avoid, minimise and compensate for these negative impacts been identified and planned?	NA	Agree

Cultural heritage	Is the Project Area officially designated or proposed as a cultural site, including international and national designations?	No, the project area does not include any officially designated or proposed cultural sites	Check at validation
	Does the project site potentially include important physical cultural resources, including burial sites and monuments, or natural features or resources of cultural significance (eg. sacred sites and species, ceremonial areas) and is there risk that the project will negatively impact this cultural heritage?	No, the project area does not include any sacred sites	Check at validation
	Is there a risk that the project will negatively impact intangible cultural heritage? Consider for example cultural practices, social and cultural norms in relation to land and natural resources.	No, the project area does not include any sacred sites	Check at validation
Indigenous Peoples	Are there Indigenous Peoples[2] living within the Project Area, using the land or natural resources within the project area, or with claims to land or territory within the Project Area?	The project works with rural households in the Mangunde Regulado. Most households rely on a combination of subsistence, cash crop production and seasonal labour migration. Most people speak Ndau/Chindau and may insist on their cultural traditions.	Agree
	Is there a risk that the project negatively affects Indigenous Peoples through economic displacement, negatively affects their rights (including right to FPIC), their self-determination, or any other social or cultural impacts?	The project works with rural households in the Mangunde Regulado. Most households rely on a combination of subsistence, cash crop production and seasonal labour migration. Most people speak Ndau/Chindau and may insist on their cultural traditions.	Agree

2 As per the IUCN Environmental and Social Management System, Indigenous Peoples include: "(i) peoples who identify themselves as "indigenous" in strict sense; (ii) tribal peoples whose social, cultural, and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations; and (iii) traditional peoples not necessarily called indigenous or tribal but who share the same characteristics of social, cultural, and economic conditions that distinguish them from other sections of the national community, whose status is regulated wholly or partially by their own customs or traditions, and whose livelihoods are closely connected to ecosystems and their goods and services" (IUCN 2016).

	Is there a risk that there is inadequate consultation of Indigenous Peoples, and/or that the project does not seek the FPIC of Indigenous Peoples, for example leading to lack of benefits or inappropriate activities?	Possibly, if the Ndau/Chindau traditions would not be involved nor respected in the project	Agree
Biodiversity and sustainable use of natural resources	Is there a risk that project activities will cause adverse impacts on biodiversity (both in areas of high biodiversity value, and outside of these areas) or the functioning of ecosystems? Consider issues such as use of pesticides, construction, fencing, disturbance etc.	Possibly, since several agroforestry species are not native to Mozambique (nevertheless these are “naturalized”)	Agree
	Is there a risk that the project will introduce non-native species or invasive species?	Possibly, since several agroforestry species are not native to Mozambique (nevertheless these are “naturalized”)	Agree
	Is there a risk that the project will lead to the unsustainable use of natural resources? Consider for example projects promoting value chains and natural resource-based livelihoods.	Possibly, since several agroforestry species are not native to Mozambique (nevertheless these are “naturalized”)	Agree
Land tenure and conflicts	Has the land tenure and use rights in the project area been assessed and understood?	Yes	Agree
	Is there a risk that project activities will exacerbate any existing land tenure conflicts, or lead to land tenure or use right conflicts?	There is a risk of conflicts arising within and between communities regarding restriction of hunting, agricultural, pastoral or harvesting activities in the project areas – although such risk of potential conflicts regarding land tenure is low if a DUAT is in place.	Agree
Risk of not accounting for climate change	Have trends in climate variability in the project areas been assessed and understood?	Yes, see §3	Agree
	Has the climate vulnerability of communities and particular	Yes, see §3	Agree

	social groups been assessed and understood?		
	Is there a risk that climate variability and changes might influence the effectiveness of project activities (eg. undermine project-supported livelihood activities) or increase community exposure to climate variation and hazards? Consider floods, droughts, wildfires, landslides, cyclones, etc.	Possibly, given the predicted vulnerability of Sofala to hydroclimatic changes (e.g. cyclones and drought)	Agree
Other – eg. cumulative impacts	Is there a risk that the project will contribute cumulatively to existing environmental or social risks or impacts, for example through introducing new access restrictions in a landscape with existing restrictions and limited land availability?	Possibly, there may be the risk of displacement of degradation towards adjacent areas (addressed in the techspec as leakage risk)	Agree
	Are there any other environmental and social risks worthy of note that are not covered by the topics and questions above?	Possibly, there may be the risk of displacement of degradation towards adjacent areas (addressed in the techspec as leakage risk)	Agree
Safeguard Provisions			
Stakeholder engagement	Has a stakeholder analysis been conducted that has identified all stakeholders that could influence or be affected by the project, or is this still to be completed? Please describe.	Stakeholder analysis was conducted, see §2.1	Agree
	Are the local community and indigenous peoples statutory or customary rights to land or resources within the project area already clear and documented, or is further assessment required? Please describe.	Yes, all project lands were covered by DUAT, see §1.2.2	Agree
	Are local governance structures and decision-making processes described and understood (including details of the involvement of women and marginalized or vulnerable groups), or is	Yes, the project governance structure is based on the “Subcomité” or “Committee”, see §1.2.2	Agree

	further assessment required? Please describe.		
	Are past or ongoing disputes over land or resources in the project area known and documented, or is there need for further assessment? Please describe.	Yes, we refer to §2.1.3 of the PDD: Disputed Land or Resources	Agree
Stakeholder consultation	Does the project have a Stakeholder Engagement Plan with clear measures to engage Vulnerable Groups, or is this plan still to be developed? Please describe.	Yes, we refer to § 2.5.2 of the PDD: Stakeholder Engagement Plan	Agree
	Has the Project Coordinator informed all stakeholders of the project, through providing relevant project information in an accessible format, or does this still need to be completed? Please describe.	Yes, we refer to § 2.6.2 of the PDD: FPIC Process and DUAT	Agree
Free, Prior and Informed Consent	Has the project analysed and understood national and international requirements for Free Prior and Informed Consent (FPIC)? Please describe.	Yes, we refer to § 2.6.2 of the PDD: FPIC Process and DUAT	Agree
	Has the project identified potential FPIC rightsholders and potential representatives in local communities and among indigenous peoples, or is this still to be completed? Please describe.	Yes, we refer to § 2.6.2 of the PDD: FPIC Process and DUAT	Agree
	Has the project worked with rightsholders and representatives of local communities and indigenous peoples to understand the local decision-making process and timeline (ensuring involvement of women and vulnerable groups), or is this still to be completed? Please describe.	Yes, we refer to § 2.6.2 of the PDD: FPIC Process and DUAT	Agree
	Has the project sought consent from communities to 'consider the proposed Project', and if so, where is this in principle consent	Yes, we refer to § 2.6.2 of the PDD: FPIC Process and DUAT	Agree

	documented? Please describe.		
Grievance Mechanism	Does the project already have a Grievance Mechanism, or is this still to be established? Please describe.	Yes, we refer to § 3.17 of the PDD: Grievance Mechanism	Agree
	For projects with a GRM, is this accessible to project affected people? Please describe.	Yes, we refer to § 3.17 of the PDD: Grievance Mechanism	Agree

SECTION D: SCREENING REPORT (E&S REVIEWER TO COMPLETE)

Name of E&S reviewer	***Eva Schoof, Hamish McGill (supporting)***
Date of E&S screening:	***23.02.2023***
Project risk rating:	*Moderate*
Principle risks and impacts	

E&S topic/ risk area	Likelihood (1-5)	Magnitude (1-5)	Significance (low, moderate, severe, high)
Vulnerable Groups	3	3	Moderate
Gender equality	3	3	Moderate
Human Rights	2	3	moderate
Community, Health, Safety & Security	3	3	Moderate
Labour and working conditions	1	3	Low
Resource efficiency, pollution, wastes, chemicals and GHG emissions	1	3	Low
Access restrictions and livelihoods	3	3	Moderate
Cultural heritage	1	2	Low
Indigenous Peoples	3	3	Moderate
Biodiversity and sustainable use of natural resources	1	3	Low
Land tenure conflicts	3	3	Moderate
Risk of not accounting for climate change	1	3	Low
Other – eg. cumulative impacts	2	3	Moderate

E&S assessment required

Yes:

- *Carry out social survey specifically with a view of how to minimise the risk on vulnerable groups and gender equality*
- *Focus on stakeholder analysis and participatory plan to involve women and vulnerable groups; how can risks to non-participation be reduced*
- *Focus stakeholder discussions on how to reduce risks of land tenure conflicts; how can potential conflicts be mitigated?*
- *Plan on engagement with indigenous people; how to make sure traditional practices are respected by the project*
- *In-field risk assessment to check for any risks with invasive species, although the risk seems low if they are naturalised species*

	- *Leakage risk to be addressed through tech specs* - *Assessment of whether DUAT is in place and being implemented*
Likely safeguard plans required	- *In-field assessment of the moderate risks* - *Risk mitigation and management plan of low and moderate risks* - *ESMS in the PDD* - *Robust grievance mechanism* - *Stakeholder engagement plan* - *FPIC on any activities to reduce any potential risks on access restrictions*

Annex 10 – Environmental and Social Assessment Report

On 3, 6 and 9 November 2023, communal meetings on risks were held in Mangunde and Nhamue. Using the model below, the main risk areas were discussed and mitigation measures were decided in common. In Mangunde, 10 people joined the risk sessions on 9 November; in Nhamue, 18 people joined the risk sessions on 3 and 6 November.

1. COMMUNITY-LEVEL RISK ASSESSMENT THROUGH COMMUNITY DISCUSSIONS

Key areas of risk	**Community discussion on the importance of risk?**	**Measures to reduce this risk?**
Vulnerable groups: How do you assess the potential costs and benefits of the project and how to ensure representation of vulnerable groups and the poor throughout project design and development? How to avoid benefit capture of the local elite?	It was mentioned that there is a risk of local elite benefit capture, in the sense that community leaders may focus on friends and family for invitations for project activities, or as members of the subcomité.	To include all community members, it is suggested to *decentralise invitations* (i.e. not only by the leader, but also by the project team) and to communicate earlier on upcoming project activities so the news can spread. The project should keep records of community members participating in project activities and use a *smart rotation system* to achieve broad inclusion of the community in the project.
Women: How to assess the potential project costs and benefits for women, and to ensure women's representation throughout project design and development?	Mentioned as insignificant.	Gender parity is safeguarded in the project design (through the hard quorum of 50% female participation).
How to assess the potential costs and benefits of access restrictions (in proposed planting areas)?	There is a risk of deforestation, because the people need construction wood, grass, space for machambas, open new areas to construct new houses or use fires when hunting or to create fresh grazing lands.	Freely distributing tree seedlings and/or seeds for direct seeding of important timber wood species to be planted in individual or communal woodlots. Grass cut-and-carry system (see further) Valorising non-timber forest products and particularly supporting honey production in the Miombo project areas. Established bee-hives in the project area would provide livelihood benefits and function as natural defenders of the area. Sensibilization and dissemination of project objectives and benefits to strengthen community ownership of the project.
How to assess the risk of conflict with neighbours and neighbouring communities?	Mentioned as insignificant.	All project lands are covered by a DUAT.
Community health and safety: How do you assess the risk of	There are no ethnic conflicts.	See: Vulnerable groups

exacerbation of conflicts in the region: social or ethnic conflict?		
Indigenous peoples: how to work with indigenous peoples in the project area, and how to assess the risk of conflict?	There are no indigenous peoples with social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live.	The project should respect cultural heritage and support traditional ceremonies when relevant.
Risk of not accounting for climate change: How to assess the potential impacts of extreme weather events on proposed activities?	There is small risk of intensifying drought conditions hindering seedling growth; there can be cyclones*	Seedlings should be micro-irrigated in periods of low rainfall to avoid desiccation. SWC structures such as swales support tree growth in enrichment planting areas.
How to assess fire risks?	There is a risk of uncontrolled fires (late dry season)	Integrated fire management strategy (not stopping all fire, but modulating the intensity and frequency): including firebreaks, fuel breaks and (cold) fires. Engage subcomité members in fire prevention and fire suppression. Support local grass cut-and-carry systems, which provide (roof) grasses for the community members, while also reducing the fuel load in the project areas.
Other risks proposed?	Not keeping promises made to the community is a risk. In that case the community may lose interest.	Pro-active, honest and careful communication towards the project participants. Avoid not delivering the promises. In case, for any reason, delays occur, we should communicate honestly on the process.

**Mangunde is over 100km inland. Project areas are well and truly higher than the areas which would be impacted in the event of cyclone. No project areas are within the Buzi River Floodplain. High winds may knock down some trees but winds in this area are usually much slower than on the coast. See for instance the limited impact of Cyclone Idai in 2019 in Mangunde (versus the significant impact in Beira). Finally, the nurseries have been built to withstand strong winds and/or built from local materials using accessible appropriate technology so reconstruction efforts are minimal.*

2. COMMUNITY E&S RISK MANAGEMENT PLAN (ESMP)

E&S risks and impacts and mitigation measures					
Environmental and social risks and impacts[3]	**Mitigation measures[4]**	**Feasibility, effectiveness and sustainability**	**Costs**	**Implementation responsibility and schedule**	**Follow-up indicator?**
Vulnerable groups: How to avoid benefit capture of the local elite?	Inclusion of community participation through **smart rotation** and **decentralised communication.**	Keep records of community participation to allow smart rotation; Decentralise communication	No costs (bureaucracy)	Annually	NA
Women: How to ensure women's representation throughout project design and development?	Women participate minimum **50% in all project activities**	Target: 50% women participation in project activities; We should keep track of women's participation during each meeting	No costs (behavioural change)	Annually	L2
How to assess the potential costs and benefits of access restrictions?	**Sensibilization** and dissemination of project objectives and benefits to strengthen community **ownership** of the project. Distributing tree seedlings and/or seeds for direct seeding of important **timber wood species** to be planted in individual or communal woodlots. Valorising non-timber forest products and particularly supporting **honey production**. Established bee-hives in the project area provide livelihood benefits and function as natural defenders of the area.	Organize sensibilization events. Free distribution of timber wood seedlings or seeds. Sharing expertise on beekeeping and provide beehives.	Sensibilisation materials (billboards, leaflets, workshops, about €1000 per year) Permanent nursery costs (about €0.5 per tree) Qualitative beehives cost about €30 per hive.	Annually Annually Stepwise implementation: towards 150 bee hives per project area.	L1
Indigenous peoples: how to work with indigenous	The project should respect cultural heritage and support **traditional ceremonies** when relevant.	Traditional ceremony at project initiation. This	Food and beverage	2023	NA

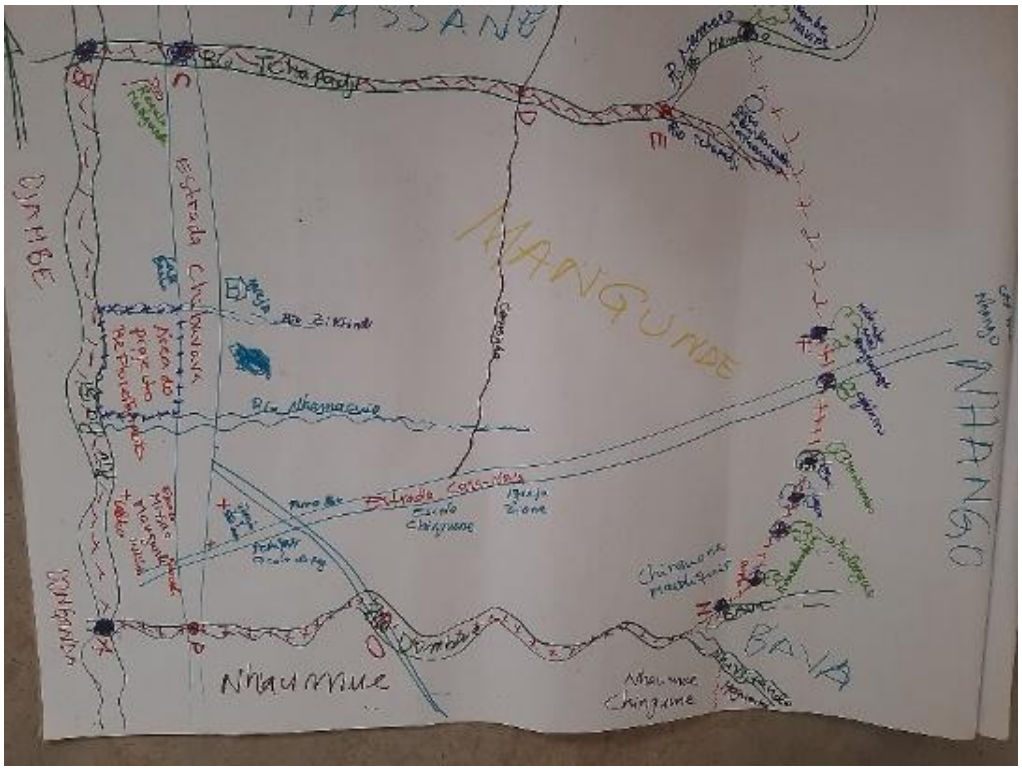
[3] For each row, include the different E&S risks and impacts that have been identified during the screening and assessment.
[4] Management measures will either be plans or protocols, or specific project activities. Where a management measure is a plan (eg. community engagement plan), the activities for this plan need to be included in the project design and budgeted for.

E&S risks and impacts and mitigation measures					
Environmental and social risks and impacts[3]	**Mitigation measures[4]**	**Feasibility, effectiveness and sustainability**	**Costs**	**Implementation responsibility and schedule**	**Follow-up indicator?**
peoples in the project area, and how to assess the risk of conflict?		was done in 2022.			
Risk of not accounting for climate change: How to assess the potential impacts of extreme weather events on proposed activities?	Seedlings should be **micro-irrigated** in periods of low rainfall to avoid desiccation. **SWC structures** support tree growth in enrichment planting areas.	Micro-irrigation of seedlings. Establish SWC in enrichment planting areas	No cost (solar irrigation system installed in 2022) Annual cost of about €250	2023	L3, P5
How to assess fire risks?	**Integrated fire management strategy**: including firebreaks, fuel breaks and controlled (cold) fires. Engage subcomité members in fire prevention and **fire suppression**. Support **local grass cut-and-carry systems**, which provide roof grasses for the community members, while also reducing the dry material in the project areas.	Integrated fire management Establish "fire brigade" with the Subcomité Allow local and organized cut-and-carry of grasses	Permanent cost of firebreaks (about €5 per 30m) T-shirts and bicycles for fire suppression (about €500) No costs (bureaucracy)	Annually Stepwise implementation. Annually	P8, P9, P10, P11, P12
Other risks proposed: Not keeping promises made to the community is a risk. In that case the community may lose interest.	Pro-active, honest and careful **communication** to the project participants.	Clear communication	No costs (bureaucracy)	Annually	NA
Safeguard Provisions					
Stakeholder Engagement & consultation	• About 2 to 3 subsequent community meetings per project area, before project start	Feasible, since the project has experienced teams across the different project areas	No cost (no per diems during meetings)	Annually (2022-2052), AV, R, CL	P18, P7

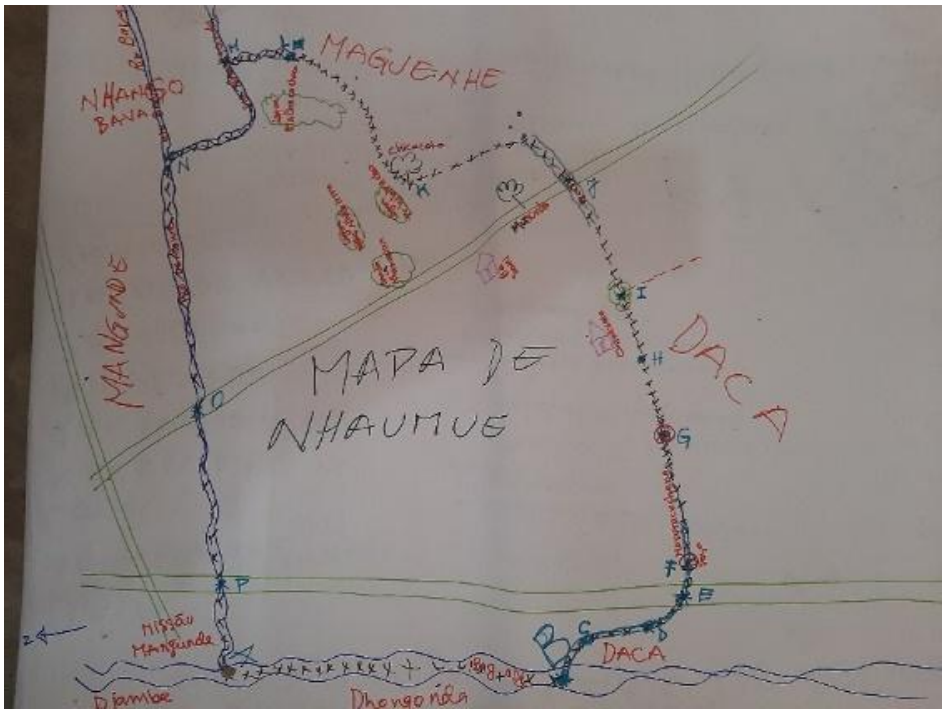
E&S risks and impacts and mitigation measures					
Environmental and social risks and impacts[3]	**Mitigation measures[4]**	**Feasibility, effectiveness and sustainability**	**Costs**	**Implementation responsibility and schedule**	**Follow-up indicator?**
	• Annual community meeting per community, during the next 30 years • Involve agricultural associations/ cooperatives of smallholders where possible • Organize trainings on sustainable forest and fire management in every village	Sustainable on the long term (annually during 2022-2052)			
Grievance Redress Mechanism	• Complaint and suggestion book • Direct messages to project team, including annual community meeting • Telephone communication with project team • Indirect message via community leader • Community satisfaction survey	See §3.17	No cost (no per diems during meetings)	Annually (2022-2052), AV, R, CL	NA
Free Prior and Informed Consent	• About 2 to 3 subsequent community meetings per project area, before project start • Annual community meetings per community, during the next 30 years • Organize trainings on sustainable forest and fire management in every village	Feasible, since the project has experienced teams across the different project areas Sustainable on the long term (annually during 2022-2052)	No cost (no per diems during meetings)	Annually (2022-2052), AV, R, CL	P18, P7

Annex 11 – Land Management Plans

Esboço do mapa Participativo da Comunidade Mangunde [Parcipatory map, Mangunde community]



Esboço do mapa Participativo da Comunidade Nhaumue [Parcipatory map, Nhaumue community]



Annex 12 – Project Agreements

Template added below

Project Agreement

This document lays out the terms of mutual commitment between **the partners of the Kukumuty project** and the **participating project community ……** in Chibabava, Mozambique. This document is to be available in English, Ndau and Portuguese. The mutual commitments contained in this agreement are as follows:

1. Introduction

1.1 The Project Agreement describes the roles and responsibilities of the project partners in relation to the Kukumuty project (Mozambique), including the involved Subcomités (Community Subcommittees), and the terms and conditions governing the distribution of benefit sharing, non-timber forest products and related management activities. The project partners are Azada Verda, Reseed Indico, Climate Lab, the Subcomité representatives and the community representatives of the participating villages.

This project agreement is valid from ……/……../……. and is valid for 30 years.

1.2 For the purposes of this agreement, carbon sequestration services, as a result of woodland enrichment and related management activities are considered. The provision of all ecosystem services from Miombo enrichment is indicated by monitoring changes in tree and forest cover, biodiversity, carbon sequestration and socio-economic parameters. The delivery of the carbon benefits will be indicated by monitoring changes in socioenvironmental indicators.

1.3 The project is intended to facilitate community ecosystem enrichment and management efforts by strengthening communities that sustainably manage the Miombo area. Ecosystem enrichment consists of sustainable soil and fire management, enrichment planting, restoration and conservation of the forests and trees. Such efforts provide community-wide benefits and valorization of non-timber forest products and agroforestry may improve the wellbeing of the community. In support of this intention, the community will be considered beneficiary. The project partners will enter into a benefit-sharing mechanism to manage the distribution of payments received. Project participants will not be able to generate any other type of carbon credits or be involved in other programmes that deliver the same benefits with other parties or standards.

2. Roles and obligations of the project coordinators

AZADA VERDE RESPONSIBILITIES

Azada Verde is responsible for the following activities:

a. Implementation of the project in the field: The entity will be responsible for the coordination and execution of the activities of the project carried out in Mozambique and specifically in the area of

action. Income received from the sale of Plan Vivo Certificates will be paid into a dedicated bank account.

b. Local Reporting: Prepare and send descriptive (word) and financial reports (excels, invoices, receipts, declarations, bank statements…), below the standards agreed by the three parties an on format and frequency decided. All these reports will allow the three parties to follow the progress of the project.

c. Relationship with our local partners: Maintain a good relationship with our local partners and a perfect coordination in the development of joint activities on the field. Currently ESMABAMA and Mezimbite but responsible for maintaining future relationship with new alliances of the project.

d. Identification: As the project evolves, new needs, opportunities, concerns and conflicts will emerge from the field. The field team would deal with it and will be the interlocutor between the community and the project. Besides the identification of annual potential new areas for the project.

e. Institutional relations in the country: Azada Verde will deal with the management and relations with local, district, provincial and national public institutions. At the level of communications, records and necessary certifications of the project.

f. Human Resource: Recruitment and management of all local staff involved in the project. Contracts, social security and payroll.

g. Logistics: Guarantee and ensure the necessary means for the proper development of activities in the field.

h. International Visits: It will be in charge of the management and coordination of the logistics, food, lodging, project activities of the international visits that are made to the project.

i. Audits and evaluations: Develop, accompany and facilitate the teams of auditors and evaluators to carry out their work in all phases to guarantee the transparency of the project.

RESEED INDICO RESPONSIBILITIES

Reseed Indico takes responsibility for the following activities:

a) Project Coordination and Steering: Reseed Indico (hereafter RI) will coordinate the planning, design, and provide guidance to local staff for implementation of the revitalisation and agroforestry activities in the project area. It will advise Azada Verde directors and project staff on addressing new needs, concerns, and conflicts that may arise in relation to the project scope and benefits.

b) Socio-economic, environmental research and baselining: RI will establish baseline information for analysis and monitoring of the socio-economic performance of the project activities and outcomes.

c) Administration: RI will organise monthly meetings with project partners and staff, maintain oversight of the overall project finances, local reporting, and records of meetings.

d) Translation: RI will provide translation of key project documents and correspondence in English and Portuguese as required.

e) Technical support to implementing partner: RI will provide technical support to Azada Verde for agroforestry development and resource management practices in the project area. It will liaise

with Mezimbite to develop appropriate agroforestry strategies and integrative approaches to natural resource revitalisation with partners and local community associations involved in the project.

f) Project, grant writing and editing: RI will assist Climate Lab in drafting and editing the annual reports and project-related grant applications.

RESPONSIBILITIES AND SERVICES TO BE PROVIDED BY CLIMATE LAB

Climate Lab takes responsibilities for the following:

a) Development of a PDD: After acceptance of a PIN by the Plan Vivo Foundation (after a PIN review), CL will prepare a Project Design Document (PDD). CL will set up and follow up a field measurement scheme in the project area (soil sampling, biomass & biodiversity sampling). Using all information, CL drafts the PDD although the Parties emphasize that the drafting of this document will require a joint effort. The PDD also includes the Technical Specifications for each project intervention – this effectively is the carbon sequestration modelling.

b) Project Validation: Once the PDD is completed, CL will submit it to the Plan Vivo Foundation. The document is independently reviewed (desk based review) during this validation stage. Additionally, Plan Vivo will appoint an independent validator and/ or verifier, who will perform a field review. CL will carry the cost of the validation and verification work, but all parties commit to the benevolent cooperation of its local coordinators when interviewed by an auditor.

c) Registration: If the project is found to meet the Plan Vivo Standard, it results in project registration. CL will organise this.

d) Annual reporting: Once registered, Plan Vivo projects can generate Plan Vivo Certificates in respect of ecosystem service benefits (typically climate services) generated. CL is responsible for the drafting of the annual reports, while the other parties must smoothly provide it with information on the project year. The other parties remain responsible for the accuracy of all information and data provided to CL.

e) Registration and reporting towards the National Emissions Reduction Transaction Registry: The Government of Mozambique may require conformity, registration and periodic reporting of the Plan Vivo project and credits towards their National Emissions Reduction Transaction Registry. CL is responsible for the administration of the transactions, in line with the requirements of Mozambican law.

f) Sales of Plan Vivo certificates: the Plan Vivo Foundation will issue certificates following its approval of project annual reports. CL will receive these certificates on its Markit Environmental Registry account and is responsible for the subsequent sales of the carbon credits, which it will do in a transparent manner. All Parties explicitly agree that CL will sell all carbon credits, who will then transfer a portion of the corresponding revenues to the other parties. CL is not an agent of the others in this regard.

g) Expansion reporting: In order to add more project areas to the Plan Vivo project, CL is responsible for the carbon measurements and the carbon modelling at all sites, and the drafting of expansion reports.

h) Cyclic Verification: Verification audits must be carried out in line with the Plan Vivo requirements. CL will carry the cost of the verification work, but all parties commit to the benevolent cooperation of its local coordinators when interviewed by an auditor.

The Coordinators will be supported by the Subcommittees, who will help to oversee the use of funds generated from the project and the operations required to achieve the project's targets (e.g. mulching, swales, firebreaks, monitoring, community meetings).

3. Monitoring and payment system

3.1 Monitoring. Monitoring activities, annual activity-based indicators and methods are described in Annex A. A simple set of monitoring indicators will be used and monitoring observations will concentrate on three main aspects:

1. Ecosystem restoration
2. Carbon sequestration
3. Livelihoods

The monitoring and payment system is set forth in Annex A. The system shows the monitoring indicators, performance targets and thresholds, and corresponding payments that apply under this agreement. It uses a traffic light system to link payments with monitoring results: green for full payment, orange for partial payment, red for zero payment.

3.2 Payments. Payment will be linked to monitoring results in relation to the targets and thresholds described in Annex A. Payments are directly dependent on sales; this means that in case that there are no sales of carbon credits, it would be impossible to have payments. Payment will only be made if responsibilities and, where applicable, corrective actions are correctly carried out by the parties. The expected annual carbon benefit will be: …….. tCO2e/ha/yr.

3.3 Buffer. There is a deduction of the risk buffer (20% of achieved annual emission reductions), which is pooled by Plan Vivo and therefore not available for participants to claim. This is in addition to at least 10% of the rPVCs received (after deducting contributions to the future risk buffer) that are set aside in the achievement reserve. Uncancelled rPVCs in the achievement reserve can be converted to vPVCs and issued at the time of verification.

4. Use of Payments

4.1 Socioenvironmental investments under this agreement are made in consensus with the community and should be gender balanced. The balance allocation as per article 4.3 of this agreement will be used to make socioenvironmental investments in accordance with monitoring targets and thresholds (see Annex A).

4.2 Plan Vivo land management plans are consulted for socioenvironmental investments. Investments should strengthen 4 main activities (1) ecosystem enrichment, restoration or protection, (2) agroforestry, (3) livelihood strengthening through non-timber forest production, (4) improve water access or education of local citizens.

4.3 Azada Verde will allocate 60% of the Net Revenue towards socioenvironmental expenses directly benefiting the project areas, project participants, communities and/or other local stakeholders. It is up to the Annual Subcomité Meetings to allocate these social and/or environmental investments and expenditures for the benefit of the project communities.

5. Corrective action

5.1 In the event that corrective action is required during the term of this agreement, the project coordinators, the Subcomités and the communities will reach agreement on the corrective actions necessary, a schedule for the corrective action, and an extension of the term of this agreement.

5.2 All stakeholders (participants, community members or other stakeholders) are encouraged to use the complaint/suggestion book. Mitigation actions to follow up complaints will be performed in mutual agreement between the Community Subcommittee and the community, and will strive towards consensus. In the event that there is a dispute between different stakeholders the Subcommittee will be consulted. If none are able to agree corrective actions, a third party arbitrator, approved by all parties, will be appointed to oversee dispute resolution. In first instance, this will be the régulo of Mangunde. If no amicable solution can be found within 1 month, a new arbitrator will be selected, who needs to be approved by all parties and the Plan Vivo Foundation.

5.3 The payment for costs of any corrective action shall be shared by all signatories and come from the revenues set in article 4.3 of this agreement.

6. Geographic solidarity formula between n villages

The allocation per village is distributed from the Fund F as follows:

Allocation = 1/n*50% F + tCO2e/ha(%)*50% F

7. Term of the agreement

This agreement will remain in force for a period of 30 years from the date of signing, unless payments are withheld in any year, in which case the parties shall agree to an extension and corrective actions as set forth in section 5.

The parties agree to the terms and conditions contained in this agreement and all annexes.

Signatures:

Subcomité Representatives

Comité de Gestão de Recursos Naturais Representatives

Community Representatives

Project Coordinators

Annex A: Annual monitoring targets

	Activity Indicator P1 to P24 (measure annually)	**Performance Targets**		
		Full Target Achievement	**Partial Target Achievement**	**Missed Target**
Miombo enrichment activities	Project area undergoing mulching activities	≥10 ha/yr	-	<10 ha/yr
	Area of each project area surrounded by firebreak or otherwise protected against annual fire	>80%	50-80%	<50%
	Number of SWC in project area (swales or other) installed and/or maintained	6 / yr	4-6 / yr	<4 / yr
	% of participating communities having soil fertility maps, a defined mulching strategy, uncontrolled fire exposure maps, a defined fire strategy, tree maps and a defined planting strategy	100%	-	<100%
Tree Planting	Number of Miombo seedlings planted	>1500 seedlings/yr	1000-1500 / yr	<1000 seedlings / yr
	Survival Rate	>60%	30-60%	<30%
Community Subcommittee meetings	Number of meetings per project area	3 per year	1-2 per year	0 per year
	Female participation	>50%	30-50%	<30%

Risk mitigation Activities	Index of uncontrolled fires, woodcutting and charcoal making in the project zones, per project zone per year	<4 per year	4-10 per year	>10 per year

There are the following consequences for certificate issuance and corrective actions that will be implemented if the performance targets are not met (mitigation actions):

(i) If the values for all indicators meet or exceed their performance target, the full issuance is received;

(ii) If one or more of the indicator values are below its performance target for one monitoring period, the full issuance is received but corrective actions must be implemented by the next year;

(iii) If one or more of the indicator values are partially achieved for two consecutive monitoring periods, the full issuance is received but corrective actions must be implemented.

(iv) If one or more of the indicator values are missed for two consecutive monitoring periods, or partially achieved for three consecutive monitoring periods, certificate issuance of the project area concerned is withheld until corrective actions have been implemented and the performance target(s) have been reached.

Annex 13 – Monitoring Plan

A13.1 Monitoring methods

1. Sampling strategy

Sampling was performed on the basis of fixed plots of 400m². The assembly of the plot is started at a point "A" as the arrival point, and it is followed in an Eastern direction covering 20m until the point "B", then in a Northern direction covering 20m until the point "C", then it is followed in Western direction covering 20m until the Point "D" and finally closed in a Southern direction until the Arrival point "A". Subsequent plots were sampled along transects every 200m. In 2022, 104 plots have been sampled.

For the identification and counting of the species present, the techniques of direct observation, comparison of specimens and literature review were employed, interacting with botanical scientists with extensive experience in the identification of forest species in southern Africa as well as with national and international herbaria, such as the Herbarium of the Instituto de Investigação Agrária de Moçambique (IIAM).

Measurement of diameter at breast height (DBH) (at 1.3m height) and recording of shrub occurrence with respective botanical identification was performed within the plots of 400m². Diameters were derived from circumferences measured in the field.

A composite soil sample was created within every plot by mixing 5 soil samples taken in the corners of a central 5m subsquare. The soil was collected in the center of the plot at points shaped like a cross and thus collected at the 4 corners of the cross as well as in the center of the cross. Samples were taken by augering in the top 0.3 m depth.

For expansion areas, the project will calculate the required number of samples based on the Winrock calculator.

2. Aboveground and belowground biomass

Aboveground and belowground biomass was quantified for all trees based on the allometric equations of Ryan et al. (2011) for Miombo woodlands in Sofala, Mozambique. The equations and root-stem ratio have been developed based on a destructive harvest of 29 Miombo trees combined with an inventory of 12,733 trees on 58 plots.

Tree biomass allometric equations. B_{dest} *is the destructively sampled tree stem biomass (s), tree coarse root biomass (r) and total tree biomass (t, i.e. stem+root), all in kg C.* dbh_{dest} *is diameter at breast height in cm. log is the natural log.* $R{:}S_{dest}$ *is the root stem ratio.*

Equation	r^2	RMSE	N
$\log(B_{dest,s}) = 2.601 \log(dbh_{dest}) - 3.629$	0.93	0.52 log(kg C)	29
$\log(B_{dest,r}) = 2.262 \log(dbh_{dest}) - 3.370$	0.94	0.43 log(kg C)	23
$\log(B_{dest,t}) = 2.545 \log(dbh_{dest}) - 3.018$	0.98	0.30 log(kg C)	23
$(R{:}S_{dest}) = -0.2671 \log(dbh_{dest}) + 1.334$	0.36	0.27	23

3. Soil organic carbon

The method of Walkley-Black (Walkley and Black, 1934) was used for soil organic carbon determination (in %C) of the composite soil samples. Analysis was performed in the Kvuno laboratory for soil analysis, Chimoio, after transport in a frigobox. The method of Walkley-Black is a reliable and standard chromic acid wet oxidation method. Oxidisable matter in the soil is oxidised by potassium bichromate solution. There is heat generation when sulfuric acid is mixed with the dichromate. The remaining dichromate is titrated with ferrous sulphate. The titre is inversely related to the amount of C present in the soil sample. Soil organic carbon content (SOC, in ton C/ha) was calculated using the following equations (Hoff et al., 2002):

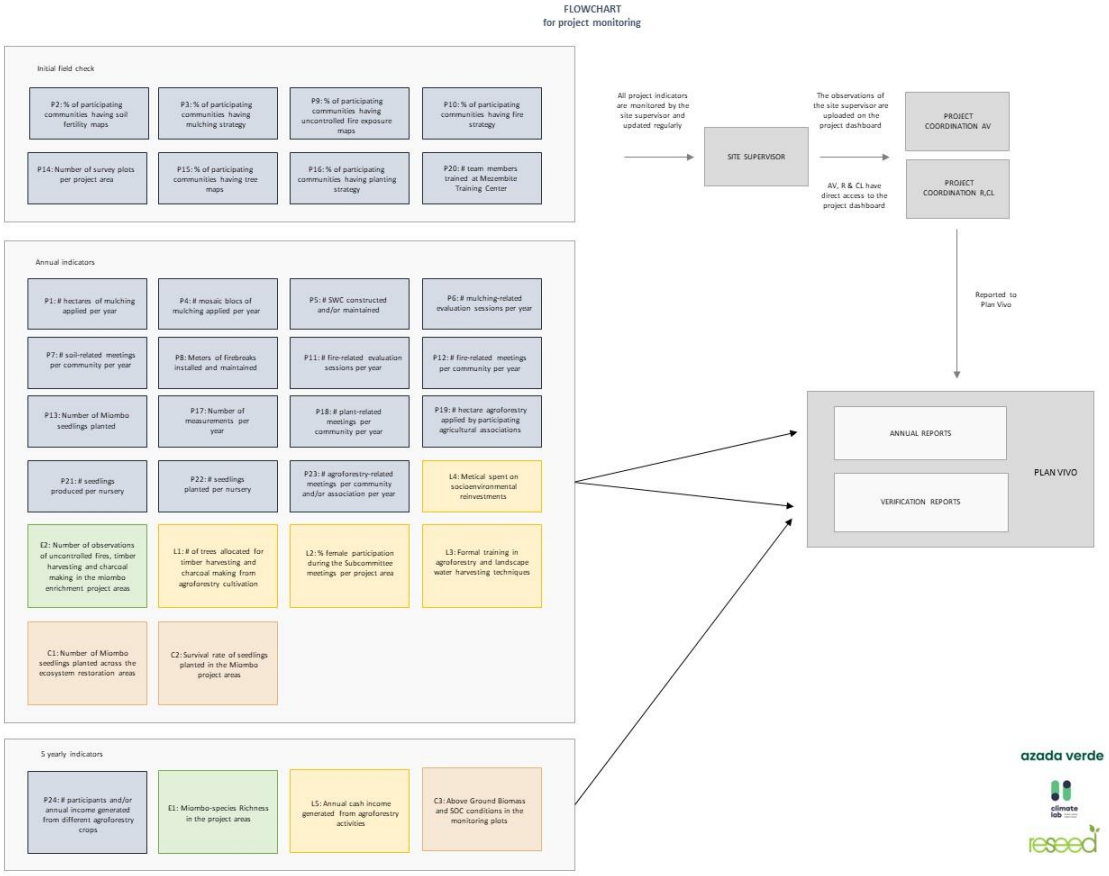
$$SOC(tonC/ha) = (\%C.\%100).Bd.D.\alpha$$

Where Bd is the bulk density (ton/m³), D is the thickness of the top soil (0.2m), and α is 10.000 m²/ha. Bulk density was derived from the same study by Ryan et al. (2011) (averaged at 1.35 ton/m³).

4. Monitoring scheme

All results are presented in Annex 6 (b and c) together with a summary in Annex A7B. The measurement protocol detailed above will be replicated every 5 years, at the same fixed plots (GPS locations), to recalibrate the initial carbon model predictions. This is in line with AR-TOOL14, § 6.2: Direct estimation of change by re-measurement of sample plots.

A13.2 Monitoring flowchart



A13.3 Monitoring parameter list

Monitoring Parameter	Definition and unit	Method	Frequency	Means of Verification
P1	# hectares of mulching applied per year	GPS delineation	To be checked annually	Reporting of mulching activities; photographic evidence and map of areas covered in Annual Report
P2	% of participating communities having soil fertility maps	Amount of participating communities with soil fertility maps	To be checked in year 1	Participatory fertility maps

P3	% of participating communities having mulching strategy	Amount of participating communities with mulching strategy	To be checked in year 1	Mulching strategy document
P4	# mosaic blocs of mulching applied per year	Counting of mulching mosaic blocs	To be checked annually	Reporting of mulching activities; photographic evidence and map of areas covered in Annual Report
P5	# SWC constructed and/or maintained	Counting of SWC structures	To be checked annually	Photographic evidence in Annual Report
P6	# mulching-related evaluation sessions per year	Amount of mulching-related evaluation sessions organised	To be checked annually	Evaluation note
P7	# soil-related meetings per community per year	Amount of soil-related community meetings organised	To be checked annually	Monthly community reports
P8	Meters of firebreaks installed and maintained	GPS delineation	To be checked annually	Reporting of firebreak activities; photographic evidence and map of areas covered in Annual Report
P9	% of participating communities having uncontrolled fire exposure maps	Amount of participating communities with fire exposure maps	To be checked in year 1	Participatory fire maps
P10	% of participating communities having fire strategy	Amount of participating communities with fire strategy	To be checked in year 1	Fire strategy document
P11	# fire-related evaluation sessions per year	Amount of fire-related evaluation	To be checked annually	Evaluation note

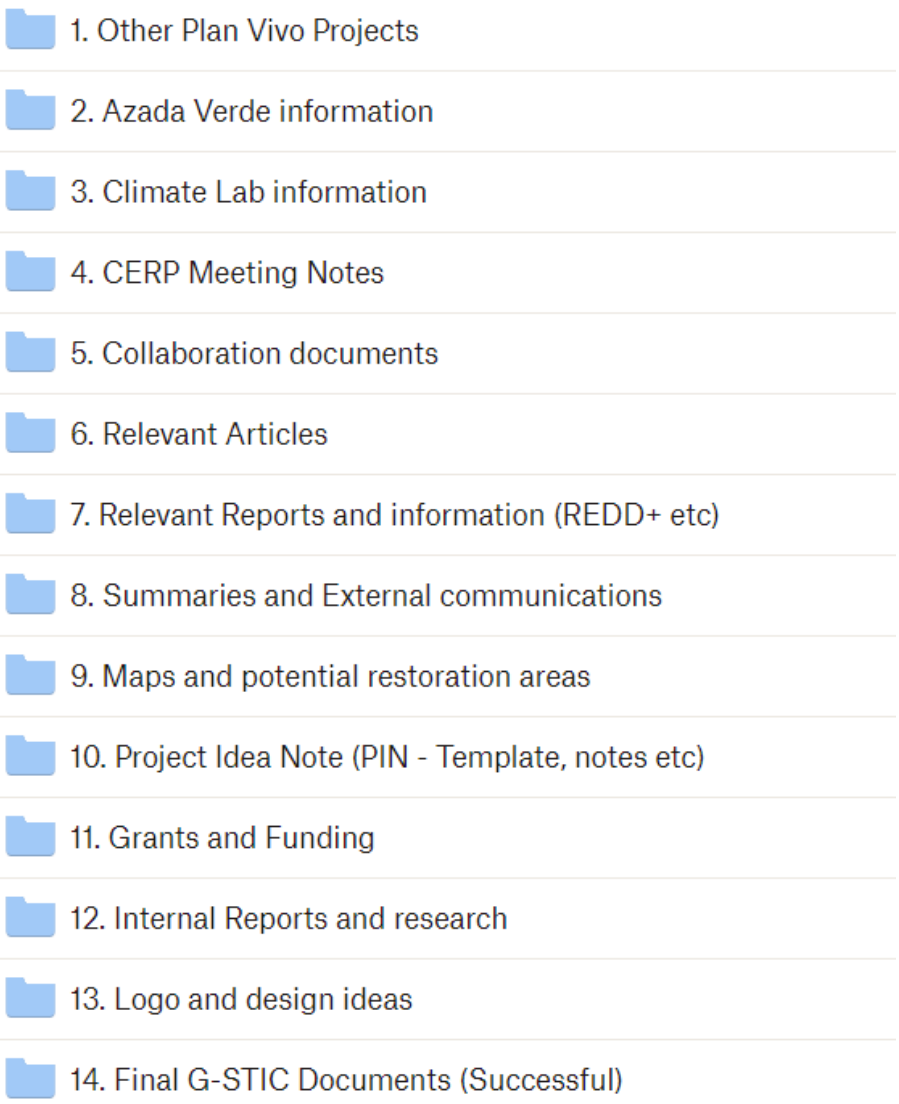
		sessions organised		
P12	# fire-related meetings per community per year	Amount of fire-related community meetings organised	To be checked annually	Monthly community reports
P13	Number of Miombo seedlings planted	Counting of Miombo seedlings planted	To be checked annually	Reporting of planting activities; photographic evidence and map of areas covered in Annual Report
P14	Number of survey plots per project area	Amount of plots surveyed	To be checked in year 1	Reported in Annex 7 of the PDD
P15	% of participating communities having tree maps	Amount of participating communities having tree maps	To be checked in year 1	Participatory tree distribution maps
P16	% of participating communities having planting strategy	Amount of participating communities having planting strategy	To be checked in year 1	Planting strategy document
P17	Number of measurements per year	Reporting on measurement results	To be checked annually	Daily results reported in Annual Report
P18	# plant-related meetings per community per year	Amount of plant-related meetings per community	To be checked annually	Monthly community reports
P19	# hectare agroforestry applied by participating agricultural associations	GPS delineation	To be checked annually	Reporting of agroforestry activities; photographic evidence and map of area and species planted in Annual Report

P20	# team members trained at Mezembite Training Center	Amount of team members trained	To be checked in year 1	Report of training
P21	# seedlings produced per nursery	Counting of seedlings produced per nursery	To be checked annually	Nursery counting, reported in Annual Report
P22	# seedlings planted per nursery	Counting of seedlings planted per nursery	To be checked annually	Planting activities reported in Annual Report
P23	# agroforestry-related meetings per community and/or association per year	Amount of agroforestry-related meetings per community	To be checked annually	Monthly community reports
P24	# participants and/or annual income generated from different agroforestry crops	Survey of income generated from agroforestry	To be checked every 5 years	Report of per capita benefits
C1	Number of Miombo seedlings planted across the ecosystem restoration areas	Counting of Miombo seedlings planted	To be checked annually	Registration of tree seedlings leaving the nurseries for enrichment planting across the restoration areas and photographs of planting activities by the project team.
C2	Survival rate of seedlings planted in the Miombo project areas	Counting of survival rate of seedlings planted	To be checked annually at the end of the rainy season	Monitoring report of survival rate of seedlings planted at the end of each rainy season.
C3	Above Ground Biomass and SOC conditions in the monitoring plots	Measurement of DBH and SOC in nested plots	To be checked every 5 years	Systematic vegetation and soil survey in nested plots (see tech spec). Survey to be repeated every 5 years.

L1	# of trees allocated for timber harvesting and charcoal making from agroforestry cultivation	Counting of trees allocated for timber harvesting and charcoal production	To be checked annually	Registration of agroforestry trees allocated for harvesting and charcoal making
L2	% female participation during the Subcommittee meetings per project area	Amount of female participants in subcommittee meetings	To be checked annually	Reporting and photographic evidence in Annual Report
L3	Formal training in agroforestry and landscape water harvesting techniques	Amount of trainings on agroforestry and landscape water harvesting	To be checked annually	Reporting and photographic evidence of trainings in Annual Report
L4	Metical spent on socioenvironmental reinvestments	Total budget spent on socio-environmental reinvestments	To be checked annually	Financial reporting included in Annual Report
L5	Annual cash income generated from agroforestry activities	Survey on cash income generated from agroforestry activities	To be checked every 5 years	Financial statements of the Agroforestry Work Group
L6	Amount of grass allocated for cut-and-carry (acres)	Registration of cut-and-carry activities	To be checked annually	Reporting on observations (photographs or GPS) by project staff
L7	Metical spent on activities (firebreaks, mulching, swales)	Budget spent	To be checked annually	Financial reporting included in Annual Report
E1	Miombo-species Richness in the project areas	Shannon diversity index	To be resampled every 5 years in the same plots	The evolution of the Shannon index will be reported every 5 years.
E2	Number of observations of uncontrolled fires, timber harvesting and charcoal making in the	Registration of observations of uncontrolled fire, timber	To be checked annually	Reporting on observations (written reports and on maps) by project staff and/or mentioned during the

	miombo enrichment project areas	harvesting and charcoal		four-monthly Community Subcommittee public meetings.
E3	Miombo understory richness in the project area	Shannon diversity index	To be resampled every 5 years in the same plots	The evolution of the Shannon index will be reported every 5 years.

Annex 14 – Project Database



- 15. Miombo Woodlands articles
- 16. Agroforestry and Nursery planning
- 17. Photos
- 18. Budgets and Finances (reporting)
- 19. Human Resources
- 20. Local environmental research
- 21. Social research and community interviews (RESEED)

Annex 15 – Letter of Approval

The approved DUATs and Decree of 3 May 2018 have been made available to the Plan Vivo Foundation and are available upon request. See REDD+ license below

Redução de Emissões por Desmatamento e Degradação Florestal (Redd +)

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA TERRA E AMBIENTE

Licença para desenvolvimento de actividades REDD+ N°. 04 / 2024

Nos termos do Decreto n.º 23/2018, de 03 de Maio e em presença do processo respeitante ao pedido formulado por..... ASSOCIAÇÃO AZADA VERDE ..... para a aprovação do programa/projecto REDD+ denominado..... PROJECTO KUKUMUTY .....a ser implementado no Distrito de ..... Chibabava .....na província de..... SOFALA.....

Concedemos a presente licença, por um período de 20 anos, conforme o número 1 do artigo 22 do decreto em referência. O titular desta licença tem direito sobre a titularidade dos créditos de carbono a serem gerados pelo projecto. No entanto, a comercialização dos créditos de carbono somente poderá ser efectuada uma vez cumpridos os requisitos legais vigentes e mediante a apresentação do certificado de créditos de carbono a ser emitido pelo Ministro que superintende o sector das finanças. Para constar, lavrou-se a presente Licença que, depois de assinada e devidamente autenticada com selo branco em uso nesta instituição. A presente licença está sujeita a condições de operação constantes do verso.

Maputo, 31 de Julho de 2024 Validade até 30 de Julho de 2044

Iveta Joaquim Maibaze

A Ministra

Redução de Emissões por Desmatamento e Degradação Florestal (Redd +)

A concessão da presente licença não dispensa os restantes alvarás ou licenças de qualquer natureza, exigidos pela legislação em vigor, bem como, não significa reconhecimento de qualquer direito de propriedade e nem de uso de terra (DUAT).

A presente licença é regida pelo decreto 23/2018, de 3 de Maio e pelas condições do termo de aprovação do Documento de Desenho de Projecto (PDD) apresentado no comunicado de aprovação que é parte integrante da licença.

Esta licença é válida por um período de vinte (20) anos.

A falta de observação das condições que regem a presente licença constitui infração punivel nos termos da lei, podendo a mesma ser suspensa ou anulada conforme a gravidade da infração.

A Renovação da licença para desenvolvimento de actividades REDD+ é condicionada a apresentação de(a):

a) Bom desempenho do programa/projecto durante a sua vigência que se traduz na produção de créditos de carbono iguais ou superiores aos acordados;
b) Implementação satisfatória do Mecanismo de partilha de beneficios acordado;
c) Relatório sobre avaliação de impacto do programa/projecto com resultados positivos e aprovado pelos parceiros de implementação.

Annex 16 – Financial Plan

The financial plan has been made available to the Plan Vivo Foundation

Annex 17 – Statutes for Community Subcommittees for the Kurarama Kutemba Muty Project – draft for community consultation

1. Each community with an area of land under the Kurarama Kutemba Muty project shall have a community subcommittee chosen by the community who will help to oversee the use of funds generated from the project and the operations required to achieve the project's targets.

2. During the establishment phase, each subcommittee will consist of 9 people.

3. Six representatives chosen by the community with voting rights

4. At least two representatives from the natural resources management committee (CGRN) without voting rights

5. One representative from Azada Verde without voting rights

6. The subcommittee will eventually consist of a total of 15 people.

7. Twelve community representatives with voting rights

8. At least two representatives from the natural resources management committee (CGRN) without voting rights

9. One representative from Azada Verde without voting rights

10. All community representatives will receive a small "cesta basica" (staple food hamper or cash stipend) every 2 months in compensation for their time, efforts and contribution to the project. This is revoked if a representative misses two or more meetings (see #17 below)

11. All committee members will be elected for a 2-year period. Committee members will be allowed to stay on the committee for a period of up to 6 years but must renominate for their position on the committee every two years. Hence, the maximum number of terms will be three consecutive two-year terms.

12. At the formation of the subcommittee, 6 members will be chosen by the community. After one year, at the first annual general meeting, another 6 members will be put forward by the community, at the second annual general meeting the original 6 members will have completed their first two-year term and will be required to renominate and stand for election if they would like to continue.

13. Elections of members will take place at the annual general meeting. Each year six positions on the subcommittee will become available. These positions may be filled by existing

members who are standing down and who have not served more than four years on the committee or by other community members who are not currently on the subcommittee.

14. After a period of 6 years, committee members must stand down and may re-stand for election after one year.

15. At least 50% of the community representatives on the subcommittee must be female and at least one of the representatives of the Committee for Natural Resources Management (CGRN) should also be female.

16. The representative of Azada Verde on the committee will act as the secretary and will be responsible for recording the minutes of meetings.

17. There will be a minimum requirement of at least three meetings per year.

18. Meetings will be used to plan project operations and discuss ways to increase community engagement.

19. The final meeting of the year will be the Annual General Meeting – at this meeting, the budget for the next year's activities will be announced and the amount of money that will go back to the community will also be announced.

20. The meeting prior to the AGM will be used to determine the budget for the next year's activities and a final budget for the following year must be agreed to prior to the AGM.

21. The subcommittee may be required and may choose to call additional meetings throughout the year.

22. At least two-thirds of all voting members must be present at a meeting in order for the meeting to go ahead. If the appointed ex-officio representative from Azada Verde cannot attend, another Azada Verde employee may attend and act in their stead.

23. If subcommittee members miss two or more committee meetings, they may be voted out of the subcommittee by the other committee members unless there are valid extenuating circumstances.

24. There will be a President and Vice-President elected by the subcommittee. At least one of these roles must be filled by a non-male person.

25. In addition to meetings, subcommittee members will also be required to attend training and engagement activities designed to build the overall capacity of the community to manage the project and increase familiarity with project areas and objectives.

26. The role of the subcommittee will be to represent and engage with their community in relation to the activities and outcomes of the Kurarama Kutemba Muty Project.

27. The objective of the subcommittee will be to support the operations of the Kurarama Kutemba Muty Project and to ensure that this project brings benefits to the community through its regeneration activities including the sale of carbon sequestration credits.

28. The scope of the Kurarama Kutemba Muty Project will be thirty years and the subcommittees should operate for the full length of the project.

Dispute resolution

In the case of a deadlock, where subcommittee members are unable to reach a majority decision, the President of the committee can:

1. Choose to give a single casting vote to the three non-voting members (CGNR and Azada Verde) for that decision only
2. Choose to refer the matter to the régulo, sagutas or chefes
3. Choose to call a community meeting to reach consensus on the issue

Where the non-voting representatives of the CGRN and Azada Verde are in agreement that a subcommittee decision is contradictory to the aims and purpose of the Kurarama Kutemba Muty Project and/or rules governing the expenditure of carbon credit income, they have the right to appeal that decision to the President. Examples can be, but are not limited to: Refusal to pursue dispute resolution as per the process defined in the Subcommittee agreement; decisions by the CGRN to undertake logging or sale of KKM project lands to a private party; decisions to use operating funds for non-project activities or allocating carbon credit income for individual gain rather than for socioenvironmental benefits for the whole village community. In this appeal, the non-voting members will be given an opportunity to explain their opposition to the decision and, after hearing these arguments, the committee will vote again. If the decision is still unsatisfactory to the CGRN and Project Coordinators, the issue will be resolved through arbitration by the Régulo.

Annex 18 – Kukumuty Glossary on Key Social Structures

CGRN: Comité de Gestão dos Recursos Naturais – The CGRN is a registered association with the responsibility of managing land and natural resources across the 11 communities in the Mangunde Regulado. It is the recognised institution for overseeing the utilization of community lands in the region. There are 2 members present for each of the 11 communities, except for Mangunde that has 5 members. Consultation with communities and community leaders determined that the CGRN would be the best body to hold the co-titles for designated enrichment areas under the KKM project.

Subcommittee: A CGRN subcommittee is established per project community (i.e. one in Nhaumue and one in Mangunde). Community Subcommittees are local daughters of the CGRN that are active at the most local level and will take the lead in participatory planning and decision-making.

Agricultural association: Grouping of farmers who can hold equal shares in a single co-owned title over the use rights of all their customary lands in a DUAT. These agricultural associations are also formally organised with their respective office-bearers. The associations enable farmers to collectively invest labour and coordinate cultivation in plots near the Buzi River. The associations also work with the assistance provided by Azada Verde for solar-based pumped irrigation to cultivate vegetable crops for household consumption and market sale. They will be involved in the agroforestry interventions.

GETA: Grupo Especial de Trabalho Agroforestal – The project's agroforestry activities and revenue generation will be overseen by a special working group (Grupo Especial de Trabalho Agroforestal) created from participating households in Nhaumue and Mangunde communities and include both non-members and members of the agricultural associations. GETAs are different from the existing agricultural associations. They are organised by the Subcommittees to be responsible for carrying out the agroforestry activities.

Proposed relation between GETA and Subcommittee: The two GETAs (one per village) will operate under their respective Subcommitees. It was decided that one person from the association and another from the community will represent the Agroforestry intervention by participating in the subcommittee, with minimum one woman. Thus, Nhaumue and Mangunde agricultural associations will be represented in their respective Subcommittees.

Régulo: Traditional chief who is head of the Regulado. The Mangunde Regulado counts 11 communities. The régulo is not only a decision-maker, but he is also a spiritual leader connected with the ancestors and he acts as an independent arbitrator in local conflicts.

Saguta: Traditional subchief, working at a more local level and under the guidance of the régulo.