UNITED NATIONS ENVIRONMENT PROGRAMME
NAIROBI CONVENTION

WIOSAP FULL PROPOSALS TEMPLATE

Call title: Implementation of the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities (WIO-SAP)

Participating countries: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, Tanzania [and France (not project beneficiary)]

Executing organization: Nairobi Convention Secretariat

Duration of demo projects: 17 months

Stage of the call: Full proposals

Submission dateline: **15**th July 2019

Organization Name	Center for Sustainable Development of Coastal Zones and Eduardo Mondlane University, Department of Biological Sciences
Project Title	Mangrove Restoration and Livelihood Support through Community Participation in Mozambique
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Registration Details	Type of organization: Government Country: Mozambique Year: 2003 Registration Number: Boletim da República Nº 7, 1ª Série, 2º Suplemento)

Executive Summary:
The proposed project is on Mangrove Restoration and Livelihood Support through Community Participation in Mozambique. The project will be implemented at the Limpopo River Estuary (Mahielane community), building up on an existent mangrove restoration program that started in 2010. The project overall objective is to improve mangrove management in Mozambique through restoration, community empowerment and generating baseline information to support management decision making. The current proposal intends to build up the previous projects, by: (1) Expanding the rehabilitation to other areas in the Limpopo estuary; (2) Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan; (3) Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program, as well as (4) explore other options for long term financial sustainability through partnerships with the private sector.

The project foresees the following activities:

A1. Environmental awareness campaigns to reinforce local understanding regarding the importance of mangroves, sustainable management and their role in climate mitigation and adaptation (Raising community awareness in villages)
A2. Update mangrove forest mapping and distribution, detailing on the overall condition of the forest (health vs. degraded mangrove);
A3. Mangrove forest structural assessment in health, degraded and restored areas
A4. Mangrove carbon inventory in health, degraded and restored areas
A5. Mangrove fauna assessments (particularly of those species with commercial importance);
A6. Conduct mangrove restoration in degraded sites (as identified in A2), following community-based mangrove ecological restoration (CBMER) approaches
A7. Community empowerment in environmental legislation (land law, environmental law, forest law, water law, conservation law), gender and climate change at the Limpopo Estuary
A8. Identify a task group to produce a community-based management plan
A9. Define enforcement mechanisms to be implemented by the community and local authorities
A10. Promote alternative income activities (mangrove honey production) to reduce pressure on the direct use of mangrove derivatives (firewood, charcoal, cuttings)
A11. Identify partnerships to complete the value chain for selected local products (ex. mangrove honey)

The project will involve directly about 400 people and benefit about 27,000 people living in the Limpopo estuary. The Limpopo estuary mangrove restoration initiative is one of the most successful mangrove restoration initiatives in the country, and serves as an important laboratory form mangrove restoration and community involvement in the country and in the region.

The project is planned to last for 17 months, with an estimated budget of US$70,000.39.
Total Project Cost: US$ 219 250.68
Project Schedule: Start date: 01 of January, 2020; end date: 30 of June, 2021
Project duration: 17 months

I. BACKGROUND AND JUSTIFICATION

Mangroves are important ecosystems for the communities from coastal Mozambique, who obtain from these tidal forest's vital goods such as food and wood, and services such as coastal protection and temperature regulation (Macamo et al. 2016). Mangroves are also among the most carbon rich forests in the tropics, with an average of 1 023 Mg carbon/ha (Donato et al. 2011). It is estimated that mangroves deforestation and degradation releases around 10% of emissions from deforestation globally (Donato et al. 2011), even though they account for only 0.7% of coastal forests (Giri et al., 2011). Estimates for carbon storage in Mozambique are scant, but a recent study in the Zambezi delta estimated that the total carbon stocks in the system ranged from 373.8 Mg/ha to 628 Mg/ha (Stringer et al. 2015); while Fatoyinbo and Simard (2013) estimated that on average mangrove biomass account to 111 Mg/ha in the country and that Mozambique has the second largest total mangrove biomass of the continent (30 974 100 Mg of carbon, average of 101 Mg of carbon per hectare). Despite these numbers, blue carbon (including mangrove carbon) was not included in National Determined Carbon for Mozambique.

In Mozambique the most important cause of mangrove deforestation and degradation is human action – mangroves are deforested for wood and charcoal and converted into saltpans. Coastal development and urban expansion are also major threats for peri-urban forests (Macamo et al., 2016). Although country estimates are not accurate, at local scale, the extent of transformation is better known: at Olumbi, in northern Mozambique 25.4% of forest area was lost between 1991 and 2013 due to human and natural pressure (Macamo et al., 2018), while in Beira town 43% of mangrove extent was lost due to city encroachment, and in Maputo Bay 25% and 40% of the mangrove forest in the Xefina and Benguelene Island were also lost between 1984 and 2003 (LeMarie et al., 2003). Part of this forest seems to be recovering, though (Macamo et al., 2015). Natural phenomena such as floods and cyclones were also in the origin of significant losses in some areas such as the Limpopo estuary and Save river delta.

In March 2019 cyclone Idai made landfall in Beira in central Mozambique causing massive mortality on the mangroves near Pungue and Buzi Rivers as well as at Nhangau further north. A month later, cyclone Keneth made landfall north of Pemba town in northern Mozambique, and although mangroves have not yet been assessed, it is expected that impacts were also significant. Mangrove degradation due to natural causes remain though in a much minor extent when compared to human causes (Bandeira and Balidy, 2016; Macamo et al., 2016).

The loss of mangroves has several implications on the socio-economic life of the communities, who lose access to wood resources, food security, protective and regulatory services, increasing the vulnerability to the impacts of climate change. In recent years the Mozambican government has adopted new policies and strategies that aim at increasing community resilience to climate change, promoting adaptation and mitigation the impacts of climate change while also promoting sustainable development. Some examples are the National Strategy for Climate Change Adaptation and Mitigation (2013-2030), the Sea Policy and Strategy, the National REDD+ Strategy and Action Plan and local development strategies (National Five-year Government Plan, National Yearly Economic and Social Plan, Strategic Plan for the District Development, and Local Adaptation Plans), and the Mozambique National Strategy and Action Plan for Mangrove Management. Mangrove conservation, sustainable management and restoration is a priority in many of these instruments. These three actions also respond to several global commitments, such as SDG 13 (Take urgent action to combat climate change and its impacts) and SDG 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) and CBD.

Although it has been carried out in several places across the country, mangrove restoration had limited outcomes in most of the sites due to lack of knowledge of mangrove restoration methods, weak community involvement, lack of financial resources, poor enforcement, among others (Bandeira et al., 2016). The mangrove replantation initiative carried out at the Limpopo River estuary, where 59% of the forest had been lost to floods in 2000, is amongst one of the most successful of the country. The proposed project aims at building on the successful experiences of this site, by monitoring, scaling up in the Limpopo River Estuary and creating a baseline to secure financial sustainability of the project in the near future.

The mangrove forest of the Limpopo estuary is the only mangrove forests in this coastal province. The major floods of 2000 caused human and material losses, but the community of Mahielene was also affected by the loss of mangroves (Christie and Halon, 2001; Bandeira and Balidy 2016). The Mahielene community was one of the most affected by the loss of mangroves, which resulted in loss of wood sources, reduction in fish stocks, and loss of temperature regulation services, among other impacts (Bandeira and Balidy, 2016). In 2010 the local government, represented by the Centre for Sustainable Development – Coastal Zones (CDS-ZC), initiated a mangrove rehabilitation and management program with the participation of the local community, after this had manifested its interest in restoring the area.

The project aimed at strengthening and sustaining community in conservation, restoration, sustainable management of mangroves based on scientific and local principles taking into account the vulnerability of the region to natural disasters, sustainable livelihood security for local communities and conservation of ecologically significant natural resources. Between 2010 and 2016 the project was successful to restore 100 ha of forest, increase community awareness on the importance of mangroves and its conservation; create a local association for natural resources management with local regulations and identify suitable alternative/complementary income generating activities.

The project was a pioneer in the country and one of the few in the region that conducted successful hydrological restoration with positive outcomes. The experiment was made in a rather small area, but with positive results. In 2016/2017 hydrological restoration was tested in Quelimane (northern Mozambique) with similar positive results. However, according to the maps produced prior to mangrove plantation, there are still 400 ha of mangrove to restore, in order to recover pre-floods extension.

Despite setting a solid base for the mangrove regulations enforcement, there is still a ned to strength management structures that will implement and enforce such regulations (for example, there is no local mangrove management plan). Additionally, there is a need to further text and develop some of the already identified alternative IGA in order the reduce the pressure on mangrove resources. For instance, during the first project the women (the most active group in mangrove restoration and the most vulnerable to the impacts of mangrove loss) expressed their desire to form a cooperative and acquire a freezer to improve fish products conservation and quality, thereby increasing their profit. Honey production was another alternative IGA identified, however its value chain is not completed, as the Mahielane community has limited access to the market.

The present proposal offers an opportunity to review and improve several of this aspect, such as extending mangrove restoration to other impacted areas, testing the efficacy of hydrological restoration at a larger scale, enforcing mangrove regulations, developing a management plan, empowering women in their income generating activities and creating partnerships with the private sector. This proposal also creates an opportunity to produce baseline for a future REDD+ as a means to support mangrove conservation efforts, as currently financial sustainability is also an issue.

The current proposal aims at building up the previous projects, by:
1. Expanding the rehabilitation to other areas in the Limpopo estuary
2. Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan;
3. Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program
4. Explore other options for long term financial sustainability through partnerships with the private sector.

II. PARTNERSHIPS

Several partners will make part of this project, including the local communities and local-based associations, academia, government institutions, private sector and others. The table below details on the information of the stakeholders involved.

Partner name and mandate	Role in the project	Resources partner will provide
CDS-ZC	Leading institution Expertise in mangrove hydrological restoration, planting and community involvement	Field equipment for hydrological restoration, salaries of technicians involved
National Institute of Fisheries Research (IIP)	Mangrove management, link to other government institutions, dissemination of study outcomes; policy influence	Human resources (salaries)
Natural Resources Management Committee of Zimilene and Natural Resources Management Committee of Zongoene Sede	Mangrove management, link to the local communities and community engagement	Human resources from local communities for field activities implementation, community engagement Implementation of legislation and regulations for mangrove management
Hanha M'tsey Association – Local CBO	Community mobilization in Mahielene	Human resources from local communities for field activities implementation, community engagement
UDEBA	Sensitization; conflict resolution	Environmental education
Eduardo Mondlane University (Department of Biological Sciences)	Mangrove monitoring, carbon inventories	Field equipment for mangrove assessment, human resources (salaries), car for the field trips
Private sector	Value chain of mangrove products	-
Xai-Xai Municipality	Community sensitization; identification of other relevant partners; identification of other areas for mangrove restoration; land tenure, conflict resolution	Human resources; Municipal land management and implementation of legislation at the municipality level

III. OBJECTIVES

A. Overall objective

The project overall objective is to improve mangrove management in Mozambique through restoration, community empowerment and generating baseline information to support decision making.

B. Immediate/specific objectives

1. Expanding the rehabilitation to other areas in the Limpopo estuary
2. Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan;
3. Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program

4. Explore other options for long term financial sustainability through partnerships with the private sector.

IV. PROJECT IMPLEMENTATION AND MANAGEMENT PLAN (See definitions in Annex 3)

A. Expected project results and indicators

The expected outputs and outcomes are presented in the table below:

Objectives	Expected results	Outcomes/Outputs	Indicators
1. To expand mangrove rehabilitation to other degraded areas in the Limpopo estuary	50 ha of degraded mangrove area are improved or restored	Overall mangrove condition is improved Mangrove ecological services are restored	Number of seedlings planted Extension of channels opened Number of mangrove hectares restored
2. Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan;	A local management plan in designed and approved by the local community The community is more aware of the ecological importance of mangroves and sustainable uses	Local community is empowered in environmental legislation and natural resources management Increased the awareness on mangroves importance Mangroves are conserved and exploited in sustainable ways by local communities Community is able to discuss several issues related to natural resources management, including development projects and climate change local adaptation plans	Number of meetings Different use areas are defined (including “no use” areas) Number of awareness activities Reduced number of illegal mangrove cutting incidents
3. Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program	Carbon stock assessments are conducted for above, below ground and soil carbon in health, degraded and restored mangroves Total carbon in the system is estimated	Most carbon-rich areas in the forest are identified Database to support management decision making is created	Technical report on mangrove carbon assessment for heatlh, degraded and restored mangroves
4. Explore other options for long term financial sustainability through partnerships with the private sector.	Partnerships with other stakeholders (including private sector) are identified Income generating activities are implemented	Commercially exploitable mangrove fauna species are identified Reduced pressure on mangrove resources Mangrove conservation and sustainable management is enhanced	Reports on mangrove fauna occurrence and distribution Number of cooperatives created number of partnerships with the private sector

B. Project activities and work plan

The project activities and work plan are presented in the table below.

Objective	Planned activities	Timing & Duration	Responsibility (bold=coordination)
1.To expand mangrove rehabilitation to other degraded areas in the Limpopo estuary	A1.1. Mangrove mapping and change detection at the Limpopo estuary between 2003 and 2018/9 (update of	Mangrove mapping and structural	**CDS-ZC** **Local communities** NGOs and Local-based organizations

	last mapping). Healthy, degraded and restored areas will be identified A1.2. Mangrove structural assessment in healthy, degraded and restored areas A1.3. Mangrove fauna assessment in healthy, degraded and restored areas A1.4. Mangrove restoration in degraded areas in need of human intervention (planting and hydrological restoration) A1.5. Monitoring of restored areas	assessments: months 1-4 Mangrove restoration: months 4-18 Mangrove monitoring: months 4-20 Final reports: months 20-24	UEM/DCB
2.Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan;	A2.1. Conduct environmental education campaigns on the importance of mangroves and best management practices; A2.2. Community capacity building on environmental law aspects A2.3. Consolidate the existent NRMC and create a task force to produce mangrove local management plan A2.4. Strengthen partnerships with local authorities for community empowerment and enforcement of the management plan	Month 1 to 20	**CDS-ZC** **NGOs** **Local community** IIP Xai-xai Municipality Private sector UEM/DCB
3. To Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program	A3.1. Conduct carbon inventories in above ground, below ground and soil pools in healthy, degraded and restored mangrove forests A3.2. Estimate total amount of carbon in the system	Months 1 to 8	**UEM/DCB** **CDS-ZC** IIP
4. To explore other options for long term financial sustainability through partnerships with the private sector.	A4.1. Facilitate the creation of a Women cooperative for fish trade A4.2. Explore business opportunities for mangrove products (ex. honey, crab *Scylla serrata*) Identify partnerships with the private sector	Months 8 to 20	**NGOs** CDS Xai-xai Municipality Local community

C. Project Beneficiaries

Stakeholders will be invited to participate in different components of the project, however most of the actions will be implemented by the community, while NGOs facilitate, academia and research institutions provide technical advice and private sector supports economic activities through win-win partnerships. Indicators will be developed to all project components and will be assessed accordingly.

The main beneficiaries will be:

1. The local communities, by improving the ecosystem services provided by mangroves. These include provision of wood, fisheries enhancement, coastal protection, climate change mitigation and adaptation. The communities will also benefit from knowledge, capacity building and the socio-economic benefits derived from the development of alternative income generating activities.

2. This project will also contribute to graduate and post-graduate degrees of students and researchers from the Eduardo Mondlane University, IIP and which as well as for the publication of scientific papers

3. The fisheries sector (including private companies, government) will also benefit from the impacts of mangrove preservation through the increase in fish yields and revenue.

4. The NGOs will benefit from the experience and knowledge exchange with other institutions such as CDS-CZ, UEM and IIP and capacity building in mangrove restoration.

5. Mangrove management authorities (local, district, municipal, province and national level) which will be provided with data to support decision making regarding mangrove management. Part of this information/experience can also be adapted to other sites with similar issues.

4. Nationwide this study will contribute to the inclusion of blue carbon on NDCs. Blue carbon inclusion in NDCs will increase the chance of the country to meet its commitments (2020-2030).

5. The study will also make contribution to the global knowledge of mangrove ecology, restoration and community-based management.

6. The study will make a global contribution towards the reduction of carbon emissions and climate change mitigation, fulfilling SDGs 13 and 14.

D. Implementing agency management of project

The implementation structure of the project will incorporate all bodies, however CDS-ZC and the Eduardo Mondlane University will be the leading institutions for the project management. CDS-ZC has nation-wide recognized experience in the implementation of community-based mangrove restoration projects as demonstrated in the Limpopo Mangrove Forests and in Quelimane.

CDS-ZC will lead and coordinate project activities in general, provide technical guidance on mangrove restoration, awareness, community engagement, etc. CDS-ZC has the main office in Xai-Xai nearby one of the implementation sites, which will facilitate both planning and implementation of the project. All sites are known to the main implementing agencies (CDS-ZC and UEM).

The Eduardo Mondlane University (Department of Biological Sciences) has long experience with managing such kind of projects and has a robust structure to assist on the implementation of project activities and logistics. The university will assist CDS-ZC, and will lead the carbon estimation related activities as well as the collection of baseline data for the REDD+ project. Other stakeholders, such as NGOs in all sites will also be called upon to assist in the components related to their activities.

V. PROJECT METHODOLOGY

Objective 1:

Satellite imagery will be used to map changes in mangrove area in the Limpopo Estuary between 2003 and 2018/9. This mapping will update information on mangrove distribution, restored areas from the last project, and identify

degraded areas to be restored in the new project. Remote sensing generated information will be complemented with on-the-ground mangrove assessment, were structural components of the forest and fauna will be targeted (ex.: height, DBH, species composition, sedimentation, etc.). Fauna assessment will have particular emphasis on species of economic importance, which can potentially be exploited for income generation.

Mangrove restoration will be conducted through planting and hydrological rehabilitation, according to each site conditions. Nurseries will be developed for most species (including Rhizophoraceae, which were attacked by pests in the previous campaigns when direct plating was implemented. Seedlings will also be wrapped with reeds *Phragmities australis* to prevent mangrove crab herbivory). The design of the hydrological restoration scheme will be preceded by a topographic survey in the areas to be restored. Garmin GPS Map 62S (Lewis et al, 2006) will be used to generate topographic levels data (dimensions), determine the depth of the channels to be excavated. The excavation will be guided by schematic maps generated by the topographic survey and done manually by the local community (using hoes, shovels, machetes, hand vans and pickaxes). Similar approaches were followed in the previous project and elsewhere (e.g. Indonesia as described by Lewis et al, 2006). The local community will be directly involved in all activities, including hydrological restoration, establishment of nurseries and mangrove planting campaigns. Community involvement will be inclusive and representative to all villages, social groups and gender representativeness. In addition, government institutions, NGOs, universities and the private sector will also be invited to join the activities.

Objective 2:

Environmental education campaigns will be conducted within the community aiming at strengthening the local knowledge on environmental law, best practices, socio-economic importance of mangroves, climate change, gender and diversity issues and other aspects. Several means will be used, such as local radios, theatre performances by local organizations, strengthening of environmental clubs on primary schools, public talks, leaflets and other advertising material. Mangrove-related topics will also be integrated into local lesson plans, and influential local figures also be trained in natural resources management, sustainability, environmental law and other relevant aspects. The community will also be encouraged to produce a local mangrove management plan, considering local knowledge and customary uses. This plan shall include different categories of use (e.g.: no use zone, pole-producing zone, crab fishing zone, etc.), a detailed mangrove planting plan, limits of the mangrove area under community management, local roles and regulations for mangrove cut and penalties for offenders. Incentive systems will also be discussed in this forum. Two Natural Resources Management Committees have already been created in the area, and this shall be the appropriate forum for the discussions in public meetings. The meetings will be chaired by the Head of the Locality.

Prior to the start of all project activities, an official launch of the project will be undertaken, which will be carried out through preliminary activities (invitations to government entities, coordination with local government, local community leadership, and implementation partners). The launch will explain in detail the objectives of the project and the main implementation mechanisms. This will be a large public event.

Objective 3. Mangrove carbon inventories as a baseline for REDD+ project on mangroves

Mangrove carbon inventories will be conducted following standard protocols such as does of Kauffman and Donato (2012), which were also adopted in the WIO Region with small modifications (eg. Shape of the plots). Rectangular plots will be set along a transect line drawn perpendicular to the coast line and separated by at least 25 m. structural data on mangrove height, diameter and species composition will be collected for each tree. General allometric equations will be used to estimate above and below ground biomass [using wood densities developed for the Zambezi delta (Bosire et al., 2012)]. The soil biomass will be assessed to at least 1m depth, using a soil core sampler. Soil samples will be collected at 0-15 cm; 15-30 cm; 30-50 cm and 50+ cm. The samples will be oven dried and burnt in a muffle for organic content. Conversion factors (of approximately 0.5) will then be used to estimate the amount of carbon in the soil and live biomass. The total carbon of the system will be estimated by summing the different pools (above ground biomass, below ground biomass and soil). Carbon estimates will be conducted in healthy, degraded and restored mangrove forests.

Objective 4. Development of alternative/supplementary livelihoods

The project will focus on empowering communities to reduce pressure on the mangroves through implementation of alternative and supplementary livelihoods. Based on the previous studies (Nehama *at al*., 2016) a set of livelihood activities to cope with climate change were identified for Zongone Administrative post (Limpopo estuary). The project will support few of these in a pilot demonstration enterprise. Other livelihood activities could be identified and added with consultation with the community. Special attention will be given to incorporating women and youth to ensure economic benefits are fairly distributed since they form the majority of underemployed or unemployed. Some of the livelihood activities to be support on a demonstration venture include and not restricted to the following:

Beekeeping – about 20 bee hives to be provided.

VI. SUSTAINABILITY AND REPLICABILITY

The project long term sustainability will be assured through:

1. Community engagement and appropriation

2. Implementing a local incentive system designed by the community

3. Alignment of the project objectives with national agenda, national mangrove management and action plan, and global commitments, which will provide technical assistance from formal management and enforcement institutions.

4. Establishment of win-win partnerships with the private sector

5. Produce baseline information to access carbon markets

6. Consider opportunities for Payment for Ecosystem Services.

VII. PROJECT MONITORING AND EVALUATION

The mechanism for project monitoring is described below:

1. A Project Management Committee will be created, which will be composed by the project Principal Coordinator and one coordinator for each of the main components (e.g.: social area; mangrove restoration; carbon inventory; economic activities; etc.);

2. This Committee will hold virtual meetings once a month to report on the project activities and discuss important issues related to project implementation;

3. Project teams will be asked to report their activities every 3 weeks (standard form will be provided). The report will be submitted one week before the PMC meeting, for compilation and preparation of the PMC meeting. The teams will also be requested to list proposed activities for a 3-months period, at the end of which they will write a report on which activities where accomplished and what were the outputs. Justifications will be presented for those activities that were not accomplished (comments and suggestions for improvement will be requested when applicable).

4. A secretariat for project management will be created, which will be responsible to keep updated information on the project activities, meeting scheduling, reports collection and compilation, communication among participants and other activities to ensure project monitoring and evaluation.

VIII. BUDGET

The table below summarizes the project budget for each of the activities. For mangrove restoration this project will conduct hydrological restoration and minimal planting, which will be conducted to assist regeneration only if necessary. Mangrove monitoring will be conducted once a month, and aims at assessing the success of restoration, the need for planting and identification of threats for regeneration success such as crabs predation on propagules. The

carbon inventories will be conducted in 4 campaigns and include travel and accommodation of UEM staff and students.

The project also intends to strengthen the community-based management structure at the Limpopo estuary with the assistance of NGOs. These will be used as a platform to raise awareness on the importance of mangroves, targeting not only the communities living nearby the mangroves, but also those that make use if mangrove resources. Dissemination material will include flyers, t-shirts, posters, and others. One or more persons will he hired for the project secretariat during the whole term of the project, and other (one or two) for a shorter period.

Incentives (to be discussed) will be provided to several groups, including community members, CBOs, municipal council officials, and other people when considered appropriate. There will also be a project kick off meeting to be held in Maputo or Xai-Xai. The co-financing for the project consists mainly on the salaries of all the staff from CDS-ZC, UEM and IIP. The Eduardo Mondlane University and CDSZC, both will also provide two cars, (one car per institution free of charge (petrol and minor maintenance costs will be charged only). All these costs amount to approximately US$ 219 250.68.

Annex1: Example of workplan

		Year 1												Year 2				
Task	**Responsible**	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
Overall objective: The project overall objective is to improve mangrove management in Mozambique through restoration, community empowerment and generating baseline information to support decision making.																		
Outcome 1.0	**Restoration of ecological services and Enhanced coastal protection**																	
Output 1.1 Restoration of ecological services and Enhanced coastal protection	**CDS-ZC**																	
	Local communities																	
	NGOs and Local-based organization																	
Activity 1.1. Mangrove mapping and change detection at the Limpopo estuary between 2003 and 2018/9 (update of last mapping). Healthy, degraded and restored areas will be identified	**CDS-ZC**																	
	UEM/DCB																	
Activity 1.2. Mangrove structural assessment in healthy, degraded and restored areas	**CDS-ZC**																	
	UEM/DCB																	
Activity 1.3. Mangrove fauna assessment in healthy, degraded and restored areas	**CDS-ZC**																	
	UEM/DCB																	
Activity 1.4. Mangrove restoration in degraded areas in need of human intervention (planting and hydrological restoration)	**CDS-ZC**																	
	Local communities																	
	NGOs and Local-based organizations																	
	UEM/DCB																	
Activity 1.5. Monitoring of restored areas	**CDS-ZC**																	
	Local communities																	
	UEM/DCB																	
Outcome 2.0	**Improving the community-based management system in the Limpopo Estuary, providing capacity building to the local community and designing a local management plan**																	
Activity 2.1. Conduct environmental education campaigns on the importance of mangroves and best management practices;	**CDS-ZC**																	
	NGOs																	
	Local community																	
	IIP																	

		Year 1												Year 2				
Task	**Responsible**	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	Xai-xai Municipality																	
Activity 2.2. Community capacity building on environmental law aspects	**CDS-ZC**																	
	NGOs																	
Activity 2.3. Consolidate the existent NRMC and create a task force to produce mangrove local management plan	**CDS-ZC**																	
	NGOs																	
Activity 2.4. Strengthen partnerships with local authorities for community empowerment and enforcement of the management plan	**CDS-ZC**																	
	NGOs																	
	Local community																	
	IIP, local authorities																	
	Xai-xai Municipality																	
Outcome 3.0	**Produce baseline information for the implementation of REDD+ project as a means to create long term sustainability for the program**																	
Activity 3.1. Conduct carbon inventories in above ground, below ground and soil pools in healthy, degraded and restored mangrove forests	**UEM/DCB**																	
	CDS-ZC																	
	IIP																	
Activity A3.2. Estimate total amount of carbon in the system	**UEM/DCB**																	
	CDS-ZC																	
	IIP																	
Outcome 4.0	**To explore other options for long term financial sustainability through partnerships with the private sector.**																	
Activity 4.1. Facilitate the creation of a Women cooperative for fish trade	**NGOs**																	
	CDS																	
	Xai-xai Municipality Local community																	
Activity 4.2. Explore business opportunities for mangrove products (ex. honey, crab *Scylla serrata*)	**NGOs**																	
	CDS																	
	Xai-xai Municipality Local community																	
Activity 4.3. Identify partnerships with the private sector	**NGOs**																	

		Year 1												Year 2				
Task	**Responsible**	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
	CDS																	
	Xai-xai Municipality Local community																	

Annex 2: Logical Framework

Project title: Mangrove Restoration and Livelihood Support through Community Participation in Mozambique			
Project overall objective: To improve mangrove management in Mozambique through restoration, community empowerment and generating baseline information to support decision making			
Project Results	**Outputs**	**Activities**	**Costs /output (US$)**
Outcome 1: Enhanced mangrove condition, extension and ecological services (such as coastal protection, wood and fish provision, carbon sequestration and others);	Healthy, degraded and restored mangrove areas identified Mangrove forest condition improved in 20 ha	A1.1. Mangrove mapping and change detection between 2003 and 2018/9 (update of last mapping). Healthy, degraded and restored areas will be identified A1.2. Mangrove structural assessment in healthy, degraded and restored areas A1.3. Mangrove fauna assessment in healthy, degraded and restored areas A1.4. Mangrove restoration in degraded areas in need of human intervention (planting and hydrological restoration) A1.5. Monitoring of restored areas	**Sub - total** 20 375,00
Outcome 2: Mangrove forests at the Limpopo estuary are managed in a sustainable way	Local communities are aware of the ecological and socio-economic of mangrove forests Local communities are trained in natural resources management and good practices A Local plan for mangrove management is conceived Partnerships between stakeholders are strengthened	A2.1. Conduct environmental education campaigns on the importance of mangroves and best management practices; A2.2. Community capacity building on environmental law aspects A2.3. Consolidate the existent NRMC and create a task force to produce mangrove local management plan A2.4. Strengthen partnerships with local authorities for community empowerment and enforcement of the management plan	11 775,00

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Outcome 3: Baseline information for a REDD+ project on mangrove forests	The amount of above and below ground carbon, as well as soil carbon in healthy, degraded and restored forests is estimated The total carbon of mangrove stored in the system is estimated	A3.1. Conduct carbon inventories in above ground, below ground and soil pools in healthy, degraded and restored mangrove forests A3.2. Estimate total amount of carbon in the system	12 327,39
Outcome 4: Gender equality promoted Reduced women vulnerability Alternative livelihood options explored Reduced pressure on mangrove resources	A women's fishing cooperative is created alternative income generating activities Partnerships with the private sector are created to complete the value chain of alternative products/activities in the community	A4.1. Facilitate the creation of a Women cooperative for fish trade and support on the acquisition of some equipment (e.g.: one freezer) A4.2. Explore business opportunities for mangrove products (ex. honey, crab *Scylla serrata*) and other locally produced products A4.3. Identify partnerships with the private sector	25 523,00

Annex 3: Project Monitoring Plan

Project Title: Mangrove Restoration and Livelihood Support through Community Participation in Mozambique			
Project overall objective: The project overall objective is to improve mangrove management in Mozambique through restoration, community empowerment and generating baseline information to support decision making			
Project Results	**Indicator**	**Target/baseline**	**Method**
Outcome 1: Enhanced mangrove condition, extension and ecological services (such as coastal protection, wood and fish provision, carbon sequestration and others)	Ind.1.1. Number of seedlings planted Ind. 1.2. Extension of channels opened Ind. 1.3. Number of mangrove hectares restored	Target: Restored/Improve the condition of 50 ha of mangrove forests Baseline: 100 ha of mangrove have already been restored. Mapping from the previous projects gives indicative location of additional sites to restore. Suitable species for the forest have already been identified. A nursery area has been created and is still operational, although at lower capacity. Due to crab seedling predation, Rhizophoraceae species must also be cultivated in the nursery and then transported to the field, wrapped in reeds (*Phragmites australis*) to protect the young stem.	Mangrove distribution and change detection maps will be produced covering the period from 2003 to 2018/9. This will provide updated information on current forest distribution and areas to be restored. This information will be complemented with on-ground structural data collected throughout the forest. Transects perpendicular to the coast line will be set. In each transect, 10 x 10 m quadrats separated by not less than 25 m will be set. Forest structural data will be collected from each quadrat, and this shall include species identification, number of trees per species, diameter and height of each tree and counting the number of juveniles per class. This information will be used to characterize forest structure. Based on both mapping and ground data, the sites for forest restoration will be identified. Forest restoration will follow community-based hydrological restoration or planting, according to specific conditions on the site. The hydrological restoration plan will be preceded by a topographical study, which will determine the depth of excavation and location of the channels to be excavated. CDS-ZC and partners will be in charge of this process. The opening of channels per se will be executed manually by the local community with the supervision of CDS-ZC technicians, using basic agricultural instruments (hoes, shovels, machetes, hand vans and pickaxes) (Lewis et al, 2006). Seedlings for planting will be cultivated in a community nursery. Nursery maintenance services will be provided by the community (approximately 10 people). We expect to produce approximately 50,000 mangrove seedlings will be produced from the nursery. Mangrove planting will only be conducted after normal tidal flux ins established however the tides fail to bring seedlings for natural regeneration. Planting will be conducted by the local community, which will be mobilized for its massive participation. Incentives to the community will be discussed. Other stakeholders (local government, private sector, local associations, local NGOs, and other stakeholders) will also be engaged on a voluntary basis.

Outcome 2: Community empowerment in environmental legislation (land law, environmental law, forest law, water law, conservation law) and gender, law) and gender, diversity and climate change	Ind. 2.1. Local management plan Ind. 2.2. Number of community meetings Ind. 2.3. Reduction on the number of illegal mangrove exploitation incidents Ind. 2.4. Number of community members attending community events Ind. 2.5. Number of active member in mangrove activities	Target: Local mangrove management plan is produced and implemented Baseline: Two Natural Resource Management Committees have already been created the previous project has started raising community awareness on the importance of mangroves	Community empowerment will be achieved through community training and capacity building in several environmental matters, including: mangroves importance, environmental legislation, climate change, gender equality and diversity, and others. Community meetings will be held where facilitators will promote discussions among the community. This training aims to provide the community with knowledge about their rights and duties before the law in the management of natural resources. Issues related to the integration of gender and diversity, equity in decision-making and management of natural resources will also be addressed. The community will be encouraged to develop a local mangrove management plan, which should integrate local knowledge, customary uses and locally delineated rules for mangrove resources use, ensuring a sustainable exploitation model. This management plan shall also clearly delineate the mangrove area under community management and different use zones (e.g: no take zone, cutting zone, restoration zone, etc.). Several resources will be used to disseminate information and promote discussions, including community radio, theatre performances by local groups, flyers, environmental clubs at primary and secondary schools, etc. Also influential people from the community will be trained to help spread the message. A project official launching will be undertaken, which will be carried out through preliminary activities (invitations to government entities, coordination with local government, local community leadership, and implementation partners). The launch will explain in detail the objectives of the project and the main implementation mechanisms. This occasion consisted of a large public event where there will be exhibitions of several local culture dancers, among others
Outcome 3: Baseline information is generated for the implementation of a REDD+ project	Ind. 1 Technical report on mangrove carbon assessment for health, degraded and restored mangroves;	Target: Quantify the total amount of carbon stored in the mangroves of the Limpopo River Estuary. Baseline: species composition at the Limpopo estuary is known	Carbon assessment will be conducted following standard protocols such as Kauffman and Donato (2012) with small adaptation. Sampling will be done in health, degraded and restored mangroves along the Incomati estuary. Ten by ten quadrats will be set along transect lines perpendicular to the coast line. All adult trees will be identified and measured (height and diameter) in each quadrat. Allometric equations will be used to estimate above and below ground biomass, using wood densities calculated for the Zambezi delta (Bosire et al, 2012) and general equations (Komiyana et al., 2005). Soil samples will be collected (one sample per quadrat) up to 100 cm, with one sub-sample taken at the depths of 0-15 cm; 15-30 cm; 30-50 cm and 50+ cm. Soil sub-samples will be lab-processed (dried, grained and burnt in a

			muffle) for organic matter content. Carbon content for both biomass and soil will be estimated with a conversion factor (approximately 0.5). The total carbon of the system will be obtained by summing carbon from the main pools (above ground biomass, below ground biomass and soil carbo).
Outcome 4: Alternative income-generating activities are identified and developed. Pressure on mangrove forest resources is reduced	Ind. 4.1. Number of cooperatives created Ind. 4.2. Number of partnerships with the private sector Ind. 4.3. Number of families engaged in new alternative IGA	Target: One Women's fishing cooperative is created At least five families engage in alternative/complementary IGA (20 bee hives) At least one partnership with private sector is created Baseline: The community has received training in honey production The community reports an increase in mangrove crab *Scylla serrata* population	The project will focus on empowering communities to reduce pressure on the mangroves through implementation of alternative and supplementary livelihoods. Based on the previous studies (Nehama *at al*., 2016) a set of livelihood activities to cope with climate change were identified for Zongone Administrative post (Limpopo estuary). The project will support few of these in a pilot demonstration enterprise. Other livelihood activities could be identified and added with consultation with the community. Special attention will be given to incorporating women and youth to ensure economic benefits are fairly distributed since they form the majority of underemployed or unemployed. Some of the livelihood activities to be support on a demonstration venture include and not restricted to the following: Beekeeping – about

Annex 4: Budget

	Category	Quantity	Unit Cost (US$)	Total Cost (US$)	WIOSAP Support	Co-financing
1.	**Personnel**	10	600	144 000,00	0,00	144 000,00
2.	**Equipment**	1	1 500	1 453,21	3 750,00	-
		1	1 270,00	1 270,00		
		1	1 000,00	1 111,11		
3.	**Operating costs**	1	100,00	46 563,73	41 313,73	5 250,00
		10	-			
4.	**Contract Services**	1	2 000,00	2 000,00	2 000,00	-
5.	**Travel**	4	3 000	12 327,39	12 327,39	**-**
		1	6 000	8 034,00	8 034,00	
		2	750	2 575,56	2 575,56	

Definitions

- **Personnel:** This will be critical personnel required for the successful implementation of the project e.g. a Project Coordinator. Such a role can also be cost-shared with another ongoing project, which has complementary interventions to the proposed WIOSAP project. This category will also include required consultants who may be required for critical technical expertise in the project.
- **Equipment:** This will include a computer, printer, any required office furniture, critical water quality measuring instruments of a reasonable and cost-effective budget etc.
- **Operating costs:** Will include internet, mailing and where very necessary, telephone charges. Will include stationary, fuel and other necessary inputs without a recurring value.
- **Contract services**: Where external services will be required to bring in critical expertise e.g. contractors for construction works etc. This category also includes meetings/workshops e.g. contracted conference package.
- **Travel:** To include ticket costs, local transport and daily subsistence allowance.

Annex 4.1: Budget justification

	Category	Justification
1.	Personnel	Personnel costs consists on salaries of UEM and CDS-ZC salaries. These will be covered by the respective institutions
2.	Equipment	Equipment includes a laser topographic laver, GPS, Laptop, and specific equipment to measure soil and water physic-chemical parameters (salinity, pH, conductivity, etc.), fuel, etc. These parameters are important to assess mangrove forest condition, however neither UEM nor CDS-ZC have such equipment.
3.	Operating costs	Operational costs are the biggest share of the costs. These include: mangrove mapping (images, software), nursery maintenance, community incentives, small investment for IGA (ex., buying a freezer) and project advertising material. Operational costs shall also cover expenses of mangrove planting campaigns. Co-financing of operational costs covers car rental, field material and laboratory use.
4.	Contract Services	Consultant services may be required for assistance on topographical surveys.
5.	Travel	Travel costs including costs for 4 trips Maputo-Limpopo-Maputo for mangrove structure assessment and carbon inventories; at least 2 trips Limpopo-Maputo-Limpopo for 4 CDS-ZC staff members to attend meetings in Maputo; and one trip of a regional UEM partner for exchange of experiences in mangrove restoration.