Commissioned by:	UN Environment, CTCN, Adaptation Fund
Project Title:	Implementation of Water-Food-Energy nexus using digital technologies for local communities in Mozambique
Implemented by:	HUB & Practica
Country:	Mozambique
Deliverable:	3.2 Minute of the stakeholder consultation workshop to present the (draft) architecture of the WEF diagram with photos, materials, list of participants disaggregated by gender.

Implementation of Water-Food- Energy nexus using digital technologies for local communities in Mozambique

The minutes of the stakeholder consultation workshop will present the (draft) architecture of the Water-Energy-Food nexus system for local communities in Mozambique, including materials and a list of participants disaggregated by gender and photos.

February 2025

Agência de Desenvolvimento has proposed this project do Vale do Zambeze.

With the support of the Ministry of Science and Technology and High Education

Implemented by PRACTICA & HUB

Commissioned by UN Environment, CTCN, Adaptation Fund

Disclaimer

This document is an output of the Technical Assistance Response in Mozambique. The present report is the output of the project ‘‘Implementation of Water-Food-Energy nexus using digital technologies for local communities in Mozambique’. The views and information contained herein are a product of the international TA implementation team led by PRACTICA & HUB.

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1. Introduction

This report is part of the deliverables for the implementation of the Water-Food-Energy nexus using digital technologies for local communities in Mozambique, which was implemented by the consortium PRACTICA and HUB. The overall objective of the project is to develop a fit-for-purpose system for one selected farm in the Zambezi Valley in Mozambique that will include aquaculture, biodigester, bio composting, and hydraulic management systems (including water storage and solar pumping integrated systems for drip irrigation).

The present report presents the results of the stakeholder consultation to present the draft decision of the system in the presence of the stakeholder working group and the owner of the selected farm. Feedback has been processed in a template to facilitate its incorporation in the refined design. The discussion prioritized identifying other possible needs, risks, and opportunities that should be considered while designing the system's architecture.

2. Objectives

The overarching objectives of the inception meeting were to:

1. Present the (draft) architecture of the Water-Energy-Food nexus for the selected farm in Chimoio, Mozambique Solar
2. Collect inputs and feedback on the technical design from the restrictive working group.

2.1 Agenda

Agenda

1st Technical presentation for the design of the project 'Implementation of Water-Food-Energy nexus using digital technologies for local communities in Mozambique.'

Location: Online[1]
Local time: Mozambique (GMT+2)
Date: 30th January 2025

Time	Activity
08:45-09:00	Opening access to the meeting link, troubleshooting internet and audio connections All
09:00-09:30	Presentation of the agenda and update on the status of the project activities Julia Barreto (HUB) & Aldo Zamarroni (Practica)
09:30-10:00	Presentation of the first draft of the WEF system designed Aldo Zamarroni (Practica)
10:00-10:30	Participatory discussion to collect feedback from the working group on the design- Julia Barreto (HUB) & Aldo Zamarroni (Practica)
10:30-10:45	Q&A, next steps Julia Barreto (HUB) & Aldo Zamarroni (Practica)

The materials used during the workshop (in Portuguese and English) can be accessed at the following link: https://drive.google.com/drive/folders/19P8j7o788EHPP609lPLvxQ9sHjzTVe8w?usp=drive_link

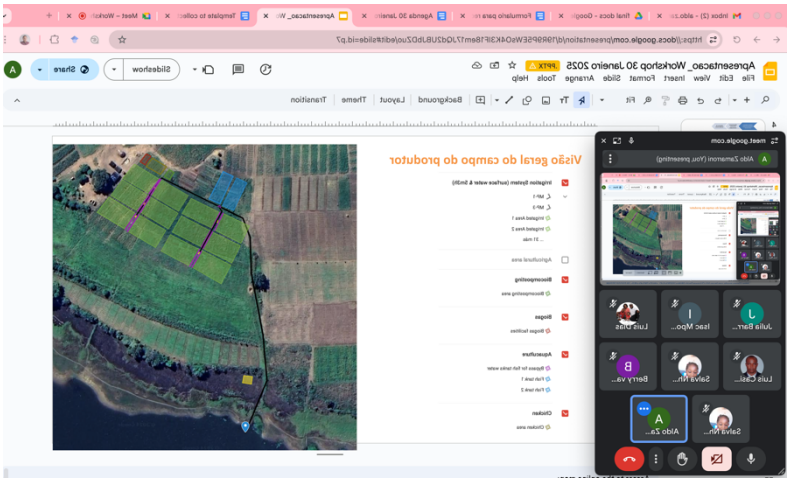

FIGURE 1. ONLINE MEETING.

[1] The meeting took place online, due to the ongoing security and political situation in the country, which does not allow for field implementation.

2.2 List of Attendants

Table 1. List of participants.

No	Name	Institution	Gender
1	Luis Dias	Agência de Desenvolvimentos do Vale do Zambeze (ADVZ)	Male
2	Isac Daniel Mponha	Centro de Investigação e Transferência de Tecnologias (CITT)	Male
3	Luis Savanguane	Instituto de Investigação Agronómica de Moçambique (IIAM)	Male
4	Jonas Domingos Tomas	Produtor selecionado	Male
5	Berry Van den Pol	Practica	Male
21	Júlia Liliana de Jesus Barreto	HUB	Female
22	Lizandra Nhalungo	Serviço Distrital de Atividades Económicas (SDAE)	Female

3. Main outcomes of the consultation workshop

3.1 Update on the project and presentation on the WEF design

Aldo Zamarroni, as the project leader, presented an overview of the project's status. Clarifying the delay in the deadlines expected for the project implementation. Group The presentation of the draft architecture started with the different land uses on the farm.

Figure 2 below shows an overview of the system's water-energy-food flowchart being designed for the selected farm. The green arrows represent inputs into the system, and the red arrows showcase outputs, which are often a result after a particular process takes place. This diagram aims to show the interconnectedness between the technologies and to provide a common ground to begin the technical design and sizing of the technologies in the field.

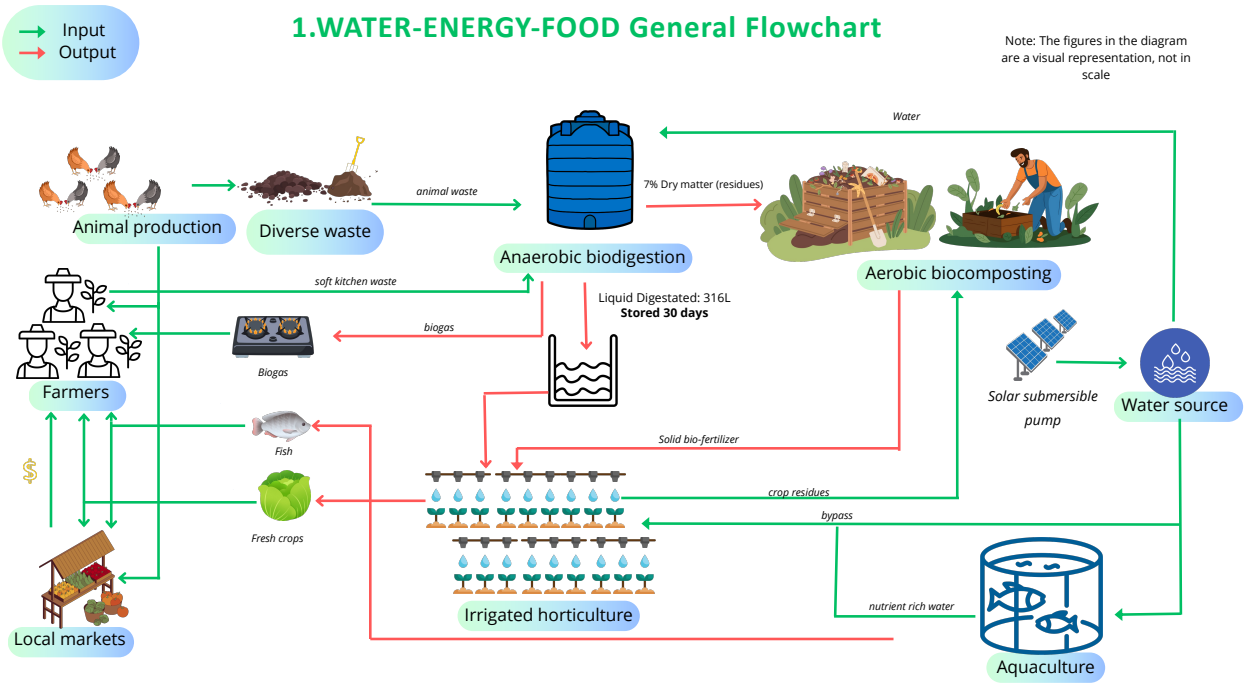

Figure 2. Flowchart of the Water-Energy-Food nexus technologies.

The figure below provides an overview of how the technologies can be distributed on the farm. The red square represents the biogas facilities, and the yellow square represents the facilities for chicken production. Green small squares are the facilities for bio-composting, next to the two aquaculture tanks represented in blue. The 12 yellow-green squares represent 0.5 irrigated area in total (see figure below).

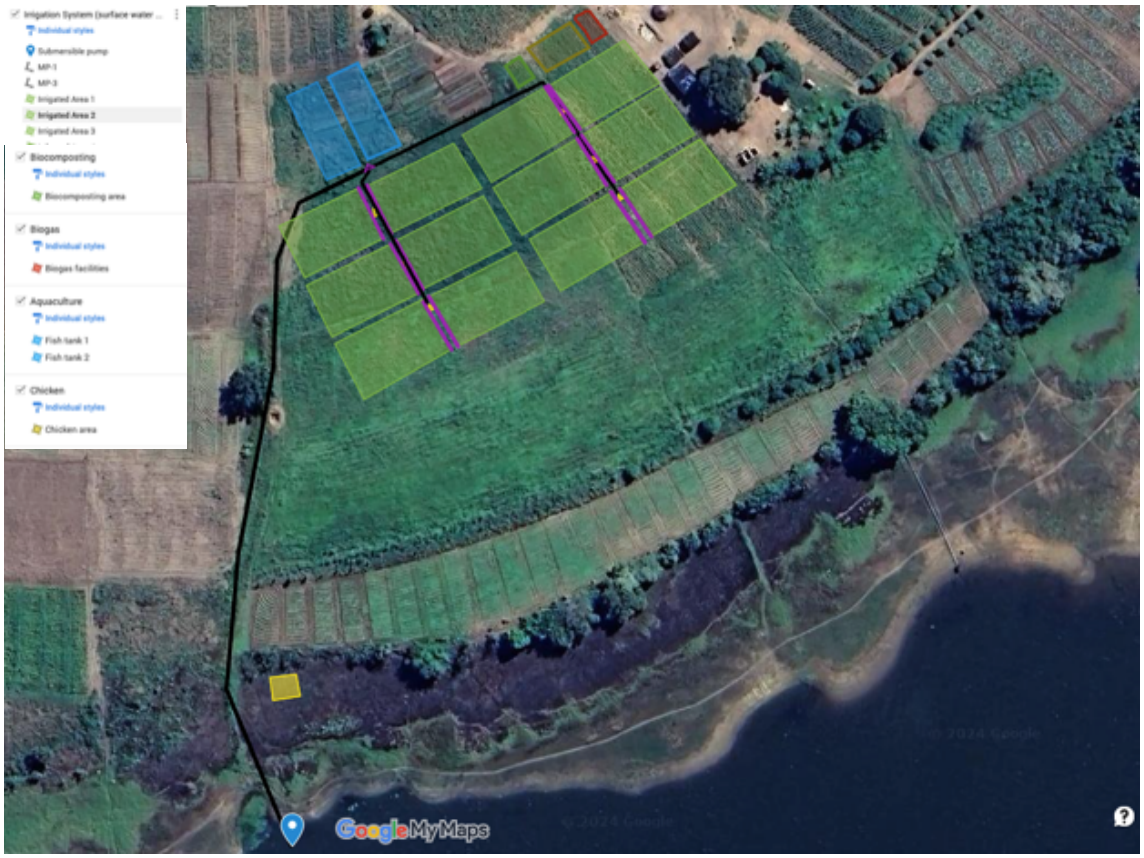

Figure 3. Overview of the productive areas distributed in the selected farm.

The farm terrain rises about nine meters from the lake to the center of the farm (see red arrow in the image below), after which the terrain flattens. The maximum slope in this trajectory is 5.4 %.

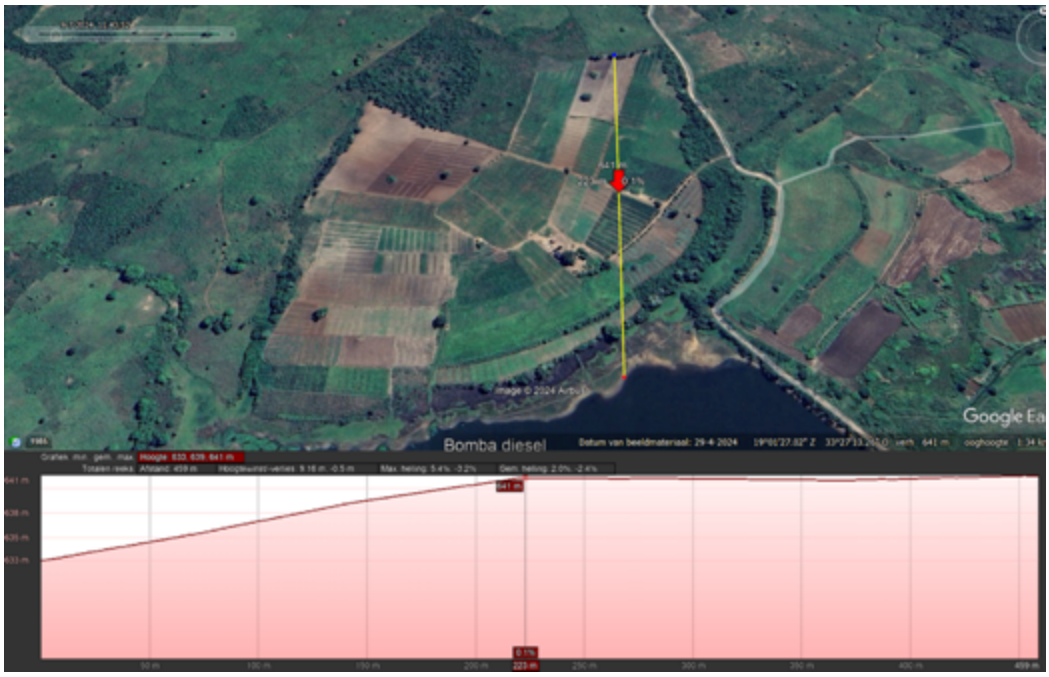

Figure 4. Slope analysis from the lake to the center of the farm.

Drawing a diagonal line from the lake to the upper left side of the farm (see image below) shows an elevation of nine meters towards the center of the farm (red arrow) and a total

elevation difference of 15 meters (see figure below). The maximum slope in this direction is 7.8%, with an average slope of 3.6%. The collected slopes will mainly be used to design the aquaculture system and the solar pump's capacity.

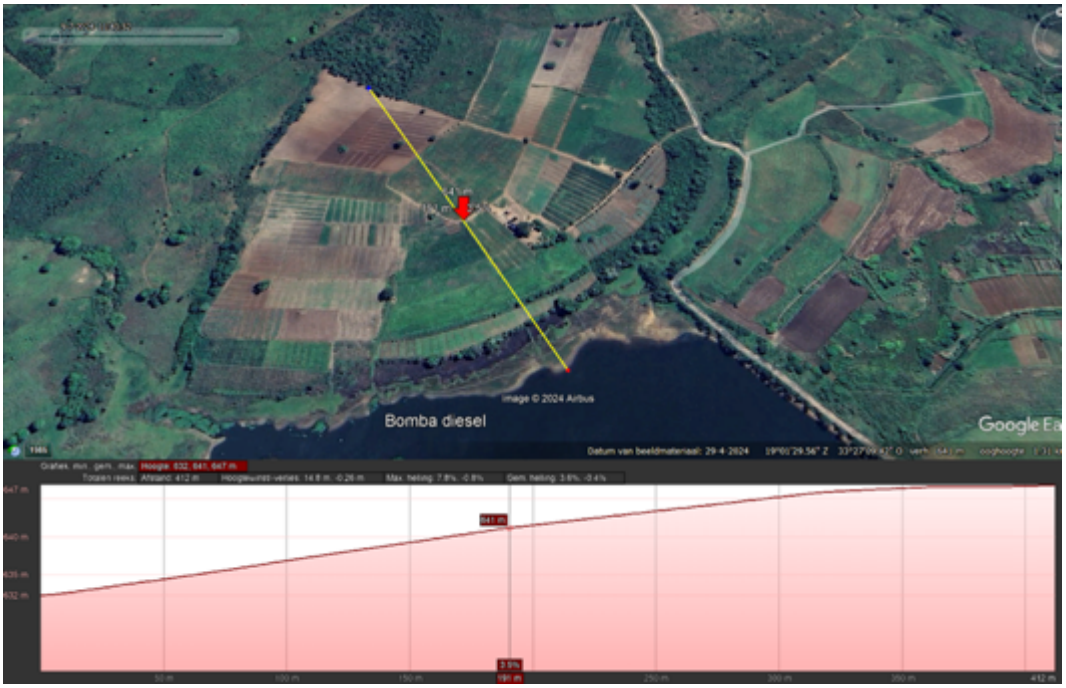

Figure 5.Slope analysis from the lake to the upper left side of the farm

3.2 Discussion session to collect contributions from the workshop participants

A plenary discussion session took place for participants to raise their observations raise questions and doubts on the presented design, and the interconnectedness between the different technologies within the system. Feedback collected is presented in the table below. The issues collected in the Table below will be used by the consortium to improve the quality of the design for the second revision round.

Table 2. Feedback collected during plenary session.

Concerns raised during the discussions		Possible (Solutions)
1. What are your initial impressions of the technical design?	1. Overall, it is a good, promising, futuristic and sustainable technology. 2. The technical project is challenging and complex, requiring a lot of mastery of its technical aspects.	Once the design has been approved and finalized, capacity building needs to take place to communicate realistic expectations from the system, what would be estimated costs and what is the business case behind the WEF system that is being designed. The cost estimation and business case, are part of this project under outcomes 4 and 5. Also, when the system is built (on a next phase, or with direct investment from the farmer), the involved technologies and its

		interconectiveness will become clearer to the people.
2. Are there any gaps or areas where additional details are needed?	1. Is it possible to consider water consumption for the family in the design? The design can also add a tap to facilitate access to get water for the workers. 2. Include technical details of the irrigation system to be installed, considering local conditions and agricultural purposes. 3. Technical details of using human fecal material for the system (procedures for its use versus public and environmental health).	A water tap will be added into the design to facilitate workers to access water from the solar-powered irrigation system. Due to the difficulties of using human fecal material for the system, and with the vision to make a realistic design, the human fecal material will be removed as an input for the biodigester and will be replaced by animal manure.
3. Does the proposed system ensure water sustainability for all intended uses (e.g., agriculture, energy production)?	1. Yes, since the flow/volume of water is sufficient according to what we have already heard, however, I suggest the inclusion of maintenance details (training) of the system as a whole 2. Yes, the system is sustainable.	
4. Should we address any water-energy-food inefficiencies or interdependencies in the current design?	1. It is not inefficiency, but a certain way is interdependent. I believe that if one system element fails, the whole system fails. 2. The idea is to add the excrement from chickens to the fish tanks to use it as food for the fish and as fertilizer for the crops irrigated with that water.	The chicken excrement will be incorporated into the fish tanks as food for the fish and fertilizer for the irrigated crops.
5. Are there any cultural, social, or	1. The use of human fecal material should be	The cost of the system will be discussed under output 4.

economic factors we should consider to make this design more acceptable and effective?	discussed, considering its social, cultural, public health, and environmental impact. 2. The cost of the system is an essential factor that should be weighted when designing the system. The overall focus should be on allowing the easy replication of the design by more families in the region. 3. There are cultural factors, and the community or the farmer's values and beliefs should be considered when deciding specific design steps. For example, when it comes to using human faeces for biogas composition is something new, and there may be a lot of discomfort, which is normal.	The human fecal use has been removed from the desing to avoid having a desing that does not fit the values and beliefs of rural communities in Mozambique, for which this system is being designed for.
6. What risks or vulnerabilities do you foresee in this design due to climate change or other external factors?	1. Economic risks in the maintenance of the system (costs and/or availability of the necessary materials) 2. Possible animal outbreaks (external animals that enter the farm to eat the crops, fish) 3. Risk of theft when there is state-of-the-art technology installed on the farm 4. Risk of having technology that cannot be easily fixed with the available tools and knowledge in Chimoio. 5. The risk would be climate or natural changes, considering that we will use water	Cost estimation and business case behind the WEF desing will be co-produced under Outputs 4 and 5 of this project. Risk of theft is being considered when selecting the suitable technologies to be installed in the fields. Same for technologies that cannot be easily fixed in the Chimoio city.

	from the dam. The fear would be the water level dropping, taking into account that we currently register changes or increases in temperature that cause the water level of rivers, lakes and dams to drop and taking into account the slope of the space taking into account that the dam is right next to the farm. 6. We propose that we consider the location of the aviaries since it is a system; if the aviaries were close to the fish tanks, it would be suitable for the fish and the crops in the field.	
7. Extra comments (please specify...)	It is a good initiative; however, It is good to think about the possibility of using locally available resources for the installation of the system to give sustainability to maintenance.	The use of locally available resources is being considered in the desing, and will be further addressed in the next steps of the technical assistance. Especially when desining the cost estimation (prices of technologies that are already available in Mozambique will be used).

Final remarks and next steps

The participants were informed that the feedback would be considered and an improved design version will be presented in the coming weeks.