



**Technical Assistance:** Implementation of an integrated Water-Energy-Food system using sustainable agriculture practices and digital technologies

**Location:** Zambezi Valley, Mozambique

**Solution:** Integrated Water-Food-Energy (WEF) system using digital technologies and aquaculture, biodigesters, bio-composting, and hydraulic management

**UNEP CTCN grant:** USD 245,000



Aquaculture production - fish farming - in the Zambezi Valley. © UNEP-CTCN

Smallholder farmers in the Zambezi Valley face challenges due to water scarcity, poor soil management, and limited access to sustainable farming technologies. This project uses digital technologies to implement an integrated Water-Food-Energy system that includes aquaculture, biodigesters, bio-composting, and hydraulic management. It aims to enhance agricultural productivity, improve resource management, and increase resilience to climate change by leveraging innovative and sustainable practices tailored to the needs of local communities.



## Objectives

- The primary objective is to design an integrated water-energy-food (WEF) system for smallholder farmers to improve agricultural practices and build resilience to climate change.
- The system combines aquaculture, biodigesters, bio-composting, and hydraulic management systems to optimize resource use, enhance agricultural productivity, and improve food security.



## Social Impact

- When replicated on a national scale, this technical assistance can reach up to 32,000,000 beneficiaries. Directly, it has supported 30 beneficiaries.
- Among the direct beneficiaries, 50% were women, and 15% were youth. For the indirect beneficiaries, 50% were women, and 25% were youth.



## Adaptation Impact

- **Enhanced Agricultural Resilience and Resource Efficiency:** The project improves the resilience of agricultural systems in the Zambezi Valley by optimizing water and energy use through the integration of WEF technologies. This leads to increased agricultural productivity and reduces the vulnerability of smallholder farmers to climate variability.
- **Sustainable Resource Management:** By promoting the use of renewable energy and sustainable agricultural practices, the project ensures the efficient use of natural resources.
- **Improved Food Security:** The project supports food security by increasing crop yields through efficient irrigation, integrated aquaculture, and nutrient recycling systems, reducing the impact of climate change on food production.



### Other Co-Benefits

- Reduced greenhouse gas emissions through the use of renewable energy.
- Increased use of organic fertilizers from biodigesters and composting.
- Strengthened community engagement in sustainable development.



### Innovation & Technology

- Aquaculture Systems: Integration of fish farming with horticulture to optimize water use and nutrient re-cycling.
- Biodigesters and bio-composting: Use of animal and agricultural waste to produce biogas and organic fertilizers, reducing reliance on chemical inputs and promoting sustainable farming practices.
- Hydraulic Management Systems: Implementation of solar-powered irrigation systems to ensure efficient water use.
- Digital Technologies: Use of digital tools to monitor and optimize the performance of the WEF system, ensuring long-term sustainability and scalability.



### Replication Potential

- The project has high replication potential, when tailored to the specific conditions of a farm. Addressing the challenges in the WEF nexus by using climate-smart solutions and digital technologies to enhance resilience.



### Key Figures

- USD 245,000 project budget
- 32,000,000 people may benefit indirectly in total
- 20 smallholder farmers, 15 investors from private and banking sector, and 15 representatives of institutions took part in project-related engagements
- The project contributed to the following SDGs:

