

Welcome to PrAECTiCe

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25.03.2026



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PrAECTiCe project is funded by the HORIZON Europe programme under Grant Agreement number 101084248



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**PrAEctiCe presents
The PrAEctiCe CWEN (Circular Water-Energy-Nutrient
Systems) Agroecology Final Conference '26**

26th March 2026 | 8:00 am - 3:00 pm
NARO ARDC-K, Kajjansi, Uganda



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PrAEctiCe

Potentials of Agroecological Practices in East Africa with a focus on Circular Water-Energy-Nutrient Systems

Initial Situation

The East African Community has made significant progress in advancing Agroecology (AE) and sustainable food systems. However, there are challenges and barriers to the transition to AE, such as:

- Detailed provisions in strategy documents and investment plans **privilege industrial agriculture approaches.**
- AE in East Africa is highly diverse, and **identifying effective AE farming methods takes much work.**
- Difficulties such as low or **no access** among farmers to **appropriate extension services.**
- Pro-AE policies that are not implemented.
- **Influx of synthetic agricultural inputs** such as fertilisers and pesticides, and industrial farming methods are promoted to increase cash-crop production by governments and private companies.

Project Solution

PrAEctiCe provides a **novel Agroecology Indicator Set** for East Africa, aimed at helping smallholder farmers in their **agroecological transition.**



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PrAectiCe Objectives

Four Key Objectives:

- Identify the most promising **agroecological approaches** for **East African** farms.
- Provide evidence that **circular water-energy-nutrient systems** of integrated aquaculture-agriculture are **among the best practices for East Africa** to address climate change issues while increasing financial viability.
- Provide suggestions and **help smallholder farmers** in their **agroecological transition**.
- To provide a **novel agroecology indicator** set focusing on circular water-energy-nutrient systems of integrated aqua-agriculture for **smallholder farmers**.

How has PrAectiCe done this?



Co-creation activities



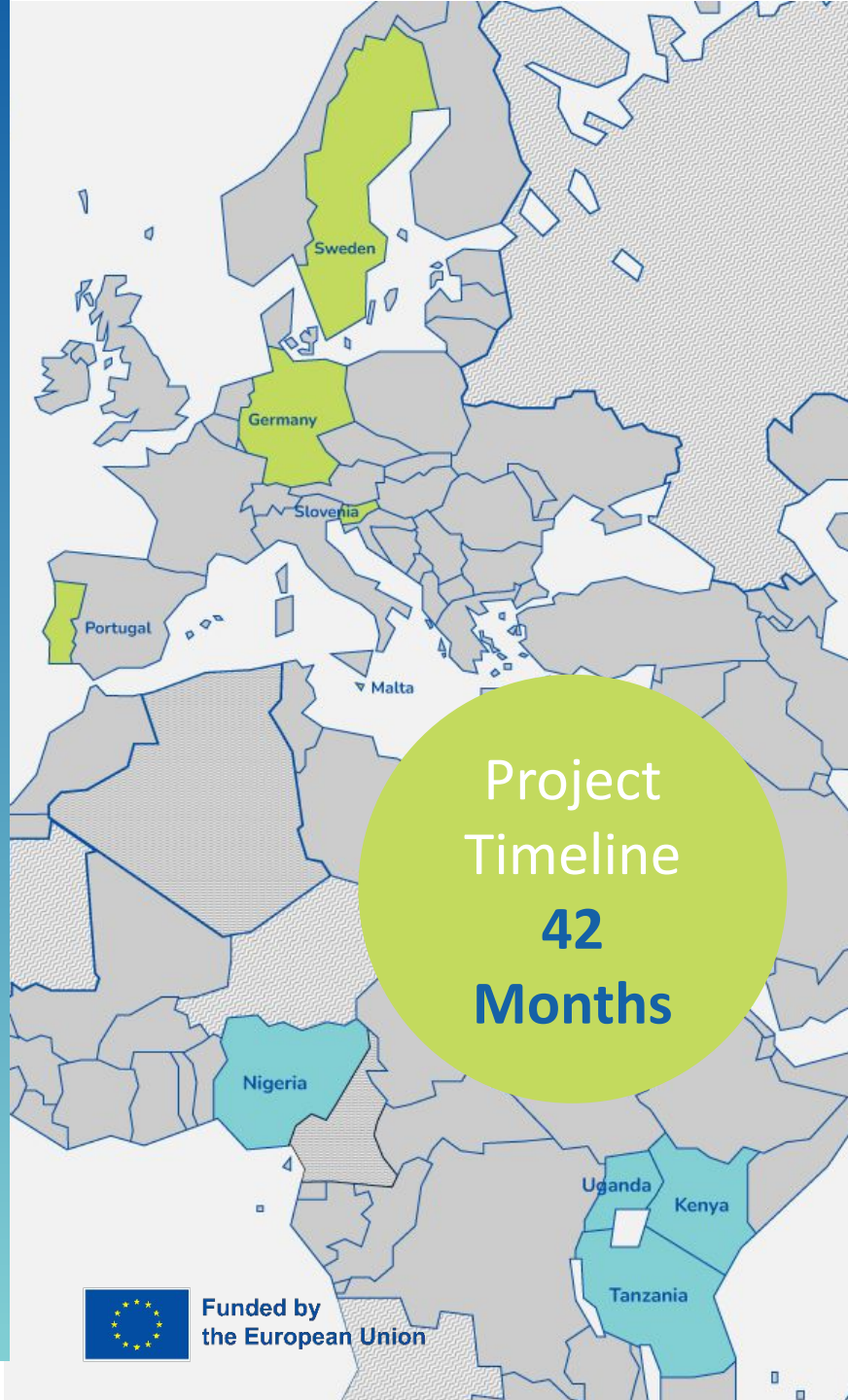
Living Labs



Training



Decision Support Tool



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Countries Involved in the project:

Europe: Portugal, Malta, Germany, Slovenia, Sweden

Africa: Kenya, Uganda, Tanzania, Nigeria

Hochschule Karlsruhe
University of Applied Sciences

HKA

 **Steinbeis Europa Zentrum**
21 GmbH

 **AQUABIO**TECH GROUP

 **APODISSI**



 **RUFORUM**
Capacity Building in Agriculture



UNIVERSITY OF
GOTHENBURG



 Uganda Darcys University
Making a difference



aquagri

AFSA
ALLIANCE FOR FOOD SOVEREIGNTY IN AFRICA

 **Africa Agribusiness Academy**

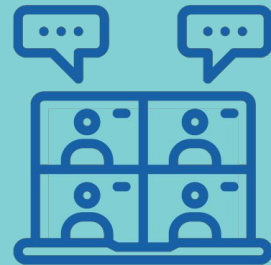


Co-creation activities

Placing the needs of farmers at the centre by involving them in research and the evaluation of results.

Activities with local stakeholders were developed to yield the best possible outcome:

- **Co-creation workshops** (on PrAEctiCe's indicator framework and users' stories)
- **Online training courses**
- On-site pieces of training in PrAEctiCe's living labs
- **Student exchange** programs
- **Business event** for young agricultural entrepreneurs
- **Online surveys** with stakeholders



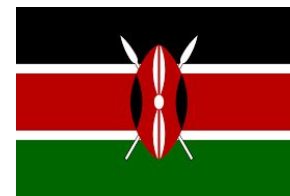
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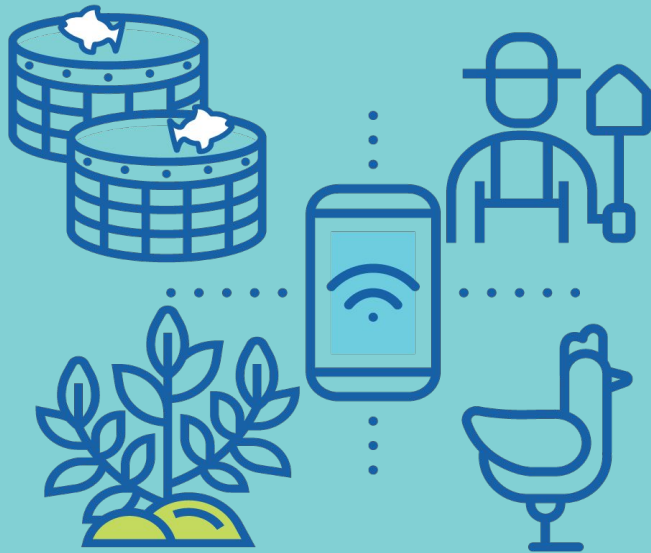
Student Exchange

No	Student Name	Gender	Level of study	Sending University	Host University	Month of Travel	Month of Return
1	Johannes Schenk	Male	MSc	HKA	Maseno University	July 2025	Sep 2025
2	Ben Schwarz	Male	BSc	HKA	Maseno University	Aug 2025	Nov 2025
3	Nakiryra Immaculate	Female	MSc	Makerere University	HKA	Sep 2025	Nov 2025
4	Faraja Mbaga Lupogo	Female	MSc	UMU	HKA	Oct 2025	Dec 2025
5	Esther Mangwale Farai	Female	MSc	UMU	University of Maribor	October	Dec 2025
6	Lea Roj	Female	MSc	UM	MSU	Jun 2025	Sept 2025
7	Michael Opiyoh	Male	PhD	MSU	UM	May 2025	Aug 2025



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Living Labs

Three Living Labs

1. Three Living Labs are **action-based projects** that optimise water, energy, and nutrient use in **three different Integrated Aqua-Agriculture (IAA) systems**.
2. They have produced data for **validation of the Decision Support Tool**.
3. Were used as **training centre** for DST Validation
4. The general public and other key stakeholders had an opportunity to visit the sites and enjoy the food grown on the farm during an **open day** organised within PrAEctiCe.





Living Lab 1

Aquaculture and intercropping (Kisumu, Kenya)

In this pilot, domestic wastewater is treated by **membrane bioreactor technology (MBR)** and reused for aquaculture, wastewater of aquaculture is used for irrigation of local crops. Black soldier larvae is used as fish food.



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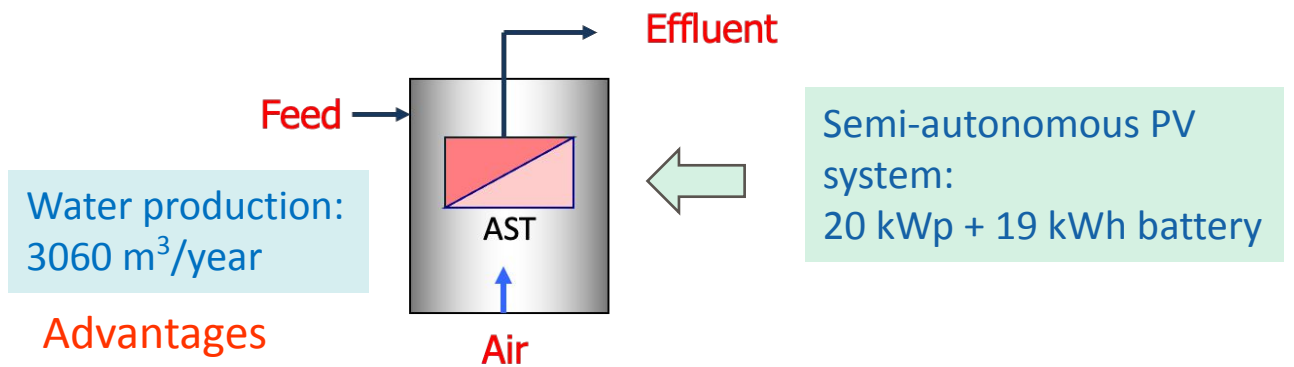
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Living Lab 1 – Membrane Bioreactors (MBRs)

MBR is a combination of the **activated sludge process** and **membrane technology** (microfiltration 0.1-0.5 μm , ultrafiltration 0.05-0.1 μm)

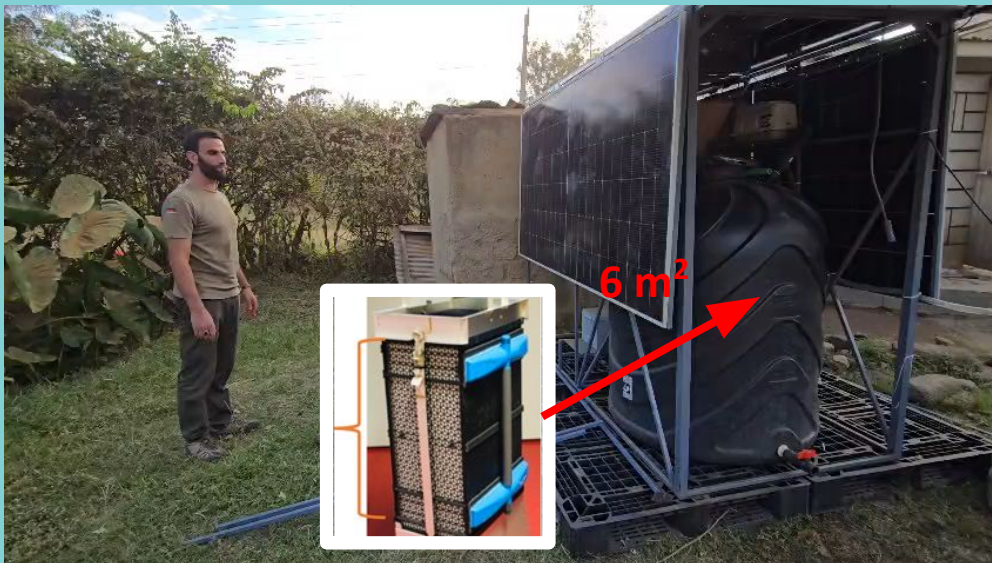
Typically membranes are **submerged in activated sludge tank (AST)**



Water production:
3060 m³/year

Advantages

- High efficiency in degradation of organic compounds
- No clarifier needed
- Treated water free of turbidity and has very low germ level (\rightarrow no disinfection!) \rightarrow reuse!

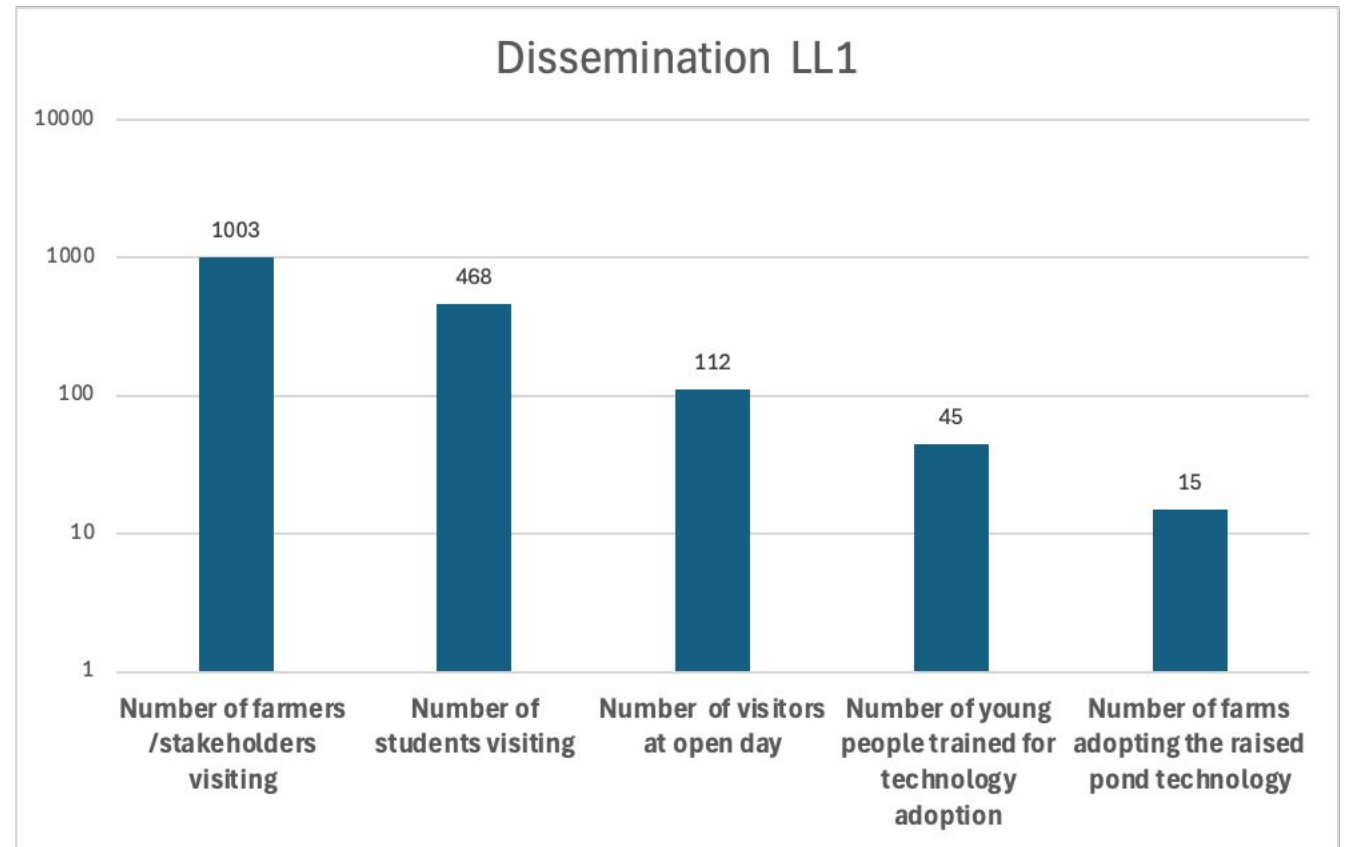


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Living Lab 1

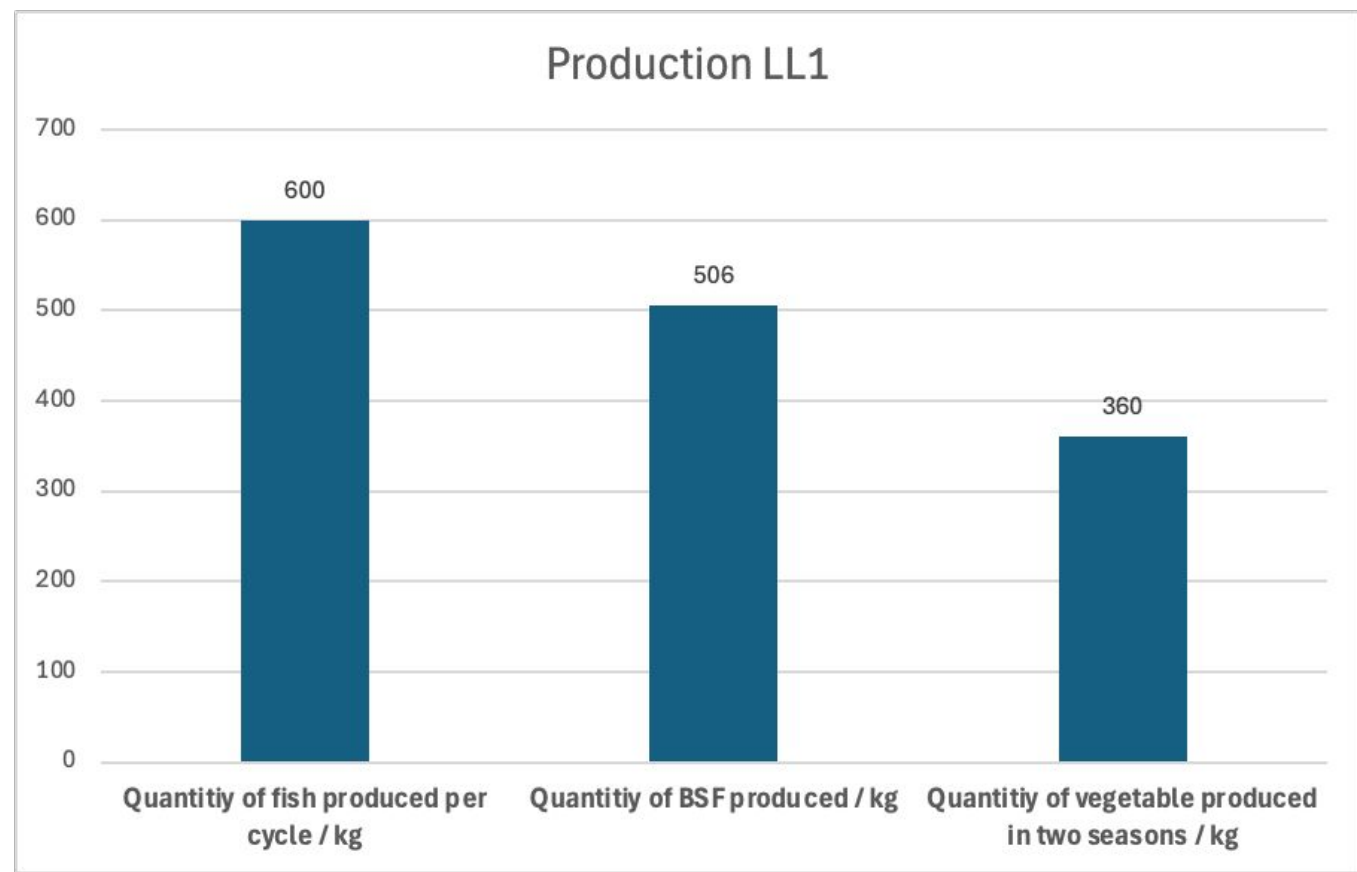


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Living Lab 1





Living Lab 2

Aquaponic system (Kajjansi, Uganda)

The **aquaponic living lab** considers several combinations of fish and vegetables with varying water, energy and nutrient needs which is piloted to optimise the water-energy-nutrient resources.

Semi-autonomous PV system:
10 kWp+ 10 kWh battery

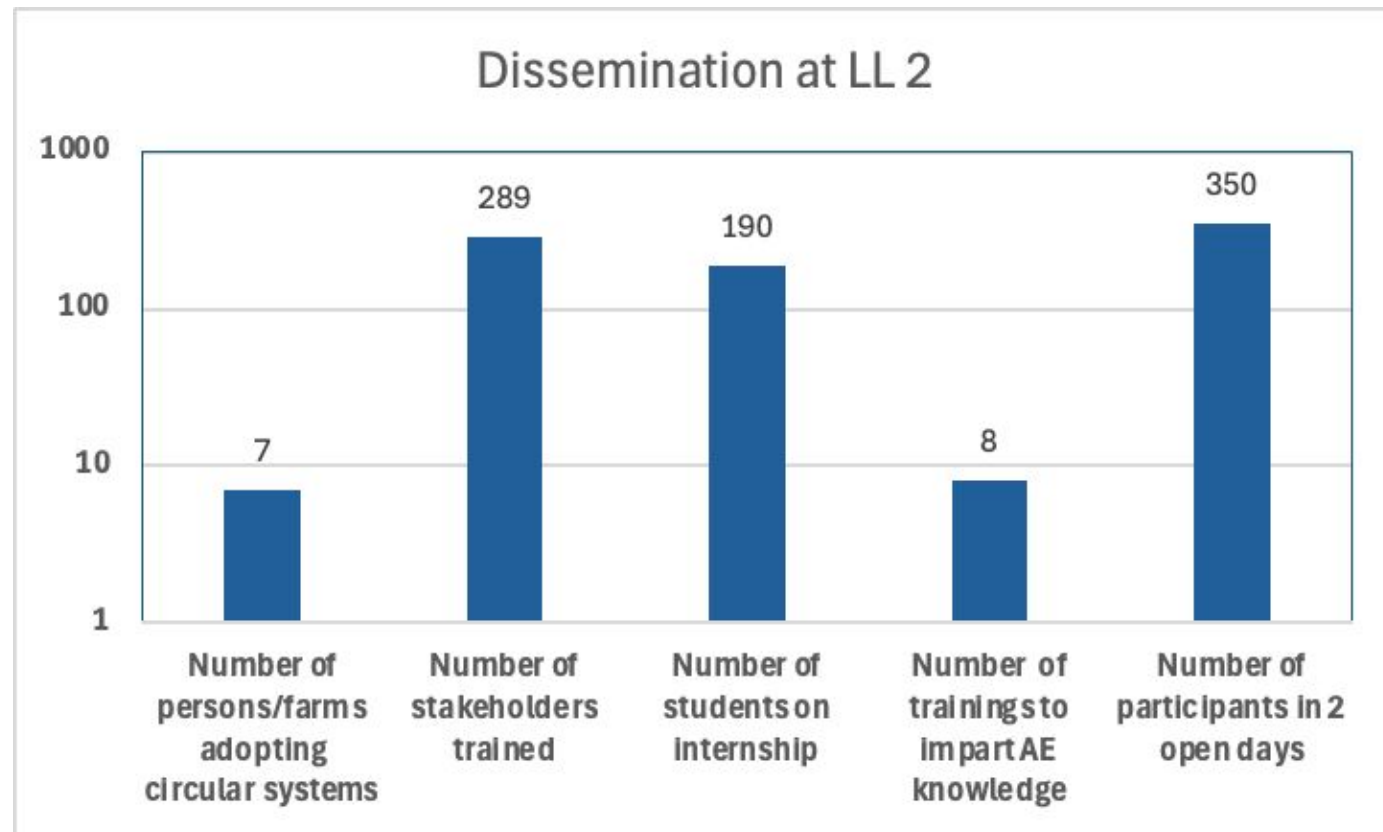


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Living Lab 2



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Living Lab 3

Fish poultry integrated system (Morogoro, Tanzania)

Poultry manure is used to feed fishes. The setup also includes vegetable production by using aquaculture sludge, poultry manure and biochar to improve soil health, and wastewater from fishponds will be used for irrigating vegetables.

Fully-autonomous PV system:
30 kWp + 57 kWh battery

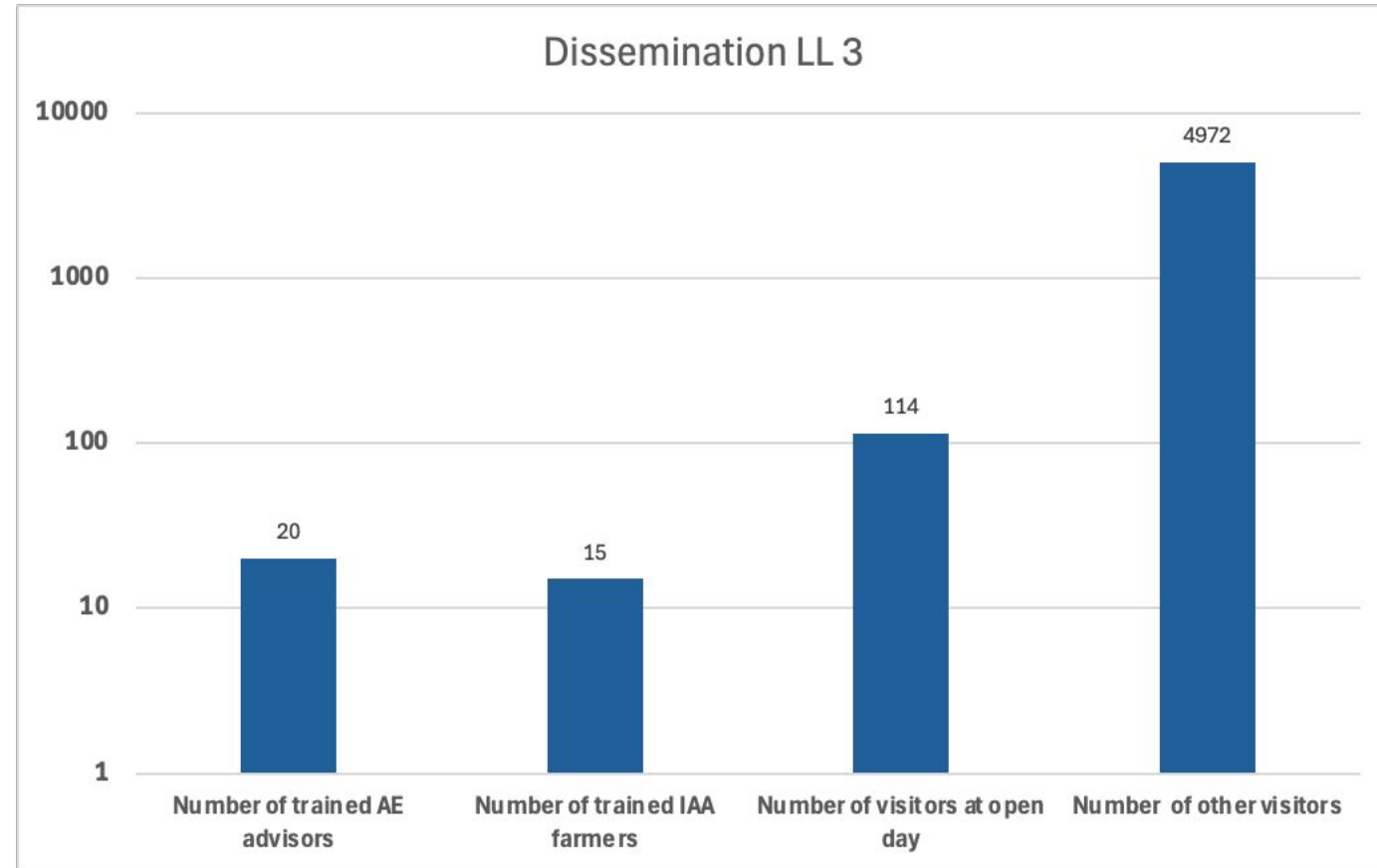


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Living Lab 3

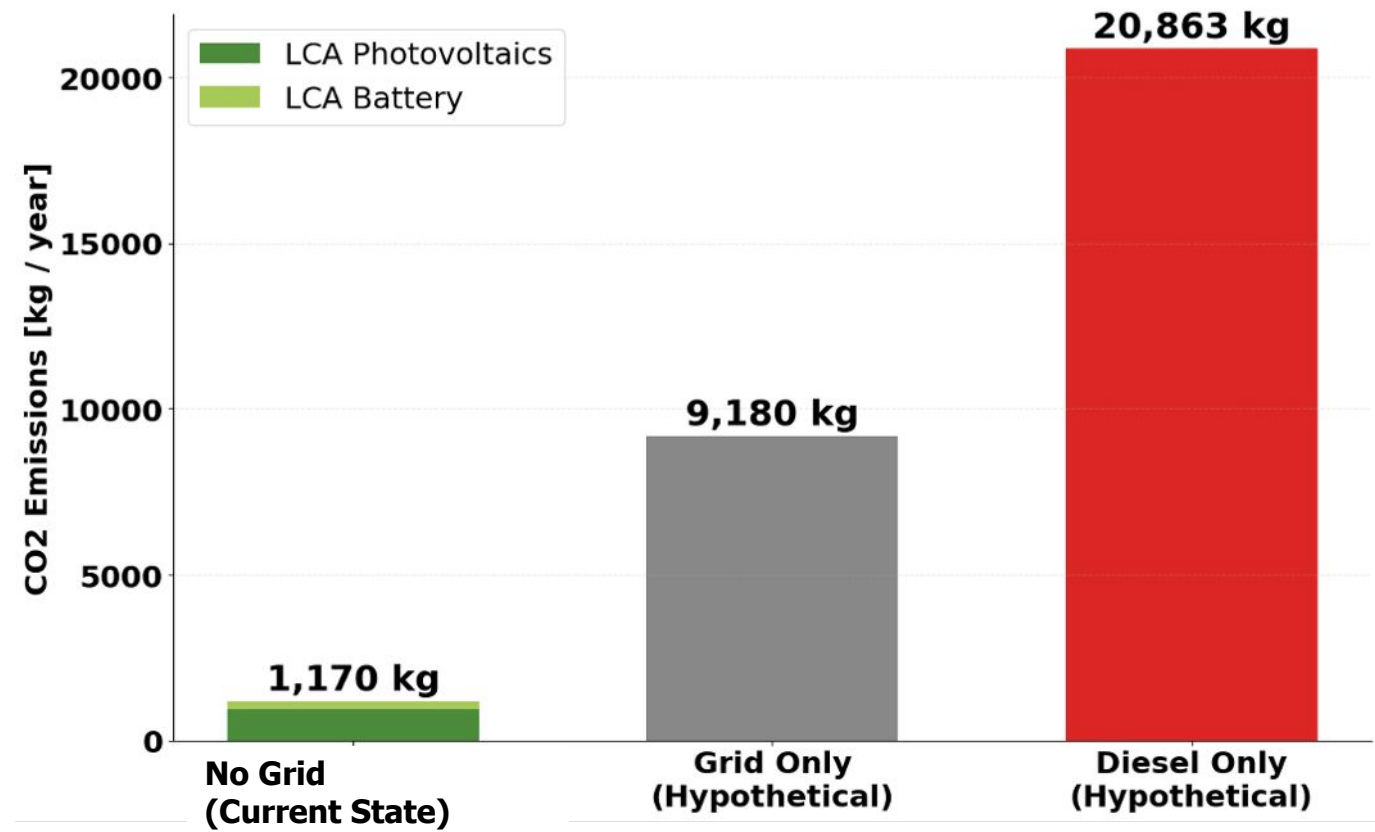


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Comparative Analysis of Annual CO₂ Emissions



Source: <https://lowcarbonpower.org/region/Tanzania>



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Living Lab 3



www.freepik.com/free-photos-vectors/



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Decision Support Tool

The Decision Support Tool concretely supports farmers, advisers and consumers to:



Increase the efficiency of recognising industrial inputs, **mapping out and collecting data on agroecological techniques.**



Redesign the agroecology system, realising **simulations and predictions of socio-economic and environmental impacts** of the previously examined farming practices.



Substitute old practices and inputs with **new farming practices**, classified and recognised, and with the **classification of environmental data** (water usage, degradation, etc.)



Address the consumer perspective, addressing the efficiency of the system's performance and analytics.

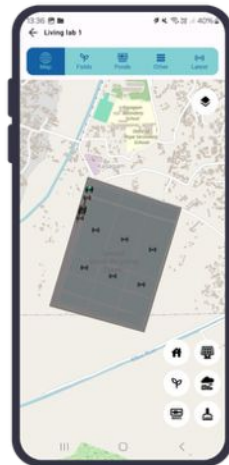
Decision Support Tool

A guiding tool focussed on data collection and practical approaches to farmers' challenging situations.

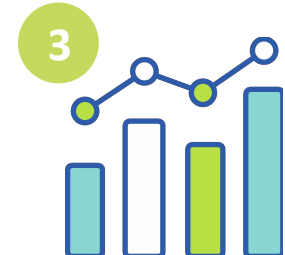


The Decision Support Tool is available in the form of 3 applications:

Mobile app for farmers



A desktop application for advisors



Backend for data specialists



Indicator monitoring center



Target users

- Data scientists
- Extension agents

Enables extension agents to edit geospatial layers

- Farms, Fields, Ponds and other infrastructure objects

Provides access to geospatial data

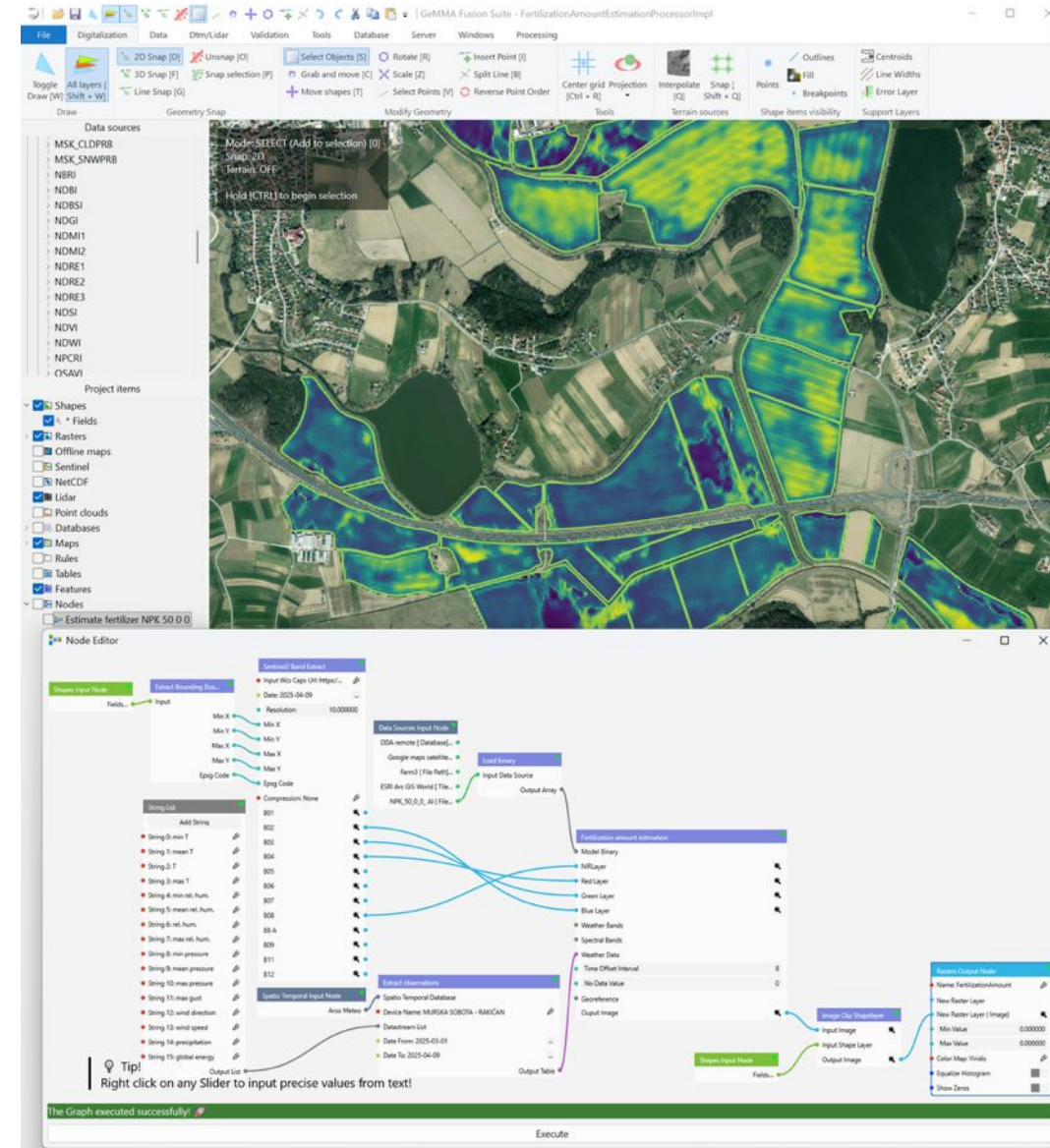
- Standardized OGC services, ArcGIS Online, custom databases, or local datasets

Supports platform integration

- Access workspace storage and databases directly

Supports data processing and AI workflows

- Through definition of custom processing pipelines
- SDK allows easy development of processing nodes



PrAEctiCe Advisor



Target users

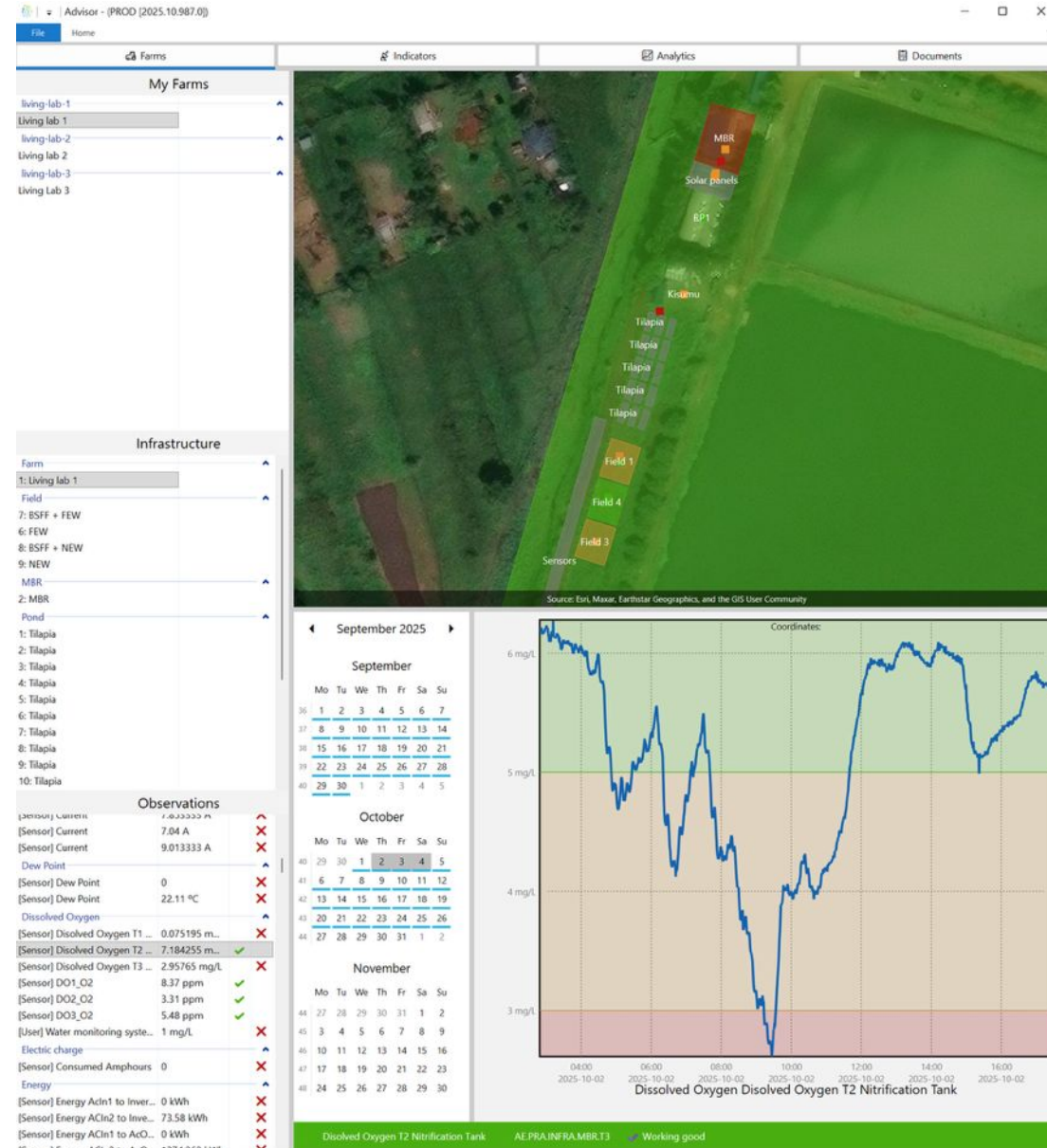
- Extension agents

Application Overview

- Dedicated tool for extension agents
- Displays all sensor data from managed farms
- Displays questionnaire inputs from managed farms
- Focuses on data insights rather than data management

Key Benefits

- Simplifies decision-making for extension agents
- Enables custom indicator definitions for farm-specific needs and solutions
- Displays latest status and indicator alerts on the map



PrAEctiCe Farmer

Target users

- Farmers

Application provides farmers with farm insights

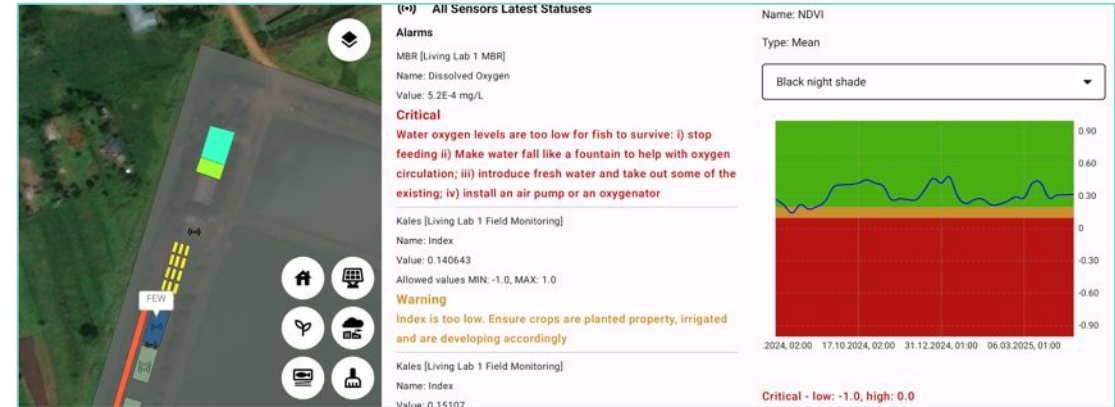
- Latest farm state
- Alerts for critical conditions
- Recommended solutions for issues

Application provides farmers with questionnaires

- Useful for taking measurements that are not automatically sent to the platform

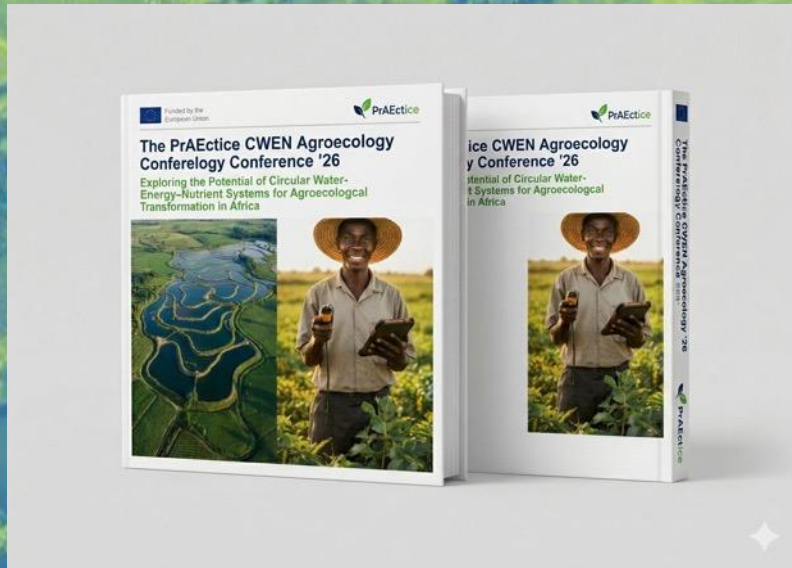
Questionnaires include

- **Parameter selection** for which crops, plants or fish are present on the farm
- **Crop growth** measurements [time, location, weight, amount]
- **Fish growth** measurements [date, location weight, standard length, mortality]
- **Soil moisture** measurements [date, location, moisture, temperature]



The three screenshots show the questionnaire flow: 1. "Questionnaires" screen with options for "Sample questionnaire", "Field Data Collection", "Field Data Collection Parameters", and "Field Parameters". 2. "Field Data Collection Parameters" screen asking "Which fish species do you grow on the farm?" with radio buttons for "Tilapia" and "Catfish". 3. "Field Parameters" screen for "Fish/Tilapia measurement data" with a "Weight" input field and "Unit: kg" label.





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www.linkedin.com/company/practice/

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