

Co-Design Workshop on Inclusive Business Models for Aquaculture in Small Reservoirs in northern Ghana Tamale, Ghana, June 10, 2025



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AND AQUATIC FOODS

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CGIAR Sustainable Animal and Aquatic Foods Program

The [Sustainable Animal and Aquatic Foods](#) (SAAF) Program is part of [CGIAR](#)'s 2025-2030 Research Portfolio. SAAF works across Africa, Asia, and beyond to improve access to nutritious foods while reducing emissions and supporting inclusive livelihoods. By combining livestock and aquatic systems, it develops integrated, climate- and environment-friendly solutions tailored to local contexts. CGIAR research is supported by contributions to the [CGIAR Trust Fund](#). CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land, and water systems in a climate crisis.

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Cover photo: Workshop participants in front of the Modern City Hotel, Tamale. Photo: hotel staff.

Contents

Background and Objectives	3
Workshop Structure	3
Key Discussions and Outcomes	4
Successes and Challenges	5
Next Steps	5
Annex : Workshop Agenda	6
Annex : Presentations	6

Background and Objectives

Ghana faces a significant decline in marine fish stocks, threatening national food security and livelihoods. Small-scale aquaculture is emerging as a viable alternative, particularly in northern Ghana, where small reservoirs offer untapped potential in terms of their multifunctional use to culture fish. Yet, systemic barriers persist, limited technical capacity, high input costs, financing gaps, and weak market linkages. These challenges are particularly acute in northern Ghana, where water scarcity and limited access to fingerlings and feed further hinder aquaculture development.

To address these issues, the International Water Management Institute (IWMI), under the CGIAR Initiative on Aquatic Foods (2022–2024), piloted aquaculture projects in four community reservoirs in the North-East Region. These communities include Nansoni, Tombu, Nalerigu, and Langbinsi in the Chereponi and East Mamprusi Districts. The pilot aimed to enhance the multifunctional use of community dams/reservoirs, support local livelihoods, and improve access to fish. Building on the lessons learnt through the pilot process, IWMI convened a co-design stakeholder workshop under the Sustainable Animal and Aquatic Foods (SAAF) Program to share the lessons and collaboratively develop context-specific business models for aquaculture in small reservoirs.

Objective of the Co-design Workshop

The workshop aimed to identify key challenges from the farmers' perspectives, explore opportunities for scaling, and co-develop inclusive and locally tailored business models that support the long-term sustainability of small-scale aquaculture in small reservoirs in northern Ghana. Additionally, it aimed to strengthen linkages between practitioners, communities, and institutional actors to enhance knowledge exchange, capacity building, and policy alignment in the aquaculture sector.

Workshop Structure

The workshop featured 3 presentations, delivered by IWMI researchers, aimed at setting the scene for collaborative group discussion. The agenda is reported in the Annex.

The workshop was attended by 37 stakeholders, including private aquaculture farmers, youth fish farming groups, policymakers, sector regulators, and private companies, to reflect on key lessons from the IWMI-led aquaculture pilots in small reservoirs and dams. [Participants summarized in Table 1].

Table 1: Workshop Participants

Organization	Expertise	Women	Men
IWMI - CGIAR	Economics	2	1
Chambers of Aquaculture	Aquaculture	1	0
Fisheries Commission North-East Region	Fisheries and Aquaculture	1	2
Fisheries Commission Northern Region	Fisheries and Aquaculture	0	3
Environmental Protection Agency	Environment (Regulator)	0	1
Northern Development Authority	Regional Development Agency	1	0
Ministry of Fisheries and Aquaculture Development	Fisheries and Aquaculture (Regulator)	0	1
CSIR Water Research Institute	Water	0	2
Raanan Fish Feed Limited	Fish Feed	0	1
Centre for Ecological Agriculture and livelihoods	Agriculture and Aquaculture	2	2
Hatchery	Hatchery	0	1
Fish Farmer Groups	Aquaculture	3	4
Private fish Farmers	Aquaculture	3	2
Fish Aggregators/ Restaurants	Fish marketing	0	4
District/ Community Leaders	Assemblyman	0	1
TOTAL		13	25

Key Discussions and Outcomes

Dr. Giulia Zane delivered the opening presentation, providing an overview of the Sustainable Animal and Aquatic Foods (SAAF) Program, the objectives of the co-design workshop, and key lessons learned from IWMI’s aquaculture pilot interventions in the North-East Region of Ghana. Subsequently, Ms. Sarah Appiah and Mr. Kekeli Gbodji presented on business cases for aquaculture in northern Ghana, and opportunities for co-developing inclusive business models for aquaculture in small reservoirs. Emphasis was placed on the multifunctional potential of small reservoirs and the need for inclusive business models. The SAAF Program’s focus on small reservoirs as a strategic entry point—rather than excluding other systems—was clarified, highlighting the broader development objective.

Stakeholders raised key challenges, including the disconnect between farmers and financial institutions, high input costs (feed, fingerlings, cages), and limited technical services such as hatcheries and extension. Farmers also pointed to the lack of proper records, gaps in the value chain, and social/environmental risks like predator threats and dam breakages. They expressed a clear preference for catfish over tilapia farming due to its adaptability to the northern region’s water conditions and growing market demand.

In group sessions, stakeholders proposed several inclusive business models:

- *Integrated Farming*: Combining aquaculture with crop or livestock farming to recycle resources. Promising but capital intensive.
- *Polyculture*: Culturing multiple fish species to maximize resource use and reduce production cycles.
- *Contract Farming*: Investors fund production and share profits with farmers.
- *Cooperative Farming*: Farmers pool resources and knowledge, but profit-sharing can be a challenge.
- *Public-Private Partnerships (PPP)*: Collaboration among communities, regulators, and businesses to mitigate conflict and share risks.
- *Networking Model*: Smallholder groups specialize across the value chain (e.g., feed production, hatcheries, processing).
- *Training of Trainers (ToT)*: Empowering selected individuals to train others in aquaculture best practices.
- *Internal Empowerment Model*: Mapping existing farmer capacities across the value chain and organizing collective proposals for funding.
- *Group Empowerment Model*: Each farmer group focuses on a specific function (e.g., fingerling production, processing,

Key recommendations from participants

- *Pilot Multiple Models*: Implement at least two models one for individuals and one for groups in different locations to test feasibility.
- *Community Engagement*: Ensure broad community consultation to build consensus and avoid conflicts, especially in shared dam use.
- *Start Small*: Begin with small-scale, manageable ventures to test and refine the models before scaling.
- *Select Committed Participants*: Ensure farmer group members are motivated and genuinely committed, rather than participating solely to meet project criteria.
- *Support Model Scalability*: Promote tailored and scalable business models backed by capacity building, private sector engagement, and reliable technical support, including input supply.

Successes and Challenges

The workshop was marked by high levels of engagement and productive interaction among the 37 diverse participants, including farmers, researchers, private sector actors, and policymakers. Group discussions were dynamic, and participants actively shared their experiences, challenges, and ideas, leading to rich insights that will inform the next phase of the project. The structure of the workshop, which combined presentations, plenary Q&As, and breakout group work, proved effective in encouraging inclusive participation and idea generation. Notably, the workshop created a valuable platform for cross-sector dialogue and strengthened networks among key actors in the aquaculture space.

While no challenges were encountered with the workshop or with the SAAF Program, several structural challenges surfaced through the discussions. These included persistent barriers to aquaculture investment in northern Ghana, such as limited access to credit, poor availability of quality inputs, inadequate extension services, and unresolved issues around water user conflicts and infrastructure maintenance. These challenges, while external to the workshop itself, reflect ongoing constraints that the co-designed business models will need to address in order to succeed.

Next Steps

In the coming months, IWMI will conduct a community survey designed to capture preferences related to fish consumption and business model design. The survey will explore which types of fish (e.g., tilapia vs. catfish), processing methods (smoked or fresh), and attributes such as size and availability are most valued by local consumers. In addition, it will assess community preferences regarding the structure of aquaculture business models—examining the importance of factors such as employment generation, contributions to the local economy, and equitable benefit sharing. These insights will guide the refinement of inclusive business models that align with local priorities and expectations. IWMI will also continue to engage a broad range of stakeholders—including community groups, private sector actors, and policymakers—to co-develop and test business models that are context-appropriate, socially inclusive, and scalable within the broader Sustainable Animal and Aquatic Foods (SAAF) Program framework.

Annex : Workshop Agenda

Time	Activity	Responsible
08:30 – 09:00	Arrival of the participants	IWMI
09:00 – 09:30	Opening of the workshop <ul style="list-style-type: none"> ➤ Words of welcome IWMI ➤ Lessons from the aquaculture pilot 	Dr. Giulia Zane
09:30 – 10:00	Business cases for aquaculture in northern Ghana Opportunities to co-develop business models for aquaculture in small reservoirs	Ms. Sarah Appiah Mr. Kekeli Gbodji
10:00 – 10:30	Questions and discussion	All
10:30 – 11:00	Coffee Break + group picture	
11:00 – 11:45	Group work 1: What are the challenges for investment in aquaculture in small reservoirs? Report back	IWMI
11:45 – 12:30	Group work 2: What inclusive business models would be profitable and sustainable? Report back	IWMI
12:30 – 1:30	Questions and discussion Closing remarks	IWMI
1:30 – 2:30	LUNCH	

Annex : Presentations



Lesson from the IWMI-CSIR-FC aquaculture pilot in the North East Region

Giulia Zane (IWMI)
10 June 2025



Why Aquaculture in Small Dams?

- About **3,000 small reservoirs** exist in the 5 regions of northern Ghana (Akpoti et al, 2024)
- The reservoirs have **multiple uses**: irrigation, livestock watering, construction, etc.
- Fishing is also common in many small reservoirs, but aquaculture is very rare
- Introduction of aquaculture can provide livelihood opportunities for youths and women in the community and increase fish availability



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Pilot design

- IWMI, the Fisheries Commission of Ghana and the CSIR Water Research Institute pilot group-based aquaculture in small dams
- 4 reservoirs were selected in the North-East region of Ghana after a suitability assessment: Nalerigu, Langbinsi, Tombu, and Nansoni
- Youth groups of 10-15 people were trained and received cages, canoes, life jackets, coaching, and inputs for 1 aquaculture cycle (Tilapia fingerlings and feed)
- The first cycle started in September 2023. The second cycle is currently ongoing.



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Achievements

- The pilot project has demonstrated the feasibility of fish farming in small community reservoirs in northern Ghana
- In 2 reservoirs, the revenues from the first harvest were sufficient to cover 50-60% of the reinvestment for the second cycle
- One of the groups received the Best Farmer Award for the North-East region
- Our calculations suggest that, with increased efficiency, it can be a profitable business

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Challenges & lessons (1)

- Water quality (turbidity) In some reservoirs might be an issue, especially during the raining season
 - Timing of stocking
 - Size of fingerlings
 - Fish species
- Demand for fish is high in the communities but they can only absorb small quantities
 - Cages should be stocked at intervals to have a continuous supply for the community
 - Take advantage of post-harvest techniques to process fish for longer shelf life
 - Create linkages with bigger buyers (e.g. in Tamale)

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Challenges & lessons (2)

- The initial training provided was not sufficient.
 - More coaching and support required
 - Training on business skills is also important
- Starting a new aquaculture venture requires substantial capital and know-how. Typically, both are not available to the communities.
 - Access to finance
 - Collaboration with private sector

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Next steps

- How can co-design sustainable business models to scale aquaculture in small reservoirs?
 - Small reservoir portal to identify suitable reservoirs
 - Today's meeting

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SMALL RESERVOIRS PORTAL

Explore over 2,000 small reservoirs in Ghana's northern regions

Reset view



Ownership & Use	Water quality	Name of Reservoir	Region	District	Risk of Drying	Suitability Level
Current use of the reservoir All	How do you describe the turbidity of the reservoir during the dry season? All	PISA DAM	Upper East	Bulsa South	Extremely low (0%)	Suitable
Accessibility Is the reservoir easily accessible by road? All	What kind of water quality issues have you observed in the past? All	PISA DAM	Upper East	Bulsa South	Extremely low (0%)	Suitable
Is the reservoir less than 30 minutes motor travel time away from a town? All	Water availability Do you have year-round water available in the reservoir? All	PISA DAM	Upper East	Bulsa South	Extremely low (0%)	Suitable
Suitability for aquaculture What is the reservoir suitability level? All	What is the approximate depth of the reservoir during the end of the dry season? All				Extremely low	
Risk of drying Risk of Drying All	From which months do you observe a significant reduction in the water surface area? All					



Reset all filters

Co-Design Workshop on Inclusive Business Models for Aquaculture in Small Reservoirs

Sustainable Animal and Aquatic Foods Science Program (SAAF)

Sarah Appiah and Kekeli Gbodji

10th June 2025
Modern City Hotel, Tamale



Outline of presentation

- Recap of SAAF program + Exploratory study on business cases
- Nature of business cases in aquaculture in northern Ghana
- Opportunities for growth
- Co-developing inclusive business models for aquaculture in small dams
- Potential challenges
- Next steps



Background

- SAAF aims to :
 - **Scale sustainable aquaculture:** Build on pilot projects to co-develop inclusive business models that empower youth and women.
 - **Address key challenges and opportunities:** Work together to identify barriers and opportunities to support sustainable aquaculture in small reservoirs
 - **Foster collaboration:** Strengthen ties among communities, practitioners, and institutions for capacity building and policy alignment.



Business cases in aquaculture in northern Ghana

- Producer only
- Producer and processor
- Aggregators
- Hatchery + production



Producers



- Produce catfish in a tank system
- **Inputs:** use of both commercial and local feed , fingerling sources from hatcheries
- **Customer segments:** direct sale to households, hotels and restaurants, aggregators, processors, point and kill
- Value addition: only cleaning
- **Challenges/weaknesses:** water scarcity, high cost of feed, high cost of water, limited access to quality fingerlings, access to market (cannot meet preferred size for prevailing market), cultural beliefs on catfish, limited access to finance to construct to boreholes.
- **Strengths/opportunities:** growing demand, business is profitable (depending on your customer segment), catfish highly resistant under harsh environmental conditions, local feed options being explored.



Producer and processor

- Produce and smoke fish
- Customer segments increased – some customers prefer smoked fish
- **Value addition:** cleaning, smoking
- **Challenges:** Similar to producers
- **Strengths** – Processed fish to some extent address cultural beliefs, increased customer segments, opportunity to export to other place (in Ghana and outside), less exposure to marketing challenges.



Aggregators (includes point and kill)

- **Source of fish:** from producers within and outside Tamale (mostly outside)
- **Customers:** Individuals, households, restaurants
- **Value addition:** cleaning, smoking, cooking
- **Challenges:** inability to source preferred size of fish from producers within region
- **Opportunities:** growing demand of catfish,



Hatchery

- Hatch and produce fingerlings
- **Customer segments:** Producers
- **Value addition:** grow fingerlings to 1- 10 grams
- **Challenges:** limited access to broodstocks, limited access to oxygen plants, transportation challenges (with fingerlings), limited extension service, limited actors within the sector, limited funding, limited capacity.
- **Strengths/ opportunities:** Aquaculture sector is evolving, demand for fingerlings increasing creating opportunities new entrants.



Opportunities for business growth



- Partnership with other value chain actors – eg: partnership between producer and aggregator to produce preferred size and type
- Awareness creation of benefits of catfish
- Do more value addition
- Consider more fish species
- **Affordable, environmentally friendly feed formulation being explored**
- Improve record keeping and production and sales to assess profitability
- **Explore uses of small dams for aquaculture including for catfish**



Co-developing inclusive business models for aquaculture in small dams

- Many dams offer free water in water-scarce regions like Northern Ghana.
- These dams also provide a healthy habitat for fish farming.
- **Challenge:** Local communities lack financial resources and know-how.
- Can communities and private businesses partner to farm fish in these dams?
- Possible Partnership Models (from literature):
 - Public-private partnerships
 - Farmer-owned businesses
 - Joint venture
 - Contract farming



Farmer-Owned Businesses

- Communities form cooperatives or producer companies to collectively manage fish farming operations.

- **Benefits:**

- Builds local ownership and capacity
- Profits stay within the community

- **Challenge:** May need external support for startup capital, training, and governance



Public-Private Partnerships (PPPs)



Government supports partnerships between communities and private firms (e.g., through infrastructure, subsidies, or training)



- **Benefits:**

- The public sector can de-risk investment and improve access to finance.
- Encourages sustainable, inclusive aquaculture



- **Challenge:** Needs coordination and policy support



Joint venture

- A formal partnership between a private investor and a community group. They share investment, risk, and profits.

- **Benefits:**

- Combines community resources (e.g., access to dams, labor) with private sector finance and skills/know-how.
- Encourages long-term commitment from both parties. May decide to leave at some point, depending on the terms agreed upon.

- **Challenge:** Requires strong governance and clear benefit-sharing agreements.

Contract farming



- A private company provides inputs (fingerlings, feed, training) and agrees to buy the fish once harvested.

- **Benefits:**

- Communities get access to capital and expertise
- Reduces market risk for farmers

- **Challenge:** Risk of unfair terms unless contracts are transparent and equitable



Potential challenges with use of small reservoirs

- **Mutual benefit:** Both communities and private partners must gain from the arrangement.

- **Environmental responsibility:** Use of non-polluting, sustainable feed is essential.

- **Risk management:** Address risks like theft, climate impacts, and water quality fluctuations.



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