Capitalization of the support in accessing farm ponds for water harvesting for 8 farmer groups, members of Cereal Growers Association in the counties of Laikipia and Meru

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1. Introduction

In 2021, Fert and the Cereal Growers Association (CGA), with support from the Louis Dreyfus Foundation (LDF), launched a pilot initiative in Laikipia and Meru counties aimed at improving farmers' livelihoods and promoting farm sustainability through agroecology and proximity based advisory services. Throughout the project, farm diversification emerged as a key strategy to enhance resilience and income for small-scale farmers. Special attention was given to agroforestry and vegetable production due to their potential to boost food security, support environmental conservation, generate income, and services for the broader community.

However, many farmer groups identified access to water as the primary barrier to advancing these activities. Based on field surveys, research findings, and community consultations, farm ponds were recommended as a viable solution for sustainable water access.

CGA and Fert proposed a cost-sharing pilot model to LDF, enabling groups to co-invest in farm pond installations. Eight (8) farm ponds were established, four (4) in Laikipia and four (4) in Meru. More than 18 months since the installation of the first ponds, Fert and CGA want to draw lessons from this experience.

2. Objectives of the Study

The main objective of this study was to document the process, from the initial idea of water conservation to the actual utilization of water by the pilot groups. The study also aimed to assess the progress, challenges, and sustainability of the groups and water management practices. The specific objectives set were:

1. Document the process of water management from planning to pond utilization and maintenance, including stakeholders' roles.
2. Record key pond characteristics such as size, depth, cost, and location identification.
3. Analyze supporting documents (e.g., MOUs and other relevant documents) and their use by stakeholders.
4. Assess the quantitative and qualitative impacts of farm ponds on group members and the community.
5. Determine the average cost of establishing a farm pond and the resulting profits or new activities generated.
6. Highlight key lessons and improvement strategies from pilot groups on pond design, management, and organization.

3. Methodology



The study employed purposive sampling for data collection, where participants were identified and selected based on specific characteristics relevant to the study. The methods employed for data collection included Interviews and Focus Group discussions. A participatory approach was employed to ensure inclusiveness and accuracy of information. Field visits were conducted to observe the farm ponds and validate the data collected during interviews. Consultative discussions were also held with stakeholders to gather qualitative insights on the effectiveness, challenges, and long-term sustainability of the farm pond initiative. The information gathered was then analyzed to assess progress, identify challenges, and provide recommendations to CGA and Fert for improving support regarding water management practices.

3.1. Study Area

This study was carried out in Laikipia and Meru Counties, where the pilot was implemented. These counties are key operational areas for the CGA-Fert partnership, which promotes agroecological practices such as kitchen gardening, organic farming and water conservation through the construction and utilization of farm ponds.

3.2. Study design and interviewees selection

The survey was questionnaire-based, targeting pilot groups that had established farm ponds with the support of CGA-Fert. Data was collected through structured interviews with the following respondents:

- The host farmer (the owner or the user of the land on which the pond is installed, who often is the main user of the farm pond),
- The Agroecology Farmer Advisor (FA) who has been selected by the group members to lead and support them on their agroecological transition and to offer them services related to agroecology
- At least two randomly selected members from each pilot group.

In addition, other key stakeholders who participated in or supported the initiative were also interviewed. These included:

- The CGA-Fert Agribusiness Coordinators (ACs) concerned with the project,
- Fert's Technical Advisor,
- County Ministry of Agriculture staff, particularly extension officers,
- Members of the local administration, such as the area Chief, where they had been involved in the process.

The following tables present the interviewees:

GROUP	WARD	County	PEOPLE INTERVIEWED
Mahiga Dincom	Olmoran Ward	Laikipia	John Kamau (host) Miriam Macharia (Farmer Advisor - FA) Martha Wanjiku (member) Monica Wanjiku (secretary)
Mugambi Dam	Rumuruti Town ward	Laikipia	Joseph Keruga (vice chairperson) Samuel Kimani (Host) Christopher Lorowoi (FA) Focus group discussion with members from the host family
Greenland SHG	Umande Ward	Laikipia	Simon Njogu (member) Elizabeth Mwenda (chairlady) Beatrice Wangari (FA) Priscilla Wairimo (Host)
Tumaini Self Help Group	Tigithi Ward	Laikipia	Sammy Kiarie (Host) Daniel Njoroge (member) Peterson Gethenji (FA) Hellen Gatweri (Chair lady)
Umoja CBO	Kibiricha Ward	Meru	Paul Mwirigi (member) Josphat Kimathi (Host /FA) Lucy Kiende (member)
Mintutu Leads Farmers	Kianjai Ward	Meru	Laibuni Ntambari (FA) Josphat Ntongai (member) Gabriel Mautia (member)
Baraka Rwarera	Ruiri Rwarera Ward	Meru	Edward Gichunge (Host/FA) Alfred Koome (member)
Nkatha Cia Mukungu	Ruiri Rwarera Ward	Meru	Purity Makena (member) Florence Nadha (Treasurer) Rose Mwingwa(chairlady) Ruth Rigiri (Host)

	OTHER RESPONDENTS	POSITIONS/ROLE
1	Erick Okello	CGA Agribusiness Coordinator (AC)
2	John Kirari	Laikipia West Sub-County Extension Officer
3	Naomi Morioki,	Ayam Chief (Mugambi Dam pilot group area chief)
4	Julius Kingori	Head of the irrigation section, Laikipia county

The questionnaire focused on aspects such as group profiles, water access project conception, pond construction and utilization, water management practices, challenges faced, support received, and sustainability measures in place.



At the end of the survey, 2 representatives of each pilot group were gathered in Meru to validate and complement the capitalized information by sharing experience on their challenges, adaptation measures, and successes.

A visit was organized on the farm of Nkatha Cia Mukungu group, who have been the most successful so far.

4. The Initiative

Water scarcity has been reported by CGA farmers as a major problem affecting Food Security in some parts of Laikipia and Meru counties. This initiative sought to demonstrate how water conservation technologies, such as farm ponds, can be a relevant/suitable solution to increase smallholders' farms' resilience and productivity, in the context of rising demand for food products, especially with increasing negative effects of climate change. The challenge of accessing water was initially raised by group members to the Agribusiness Coordinators (AC), who then facilitated a cost-sharing arrangement between CGA and the farmer groups to address the challenge. Under this arrangement, the groups were responsible for pond excavation, while CGA through LDF support provided the dam liners, transportation, installation support and the after installation technical support.

4.1. Objectives of the initiative



The objective of the farm pond initiative included:

- To enhance water availability during and at the end of the rain seasons, to promote activities such as vegetable production, Agroforestry tree nursery, agroecological farming, vermicomposting, and Azolla production;
- To strengthen community collaboration and resource management. The initiative encourages collective action among group members in planning, construction, maintenance, and management of the ponds, fostering unity and shared responsibility.
- To provide learning platform and demonstration sites for capacity building on diverse agroecological practices. The farm ponds serve as practical learning centers where farmers, institutions, and community members can observe and adopt innovative farming technologies.
- To facilitate replication and scaling up of best practices through mentorship and community exposure, through stimulating interest and adoption of farm ponds in surrounding communities, increasing the overall impact.

A short benchmarking and experience analysis were carried out by CGA, from which farm ponds have been identified as the most cost-effective and sustainable option for access to water.

4.2. Groups selection

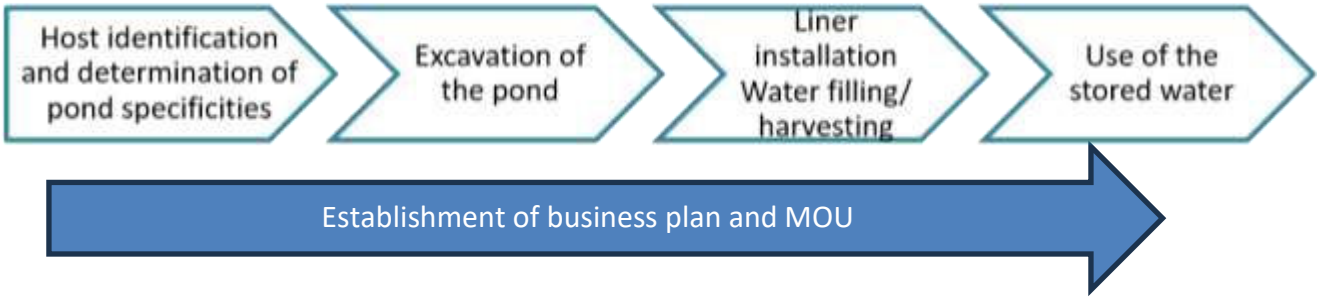
Groups who were supported to access a farm pond were selected using predetermined criteria developed by CGA:

- Membership in CGA
- Interest in group learning at the demo, implication in CGA activities
- Genuine need and potential for enterprise development in areas such as vegetable farming and tree nursery establishment
- Cohesiveness
- Capacity to bear the cost of digging up the earmarked space

Beyond the criteria, the 2 counties opted for a different approach:
In Meru, the first Agroecology pilot groups were prioritized (3 out of 4, the last one benefiting from another source of water). After the installation of these first ponds, having some available budget, it was proposed to add Umoja CBO as the group is in an arid area but with high potential.
In Laikipia, the AE pilot groups were also prioritized, but the aspect of the level of need (for Mugambi Dam) and regional balance (for Tumaini and Greenland) were taken into account. The decision on the groups was done during a county chapter meeting, with the county leaders being the ones making the final selection among the pre-qualified groups.

4.3. Pond Installation and Utilization Process

The figure below summarizes the steps undertaken in this initiative:



Memorandum of Understanding

The Memorandum of Understanding (MOU) was introduced with the objective of creating a key document to guide the conceptualization, establishment, utilization and monitoring of the farm pond project at group level. Its main purpose was to formalize cooperation between landowners and group members, since the ponds were constructed on privately owned land for collective benefit, and to provide a clear framework for resolving potential conflicts by outlining the responsibilities of each party. Other enjoined parties were CGA and the County Government Department of Agriculture, who provided oversight. An MOU template was designed by the CGA Agribusiness Coordinators (ACs) as a reference tool, on which basis each group was expected to customize it for its own use with rules and roles in terms of water use, organization within the group for labour related farm activities, financial contributions and fair distribution of the pond associated benefits among others.
The MOU enforcement depended on the agribusiness coordinators who continued to accompany the groups after the previous AC departed.

Being the first of its own kind, there was hesitation towards the MoU from many group members fearing that it may interfere with their land rights, concerns which were heightened by the sensitivity of land related dynamics in Laikipia among different communities. Through sustained explanation and reassurance from the AC, members gradually understood that the MoU was intended to protect their interests and strengthen transparency in the initiative. Once this clarity was achieved, the groups accepted the document, which was eventually signed by the farmer group representative, the host farmer, CGA and the Ministry of Agriculture. The signing of the MoU was intended to be done before confirmation of the attribution of the liner to the group. However, the rains started much earlier than expected, making the digging of the pond and the installation of the liner fast-tracked. This contributed to rushed process of MOU development and signing.

Procurement and Distribution of Moneymaker Pump

CGA later procured and distributed Moneymaker pumps to farmer groups following concerns raised during group meetings and field monitoring visits to the ACs.

At that time, several farmer groups had reported significant challenges associated with fetching water manually using containers such as buckets and watering cans. This practice was labour-intensive, time-consuming, and exposed members to physical strain and fatigue, including the risk of slipping and falling into the pond. In addition, the manual method limited the area under irrigation and affected timely crop watering, particularly during dry periods.



After reviewing the concerns and assessing possible solutions, CGA resolved to procure and distribute Moneymaker pumps to the affected groups. The decision was guided by the following considerations:

- The moneymaker pump requires minimal maintenance compared to other irrigation technologies.
- It is relatively affordable and suitable for smallholder farmers.
- The pump has controlled water output, thereby reducing the likelihood of over-irrigation and minimizing water wastage.
- It is simple to operate and manage at the group level.

5. Stakeholders and their global role and responsibilities

The implementation of the farm pond initiative in Laikipia and Meru Counties involved several key stakeholders whose contributions ensured the successful planning, execution, management, and sustainability of the project. Their roles and responsibilities are outlined below.

5.1. CGA-Fert Agribusiness Coordinators (AC)



In each county, 2 agribusiness coordinators (ACs) support farmer groups closely. During the pilot phase of the partnership with the Louis Dreyfus Foundation, one of the Meru ACs was assigned to be the leader for this pilot, as he was the economic advisory reference. He provided leadership from the conception of the idea to the final stages of implementation. His responsibilities included carrying out a benchmark study, presenting proposals from all pilot groups to the CGA-Fert Technical Advisor, consulting with the Ministry of Agriculture to determine the pond characteristics, preparing the frame of the MOU and working on its content with the groups. He oversaw all project activities and prepared the budgets required to facilitate smooth implementation.

Once the ponds were installed, the other ACs being attached to each specific group took over to support the groups on their use of the pond for their activities.

5.2. CGA-Fert Project Manager

The Project Manager supported the initiative through continuous consultations and follow-ups on emerging issues. The manager ensured effective communication and coordination among all project actors, addressing challenges promptly and facilitating smooth project operations.

5.3. CGA-Fert Technical Advisor

The Technical Advisor provided key technical support by reviewing and approving the groups identified for farm pond support. She conducted field visits to confirm progress, guided the groups on effective utilization of the farm ponds, contributed to refining the MoU, and reviewed proposals for groups to be supported with mini-pumps.

5.4. Ministry of Agriculture (MOA)

The Ministry of Agriculture officials contributed oversight, technical support, and continuity for the initiative. They highlighted that the farm pond intervention aligned well with the Counties' strategic plans for agricultural development. For instance, the Laikipia County Water Management Master Plan (2021-2031) is promoting rainwater harvesting through farm ponds and building irrigation infrastructure as key climate-smart technologies, aiming to boost food security despite drought challenges in the county.

Through the Extension Officers from Laikipia and Meru counties, the Ministry participated in the signing of the MOU, on behalf of their respective County Government. This is because the Extension Officers work closely with farmer groups at the ward level and are directly involved in supporting their activities. The Ministry also ensured institutional support for the project, and the Extension Officers strengthened sustainability by committing to continue supporting the groups even after CGA's exit.

The Ministry's irrigation engineers provided essential technical expertise. In both counties, they confirmed the site selection, designed the farm ponds to ensure efficient water harvesting and utilization and technical compliance. Their involvement guaranteed that the ponds met engineering standards.

5.5. Host Farmers



Host farmers, who are members of the groups, provided land for the pond and oversaw on-site activities. They played a critical role in supervising excavation and supporting the work logistically. In groups such as Mahiga Dincom, Tumaini, and Baraka Rwarera, the host has been designated responsible for maintaining the pond and was allowed to use a small percentage of the harvested water for their own domestic needs. In other groups, maintenance responsibilities are shared collectively.

5.6. Farmer Advisors (FA)

Farmer Advisors were selected by the groups and trained by CGA on agroecological practices such as preparing biopesticides, biofertilizers, and vermicompost. In some groups, such as Umoja CBO, Mahiga Dincom, and Baraka Rwarera, the FA also serves as the host farmer. The FA motivated members to utilize the pond for income-generating activities, particularly agroecological vegetable production and establishment of tree nurseries. They also mobilized, guided, and mentored the groups to ensure the pond became a sustainable and productive resource.

5.7. Farmer Groups

The groups as an entity played an essential role in the construction and use of the farm ponds. First, they selected the host and determined the pond's location. Also, in most of them, the members contributed labour for excavation and fencing to secure the ponds. After the ponds filled with water, the groups initially made collective decisions on water use, crop selection, and management arrangements.

5.8. Others

For the case of Mugambi Dam, the area Chief was informed about the initiative, since the project was located within her area of jurisdiction. This enabled her to take part in the issues that emerged. In addition, she played a key role in promoting dialogue and resolving disagreements among the group members, helping them reach a consensus on the host site.

6. Technical Solution



Farmers' initial conditions varied, with some hosts having already dug holes and others starting from scratch, resulting in diverse pond sizes and dam liner needs. Pond capacities ranged from 140 to 1500 m^3, influenced by factors such as available space, soil type, excavation depth, and the group's capacity to dig the pond. The dam liners procured were of uniform standard (1mm thickness).

A summary of estimated pond dimensions and capacities is provided below, using the formula: Volume (m^3) = Length × Width × Depth :

FARM POND	LENGTH	WIDTH	DEPTH	CAPACITY{M^3}	Capacity in Liters
Mahiga Dincom	18m	14m	5m	1260 m^3	1 260 000 L
Mugambi Dam	10m	8m	2m	160 m^3	160 000 L
Tumaini	12m	8m	2m	192 m^3	192 000 L
Greenland	10m	8m	2m	160 m3	160 000 L
Nkatha Cia Mukungu	20m	15m	5m	1500 m^3	1 5000 000 L
Baraka Rwarera	12m	10m	2m	240 m^3	240 000 L
Umoja CBO	15m	10m	2m	300 m^3	300 000 L
Mituntu Lead Farmers	10m	8m	2m	160 m^3	160 000 L

In most cases, the pond excavation was carried out by hiring laborers because the advanced age of many group members limited their ability to undertake the work themselves. In some instances, such as the Tumaini group, the excavation was done by the county government, with the host group only meeting the cost of the driver. For Nkatha Cia Mukungu, part of the pond excavation was undertaken by the County Government of Meru, while the remaining work was completed by hired laborers engaged by the group to finalize the excavation.

The table below summarizes the excavation cost of every case :

FARM POND	Excavation process	Excavation cost
Mahiga Dincom	County government of Laikipia (prior intervention)	KShs.1 500 for excavation driver's lunch
Mugambi Dam	8 people in 20 days	KShs. 500 /person/day = KShs. 80,000
Tumaini	8 people for 12 days	KShs. 500 /person/day = KShs. 48,000
Greenland	8 people for 12 days	KShs. 500 /person/day = KShs. 48 000
Nkatha Cia Mukungu	8 people for 5 days paid by the group, the rest was done with a machine by County government	KShs. 500 /person/day = KShs. 20,000
Baraka Rwarera	8 people for 20 days	KShs. 500 /person/day = KShs. 80 000
Umoja CBO	5 people for 20 days	KShs. 500 /person/day = KShs. 50,000
Mituntu Lead Farmers	8 people for 15 days	KShs. 500 /person/day = KShs. 60,000

From the above table, the cost of digging a pond ranges between KShs. 15 000 and KShs. 50,000 /100 m^3 with average labour cost of KShs. 32,500 / 100 m^3, labour force's cost averaging KShs. 465 per person-day. Around 70 person-days are required to dig a 100 m^3 pond.

The table below presents the estimated sizes and material costs of 1 mm-thickness dam liner. Calculations were based on each dam's dimensions (length, width, and depth) with an additional 7% allowance for trimming and wastage (overlap at joints, anchoring at the edges, irregular dam shapes, slope lining and cutting losses). The total liner area for each dam was determined by adding the base area and the sidewall areas. The cost was then obtained by multiplying the total liner area by the unit price of KShs. 500 per $m^{2.}$

FARM POND	DIMENSIONS (METERS)	SIZE OF THE LINER	COST OF LINER {KSH}	TRANSPORT COST (KSH))	INSTALLATION COST (KSH)	TOTAL COST (KSH)
Mahiga Dincom	18x14x5m	572m^2	286 000	12 000	15 000	313 000 Kshs
Mugambi Dam	10x8x2m	168m^2	84 000	10 000	15 000	109 000 Kshs
Tumaini SHG	12x8x2m	192m^2	96 000	10 000	15 000	121 000 Kshs
Mituntu Leads farmers	10x8x2m	168m^2	84 000	15 000	15 000	114 000 Kshs
Baraka Rwarera	12x 10x2m	224m^2	112 000	12 000	17 000	141 000 Kshs
Nkatha CIA Mukungu	20x15x5m	650m^2	325 000	12 000	20 000	357 000 Kshs
Greenland SHG	10x8x2m	168m^2	84 000	10 000	15 000	145 000 Kshs
Umoja CBO	15x10x 2m	266m^2	133 000	15 000	20 000	168 000 Kshs

The cost of lining a 100 m^3 pond averages 65 000 Kshs.

In conclusion, to dig and install a liner for a 100 m^3 pond, a farmer or farmer group should anticipate an average cost of **97 500 Kshs**.

Filling of the Pond

The filling of most ponds is mainly achieved through surface runoff during the rainy seasons and largely depended on the amount of rainfall received. Under normal rainfall conditions, 7 out of the 8 ponds were fully filled. Mituntu Leads Farmers' pond, however, showed filling challenges due to ineffective siting of collection of runoffs, even during periods of adequate rainfall.

Tumaini Group and Umoja CBO did not rely on rain and surface runoff, due to hygiene concerns for fish farming activities, instead they depended on water supplied through the community water projects. The effectiveness of refilling of such ponds depended on the availability and amount of water released from the community source.

Apart from these groups, refilling the pond after all the water has been used, was a major challenge as the groups lacked permanent rivers nearby or access to reliable community water projects. Only Nkatha Cia Mukungu group regularly bought water to refill their pond.

7. Case studies

Before the installation of the pond and the start of the farming activities, each group had to select among its members a host for the pond. Groups shared common criteria but also some specific considerations. Host identification was done by the group members and vetted by CGA. Key considerations were: land availability, proximity to homes, host farmer motivation and commitment, budget, soil suitability, and catchment potential.

Proximity to water sources was also considered: members near permanent rivers or government water projects were prioritized since that meant the ponds could be refilled with ease during dry spells.

When a potential host had been identified, the group ensured that there was evidence of land ownership of the identified land and the absence of land disputes.

For the Mahiga Dincom case, the host, (father to the FA), already had a water pan on his land except it didn't have a dam liner. To exploit the existing potential of the pan the group decided to install the dam liner.

7.1. Case Study 1: Mahiga Dincom

1. The Group

Mahiga Dincom Group was established in 2011 with an initial membership of 30 individuals. It began as a merry-go-round to promote savings and mutual financial support. As membership and confidence grew, the group introduced table banking, allowing members to save collectively and access small loans with interest. In 2021, the group started working with CGA through the Kenya Climate Smart Agriculture Project (KCSAP), a county government initiative, and was identified as one of the pilot Agroecology Extension Programme (AEP) groups in Laikipia.

2. Origin of the need

In 2023, the group sought to expand its income sources through projects that can benefit from water conservation. They initiated a farm pond project to support irrigation of vegetable production, intending to improve nutrition, enhance household income, and strengthening their table banking activities. The initiative also aimed to serve as a learning and demonstration site for agroecological practices within the community.

3. Setting up of the pond



One group member had access to a pre-existing pond at her father's homestead, excavated earlier by the County Government of Laikipia for community water harvesting, but lacking a dam liner. Through consensus, the group decided to use this existing site rather than incur new construction costs. Some members initially resisted, fearing the host family might become sole beneficiaries if the CGA partnership ended; this concern was addressed through group discussion.

The host's daughter was identified and trained as an Agroecology Farmer Advisor (FA) to manage the site and ensure benefits would be shared equally. The site was verified and approved by the Laikipia West Sub-County Extension Officer as suitable for rainwater harvesting.

4. Usage of the pond

At full capacity, the pond holds 1,260 m³ of water, sufficient to support continuous vegetable production, tree seedling growing, vermicomposting, and the preparation of biopesticides such as Tithonia juice. Irrigation is carried out manually using a solar pump, or occasionally with a hired generator pump. Vegetables, primarily spinach and kale, are produced year-round. The FA has also produced 2,500 tree nursery seedlings using pond water and introduced fish farming in the pond to diversify income.

5. Results and Benefits





The FA earns approximately KShs. 1,500 (€10) per week from vegetable sales, and benefits from reliable water for irrigation, seedling production, and fish farming, as well as improved household nutrition.

For group members: Members benefit from practical training conducted at the site in agroecology, organic fertiliser preparation, seed multiplication, and water-saving techniques. Some have replicated these practices at home. The site acts as a seed multiplication centre for cover crops and green manure species such as Mucuna, Tephrosia, and Canavalia, as well as worms which have been shared with group members and groups from other counties.

For the community: The site serves as a demonstration and learning centre on water harvesting, soil conservation, and sustainable crop production.

6. Group Dynamics and Governance

The group initially established a duty roster for farm activities. However, attendance and commitment declined as members withdrew due to personal disagreements. Following internal consultations, the group collectively agreed to hand over full responsibility for farm management to the FA. The FA now personally covers the costs of seedlings and polytubes from her own funds, and proceeds from vegetable sales . The remaining group members participate only for learning purposes, without contributing either labour or finances. The FA requested CGA to intervene and facilitate regular meetings to restore group cohesion a process that is ongoing.

7. Challenges and Solutions

- Water pumping: The manual pump requires two people to operate, making irrigation labour-intensive. The FA occasionally hires a motorised pump to ease the work.
- Internal conflicts: Disagreements over benefits and responsibilities caused tension and led to member withdrawal. CGA was requested to mediate, and regular meetings were proposed.
- Evaporation: The absence of shade leads to water loss. The group plans to establish shade trees and shade nets around the pond.

7.2. Case Study 2: Mugambi Dam

1. The Group

Mugambi Dam Group was established in 2014 as a self-help group aimed at improving the livelihoods of its members through cooperation and financial empowerment. They grew vegetables for household use and sale, using a communal dam built during road construction works nearby.

2. Origin of the need

In 2022, the group faced conflicts with the wider community, who accused them of monopolising the communal dam. To avoid further disputes and secure an independent water source, they resolved to construct their own farm pond with technical and financial support from CGA and the County Government. The goal was to grow high-demand vegetables such as spinach and cabbages for income generation and improved household nutrition.

3. Setting up of the pond



During planning meetings, the group selected a centrally located site accessible to all members. The host was chosen for his willingness to donate land and his reputation for cooperation and integrity. His land lies near a seasonal river, making it well-suited for pond water recharge during rainy seasons. The host and the Agroecology Farmer Advisor (FA) were different individuals, but they worked closely together. The group initially mobilised individual contributions to hire labourers for excavation, but the project stalled due to insufficient funds. CGA intervened by providing resources to hire an excavator at a cost of KShs.16,000, ensuring the work was completed. After construction, group members fenced off the vegetable production area.

4. Usage of the pond

The pond irrigated approximately 0.25 acres of land. Spinach, kale, and cabbages were grown by the active members. Water was pumped manually and occasionally using a rented generator, with irrigation carried out three to four times per week during the dry season. Pond water also supported a tree nursery producing around 100 seedlings shared among members, and limited livestock watering.





5. Results and Benefits

For the host: Access to irrigation water, improved nutrition, increased income from vegetables, and enhanced standing in the community.

For the FA: Improved technical knowledge in water management, agroecology, and leadership skills.

For group members: Hands-on learning on irrigation farming, new income opportunities, and improved access to fresh produce. Vegetables sold within the local community generated an average weekly income of KShs.1,200–1,800, used to purchase inputs and support member welfare. Some members replicated small kitchen gardens at home. Proceeds also funded a tree nursery shared among members.

For the community: The pond and garden served as a demonstration site on pond construction, vegetable production, and water conservation.

6. Group Dynamics and Governance

After construction, members collectively participated in early vegetable production. Over time, participation declined due to personal and social challenges, including household duties and alcoholism among some members. Eventually, a smaller active group consisting of the host family, the FA, and the chairperson continued managing the site. No formal group activity has been ongoing for some time, since 2025, social tensions and personal issues within the host family led pond-related activities to stop entirely. CGA is working with the group to find solutions for the pond.

7. Challenges and Solutions

- Reduced member commitment: Engagement dropped due to personal and social issues. The group planned to form smaller active committees and encourage accountability, but this was not carried through before activities ceased.
- Financial vulnerability: Members relied on casual labour, making income unpredictable and limiting time for farm activities. Plans to rebuild savings were made but not implemented.
- Low water levels: Limited rainfall reduced pond recharge. The group had considered adding a runoff collection channel.
- Labour-intensive pumping: Manual pumping was tiring; solutions were discussed but not implemented before activities stopped.

7.3. Case Study 3: Greenland SHG Group

1. The Group

Greenland Group was founded in 2016 with the support of Caritas, which trained farmers in Umande Ward, Laikipia East Sub-County, on improved farming practices. In 2021, the group officially registered as a CGA member and was selected as one of the pilot AEP groups. In addition to crop production, the group operates a poultry feed production activity. Their vision is to become champions in cereal and vegetable production.

2. Origin of the need

In 2023, the group proposed a water-conservation initiative through the construction of a farm pond, sharing the idea with the CGA Agribusiness Coordinator. The aim was to enhance vegetable production to support the poultry feed project, reinforce table banking, improve household income, and contribute to community nutrition.

3. Setting up of the pond

The host was selected for her activeness in group activities, willingness to avail land, and the suitability of her site for collecting rainwater runoff and pond refilling, given its location next to a river.

As most members are elderly and unable to undertake intensive manual work, the group contributed KShS. 14,000 to hire excavation labourers. Water from the pond was used to irrigate a quarter of an acre during one production season before the structure was destroyed by floods.

4. Usage of the pond

The main crops produced were spinach, kale, and tree seedlings. Watering was carried out four times per week. Initially done manually, CGA later provided a Moneymaker pump to ease the work. The pond was used for one season only: during the April 2025 heavy rains, the dam was severely damaged and had since remained in poor condition. The group has however, embarked on repairing the dam ahead of the next rainy season.



5. Results and Benefits

For the host: Reliable water supply for irrigating her kitchen garden during the operational period.

For group members: Despite the short operational period, the group earned KShs. 11,300 from spinach and kale sales and KShs. 18,000 from tree seedlings, a total of KShs.29,300. Input costs amounted to KShs. 1,600 for seedlings and polytubes. The group used part of the income to buy supplements and prepare poultry feeds (KShs.3,000), rented a motorised pump (KShs. 5,000), and reinvested the remainder in the table banking scheme. Members also received greens valued at KShs.6,000 and seedlings valued at KShs. 2,100.

For the community: Community members accessed safe, organic vegetables. Tree seedlings were sold at KShs.30 per seedling, a price that was well below the market price of KShs. 50 - 60. The community also gained knowledge in agroecological practices such as vermicomposting and ripening techniques through group demonstrations.

6. Group Dynamics and Governance

All group members participated in watering activities according to a duty roster. Water use and dam management were shared responsibilities: the host was required to report any issues to the group, as all members were collectively responsible for its safety.

7. Challenges and Solutions

- Overflow and water loss: the absence of a water storage tank caused the pond to overflow when full, resulting in water wastage .
- Safety risks: The pond is not fenced, posing risks to humans and animals.
- Structural failure: Inadequate lining at the edges caused seepage and eventually led to the collapse of the pond structure during heavy rains.
- Extended downtime: The pond remained unrepaired for a long period, halting all group farming activities.



The liner has recently been reinstalled. The pond's depth has been reduced to leave for length of liner for proper stabilization of its hedges.

7.4. Case Study 4: Umoja CBO

1. The Group

Umoja Community-Based Organisation (CBO) was established in 2014 as a 60-member welfare group. Activities began with monthly savings before expanding to tent and equipment hire for income generation. Membership later fell to 23 due to financial trust issues. In 2018 the group moved into avocado seedling production and grafting, and in 2019 registered as a CGA member. In 2023, a poultry farming project was introduced as an income alternative during drought periods. The pond was completed in February 2025.

2. Origin of the need

To support further income diversification, specifically vegetable and tree seedling production, members identified the need for better access to water. The farm pond was conceived as a solution to enable year-round production alongside the existing poultry and avocado activities.

3. Setting up of the pond



Members unanimously agreed on a host who had previously demonstrated commitment and reliability by hosting the poultry project and the avocado nursery on his farm. His leadership and cooperative character reassured members of his suitability.

The site's suitability for water harvesting and storage was confirmed by a Ministry of Agriculture engineer, who conducted measurements to ensure compliance with safety and construction standards. Although the host opted not to harvest direct rainwater, his farm is served by a Three-Line Community Water Project that releases water freely during

the rainy season; he uses this to divert and store water in the pond. The host was able to connect the pond directly to the water project line, simplifying refilling and reducing operational costs.

4. Usage of the pond



The group accessed the pond for one season, from June to early September 2025, as the liner was installed 2025. Following the erratic release of water by the community project and very little rainfall, the group opted to focus on a 20 m × 10 m plot planted with the tree nursery, tomatoes, spinach, and kale (rather than the fuller range originally planned, which included onions and potatoes). Irrigation was carried out four times per week in dry weather and twice per week in cooler periods, using a gravity-fed hosepipe and the Moneymaker pump provided by CGA.

Group activities were later suspended due to prolonged drought, which reduced supply from the community water project to a level insufficient to refill the pond.

The little water in the pond now supports production of azolla and fish farming.

5. Results and Benefits

For the host: The host intended to introduce fish farming in the pond for direct benefit, but the pond dried up due to drought, making this impossible. The host remains interested in reviving the project once water availability improves.

For group members: The group earned KShs. 5,000 from kales and spinach sales and KShs.12,000 from tomatoes,, a total of KShs.17,000, after spending KShs.3,000 on seedlings and polytubes, yielding a margin of KShs.14,000 9a seson of 3 months). Through a joint meeting, proceeds were allocated to members' expenses: membership card payments, e-citizen registration, certificate renewal, and farm input costs. Each member also received 10Grevillea seedlings for planting at their homestead, and their poultry had easier access to water during the operational period.

Each member also received some azolla seed to grow at their homes.

For the community: Surrounding community members benefited from access to organic vegetables and gained exposure to water-conservation techniques demonstrated using the pond.

6. Group Dynamics and Governance

According to the host and FA, the farm pond strengthened group cohesion during its active period. Members worked together, held regular planning meetings, and all decision-making and profit distribution were conducted equally. The pond was described as a collective asset with shared benefits.

7. Challenges and Solutions

- Unreliable water source: The group depends on a community water project releasing water only during the rainy season. Securing an alternative source and strengthening rainwater harvesting have been proposed, but not yet implemented.
- High evaporation: Extreme heat and insufficient shading caused significant water loss. Installing shade structures has been proposed but is yet to be implemented
- Low youth participation: Limited engagement from young members delays activities and increases workload for others. Sensitisation and clearer task allocation have been proposed

7.5. Case Study 5: Nkatha Cia Mukungu

1. The Group

Nkatha Cia Mukungu was formed in 2014 and joined CGA in 2018. With improved skills gained from CGA trainings, the group started a fruit tree nursery hosted at a member's homestead. They soon encountered water scarcity, theft, and mismanagement of group resources by the nursery host, who also demanded payment for water used to irrigate the nursery. These difficulties prompted group leadership to seek a more reliable and autonomous water solution.

2. Origin of the need

The problems experienced at the original nursery site, water scarcity, theft, and host misconduct, led the group to propose constructing their own farm pond to support both the nursery and vegetable production.

3. Setting up of the pond

The group selected the farm of the Group Treasurer, who volunteered her land. Members trusted her, and her farm offered the appropriate slope, space, and natural water runoff for effective water harvesting. The previous nursery host was explicitly excluded from consideration due to her past conduct.

According to group members, the excavation was financed entirely by the group: they withdrew KShs.20,000 from their savings account and contributed an additional KShs. 10,000. The group later contributed a further KShs. 20,000 to fence off the pond.





4. Usage of the pond

The pond supplies water to eight vertical gardens, four for spinach and four for kale. Water is pumped from the pond to a storage tank using a hired petrol generator, then distributed manually to the gardens. Watering is done four times per week, depending on the weather. The group also runs a tree nursery and has grown potatoes, capsicum, and avocado seedlings using pond water.

5. Results and Benefits

Vegetables, kales and spinach are sold to local community members and market traders. Weekly earnings range from KShs. 800 - 1,000 and can reach KShs.3,000 during peak demand. After settling input costs, all earnings are deposited into the group's savings account.

As of November 2025, the group had generated the following income from pond-supported activities:

- Grevillea seedlings: KShs. 85,000 (1,500 distributed to members; 8 500 sold to the community at KShs. 10 each)

- Avocado seedlings: KShs.480,000 (4,800 grafted seedlings sold at KShs. 100 each; 1,500 distributed to members)
- Vegetables (spinach and kales): KShs.11,000
- Potatoes (5 bags harvested from 3 bags planted): KShs. 10,000
- Capsicum: KShs. 2,000
- VSLA savings: KShs. 50,000
- Total income: KShs. 638,000

With the generated income, the group bought 30 dairy goats at KShs.8,000 each (KShs.240,000), 600 poultry birds at KShs. 200 each (KShs.120,000) to be given to each member, and reinvested in seeds, seedlings, and polytubes (KShs. 58,000). KShs. 68,000 were deposited with the Ruiri-Rwarera Farmers SACCO. The rest (KShs. 50,000) was put into the group's table banking savings account.

Members also benefited from improved nutrition through organic vegetables, enhanced knowledge of organic farming, and access to tree seedlings for their homesteads. The site is a community learning space for kitchen gardening.

6. Group Dynamics and Governance

Group roles are agreed upon orally (a written document had been prepared earlier but is no longer in active use). Watering duties are assigned through a roster prepared by group leadership; any member absent from their duty without reason is fined KShs. 200. Community members are welcome to visit and learn.

7. Challenges and Solutions

- High evaporation: Significant water loss occurs due to high temperatures. The group wants to install shade structures.
- Costly and difficult pumping: Hiring a generator and buying petrol to pump water to the storage tank is expensive. A solar pump has been proposed as the solution.
- Water wastage during manual irrigation: A drip irrigation system and an additional storage tank have been proposed to improve water efficiency.

7.6. Case Study 6: Baraka Rwarera

1. The Group

Baraka Rwarera Group was established in 2005. After registration, the group began table banking and issuing member loans to generate income through interest. In 2018 the group joined CGA and started receiving trainings, on kitchen garden establishment to improve household nutrition among others. Through CGA support, the group ventured into tree nursery establishment and learned grafting techniques; each member received grafted seedlings for planting at home.

2. Origin of the need



During nursery operations, water scarcity emerged as a major challenge. After consulting the CGA team, the group was advised to draft a proposal requesting assistance for the establishment of a farm pond to secure reliable water for the nursery and future vegetable production.

3. Setting up of the pond

The selected site belongs to the group leader, whose land availability and strong leadership earned the trust of members. The site was judged suitable due to its favourable gradient for water harvesting and its proximity to a community water project that could help refill the pond. The host expressed strong willingness to manage and maintain the pond in the absence of other members.

Initially the group expected to handle all excavation themselves, but given the group's level of vulnerability, CGA ultimately paid for machine excavation, contributing a significantly larger share than originally anticipated.

4. Usage of the pond

Pond water supports the tree nursery and kale grown in vertical gardens. Seeds and polytubes were purchased using the group's table banking savings. Rather than selling seedlings commercially, the group distributed them to members for planting at their homesteads; vegetables were similarly shared among members to improve nutrition. The group is not currently engaged in a capital-generating venture but is planning to acquire a drip irrigation system to begin commercial production of onions and tomatoes.

5. Results and Benefits

Members received 120 tree seedlings for planting in their homes, contributing to environmental conservation. The vertical gardens supply organic vegetables improving household nutrition. Regular meetings and shared pond activities have strengthened cooperation and teamwork, though engagement has been affected by prolonged drought.

6. Group Dynamics and Governance

Watering was initially carried out by all group members using a duty roster. However, the manual method of fetching water from the deep pond discouraged participation, particularly women, who feared falling in the pond while using containers. This progressively led to the host taking over watering responsibilities. The moneymaker pump donated by CGA has also not resolved the issue, as it requires two physically strong people to operate. The group has not yet found a workable shared solution for water abstraction.

7. Challenges and Solutions

- Unsafe water access: Fetching water from the deep pond with containers poses a risk, especially for women, leading to reduced participation. The group hopes to adopt a solar or generator pump and a drip irrigation system.
- Ineffective pump: The Moneymaker pump requires two strong individuals to operate and has not enabled broader member participation in irrigation.

- Limited training: Members feel current training is insufficient for strengthening skills in production, water management, and agribusiness. They want more training, exchange visits, and benchmarking with successful groups.
- Incomplete fencing: The pond area remains partially unfenced, posing safety and security concerns. The group is mobilizing resources to complete the work.

7.7. Case Study 7: Tumaini SHG

1. The Group

Tumaini Self-Help Group (SHG) was established in 2018 by community members seeking to improve their livelihoods through sustainable agriculture. The group initially focused on fruit tree planting and kitchen gardening but faced persistent water shortages. They then diversified into fruit selling and poultry farming, engaging in feed formulation and acquiring a poultry incubator. In 2019 the group registered with CGA and began receiving training, mentorship, and exposure visits.

2. Origin of the need

Through CGA interactions, the group identified the need to revive fruit tree planting, which had previously stalled due to water shortages. The idea of a farm pond emerged from group members and was presented to CGA. The main objectives were to secure water for fruit tree production, promote organic farming, and advocate for agroforestry in the semi-arid area where the group operates.

3. Setting up of the pond



According to the host, a democratic process was followed: the group nominated three candidates who were evaluated on security and commitment. The current host was chosen based on his readiness and the suitability of his site. However, the Chairlady and FA reported that the chosen host began excavation at his home before the group had reached a final consensus, leaving other members feeling excluded. This was further complicated by pre-existing tensions with another member who had refused to share produce from a demonstration plot. These combined tensions led two families to leave Tumaini SHG and form a new group, Poul Cereals SHG, weakening the original group significantly.

With most members having withdrawn, the host assumed full financial and physical responsibility for excavating, developing, and maintaining the pond. No shared financial arrangement or formal role allocation was ever established.



4. Usage of the pond

The pond receives water from a community water project, enabling a variety of agricultural activities. The host uses pond water for fish farming, fruit tree irrigation, vegetable production (spinach, kale, and Irish potatoes, irrigated by gravity-fed hosepipe), and vermicomposting preparation to support soil fertility. While the pond was formally intended for group use, group members rarely participate due to unresolved conflicts over pond hosting and resource control.

5. Results and Benefits

Benefits have been primarily concentrated at the host's household level. The host family has improved their nutrition through access to organic fruits, vegetables, and fish, and has adopted and demonstrated agroecological practices including vermicomposting, Azolla production, biofertiliser application, and soil conservation. Over time, the host's farm has become a learning site for community members and for academic institutions including Kenyatta University and Egerton University.

From the Chairlady's and FA's perspective, the pond has not achieved its intended purpose of fostering group cohesion and shared income. Most members cannot access the pond or participate in its activities. The project contributed to division rather than unity, and the group as a whole did not experience equitable benefits.

6. Group Dynamics and Governance

No formal governance structure, role allocation, or financial arrangement was ever established for the pond, due to the conflicts that arose during host selection. The host operates the pond essentially as an individual, with only occasional involvement from a small number of members. The lack of shared governance has perpetuated the exclusion of most members from decision-making and from the benefits of the pond.

There are attempts by group members from the two conflicting sides to reconcile.

7. Challenges and Solutions

- Conflicted host selection: The process led to the withdrawal of two families and ongoing division. No agreed solution has been found yet to restore equitable access or group participation.
- Absence of governance structures: No roles, financial arrangements, or accountability mechanisms were established. This remains unresolved.
- Member exclusion: Most members are unable to access the pond or benefit from it. Restoring participation would require resolving the underlying conflict, which has not yet been addressed.

7.8. Case Study 8: Mituntu Leads Farmers

1. The group

Mituntu Leads Farmers is a community-based agricultural group formed in 2009 with the aim of promoting farming activities and improving the livelihoods of its members. After registering with CGA in 2021, the group initiated a tree nursery project. Through their involvement in raising and managing the nursery, they realised that water scarcity was a major challenge affecting project sustainability.

2. Origin of the need

Recognising the importance of a reliable water source, the group approached the CGA Agribusiness Coordinator and requested support in establishing a farm pond. Their vision was to secure a stable water supply for tree seedlings, vegetables, and other agricultural activities, while also creating opportunities to supply local markets and improve household food security.

3. Setting up of the pond



Selecting a suitable host was straightforward. The group's previous collaboration with the host of the tree nursery project had demonstrated her reliability, generosity, and commitment to community development. She willingly offered a portion of her land at no cost. The natural slope of her farm also made it well suited for harvesting rainwater runoff.

However, the group later expressed concern about the exact location chosen for the pond within the farm. The site was selected by the Ministry of Agriculture (MOA) technical team, and members felt it was not their preferred location. In practice, the chosen spot does not effectively capture surface runoff during rainfall, meaning the pond rarely fills to its expected capacity. To compensate, the host voluntarily redirected water from her rooftop gutters into the pond, ensuring agricultural activities could continue.

As a majority of group members are elderly, the group hired local youth to carry out the excavation, ensuring timely completion while supporting local employment. Members contributed by clearing vegetation around the pond in preparation for dam liner installation. Supervision was jointly handled by the Farmer Advisor and the host. The excavation costs were financed from the group's table banking scheme, demonstrating strong internal resource mobilisation.

4. Usage of the pond

During seasons when the pond holds sufficient water, it is used to irrigate kale, spinach, and the tree nursery. Watering is managed by group members through a duty roster. The group agreed informally that water drawn from the pond is mainly for group-based activities. As a gesture of appreciation for providing land, the host was allocated a small share of water to irrigate her household kitchen garden.

5. Results and Benefits

For group members: Members accessed fresh, organically grown vegetables, improving dietary diversity and household nutrition. Vegetables were not sold but consumed by members. Tree seedlings produced

in the nursery were distributed equally among members, five seedlings each, promoting agroforestry at the homestead level and contributing to environmental conservation.
For the host: The host's kitchen garden benefited from controlled water access, improving her household food security in recognition of her land contribution.
For the group as a whole: The shared water use agreement ensured fairness, strengthened unity, and minimised potential conflicts. The group has resolved to allocate part of table banking profits to purchase farm inputs, working towards making the farm pond an income-generating asset.

6. Group Dynamics and Governance
The group operates on a clear principle of collective benefit: pond water is for group activities only, not individual gain. Duties are assigned through a roster. The Farmer Advisor and host jointly oversee day-to-day operations, while other members are free to visit and monitor progress. Financial decisions, such as using table banking savings to fund excavation, reflect strong internal discipline and collective decision-making.

7. Challenges and Solutions

- Poor pond location: The site selected by the MOA technical team does not effectively capture surface runoff, limiting water storage. The group suggests a reassessment by a qualified water engineer to determine whether the pond can be repositioned, deepened, or complemented with additional channels to improve water inflow.
- Lack of security: The absence of a fence exposes the pond to safety risks and leaves the dam liner vulnerable to damage by animals and children.
- Tree shading: Nearby trees introduce debris into the water affecting water quality. Managing or removing overhanging vegetation has been identified as a need.

8. Key findings and lessons learnt

8.1. Impact

The eight farm ponds established across Laikipia and Meru counties have generated significant multifaceted impacts across economic, social, environmental, and knowledge-sharing dimensions. When well-managed, pond projects deliver strong and diverse benefits; however, governance challenges and external factors can significantly undermine these outcomes. Below is a summary of the impacts observed:

- **Economic impacts:** Groups have generated income through diversified enterprises, enhanced their table banking activities, and acquired new productive assets such as storage tanks and livestock (notably evidenced by Nkatha Cia Mukungu group).
- **Social impacts:** Access to agroecologically produced vegetables has improved household nutrition and food security. Group cohesion and teamwork have been strengthened in most groups. However, some groups experienced negative social impacts when conflicts over pond management contributed to group division and withdrawal of members.
- **Environmental impacts:** Tree nurseries have been established and seedlings have been planted by the group members themselves and sold to the broader community. Agroecological practices

such as vermicomposting and the use of organic inputs have been widely adopted for vegetables production, contributing to soil health and environmental protection.

- **Knowledge dissemination:** Several ponds serve as demonstration and training sites, attracting interest from neighboring farmers and academic institutions, facilitating knowledge exchange on sustainable water management and agroecology.

8.2. Gaps between Planning and Reality

A significant gap exists between initial planning assumptions and field realities. The pilot assumed that group cohesion, labor availability, and manual pumping would be sufficient for sustainable pond operation. In practice, the initiative encountered unanticipated challenges:

- Group dynamics proved more complex than thought, with personal conflicts and social tensions affecting participation. Main reasons being on the host choice and/or on the location of the pond and the initial willingness to involve each member in the daily tasks, despite their distance to the pond site. Both cases led to either collective decision to allocate the daily management of pond activities to the host or by-default appropriation of the pond by its host.
- Aging membership limited the availability of labor for manual tasks, initially to dig the pond and later to fetch water, necessitating the introduction of pumping technologies.
- Labor intensity and safety concerns with manual water fetching, particularly from deep ponds, discouraged member participation and affected utilization efficiency. This concern led to mid-course corrections, such as procuring Moneymaker pumps, which later also revealed not to be an appropriate solution. Many groups then explored on their own solar-powered or engine pumping alternatives.
- Designing a MOU defining clear roles, responsibilities, and anticipating costs and incomes over multiple cycles appeared to be difficult for groups.
- Lack of entrepreneurial mindset of farmers. It was assumed that the farmer groups would quickly see the business opportunity in the farm pond and would spontaneously make plans to sustain these activities and invest in pumping system or storage tank.

8.3. Initiative design

Choice of the groups and hosts:

Most of the groups were chosen because of their motivation to venture into vegetable farming and tree seedlings production, as well as for their unity. For the case of Mugambi dam, the vulnerability of the members and the potential of the pond improving greatly their livelihoods was part of their choice as a pilot group. However, the same vulnerability and its direct or indirect consequences (casual jobs outside of the group, alcoholism, social tensions, etc) compromised the success of the initiative, despite the multiple attempts of CGA field team to help the group solving their issues and finding solutions for a sustainable use of the pond.

As far as the choice of the host is concerned, beyond his/her willingness and the technical considerations, social aspects need to be taken into account. Sometimes, the more audible members of the groups, or those with a leadership position can influence the decisions taken. For the case of Tumaini Poultry, the host matched all the technical requirements, but this choice was later criticized by some members.

In all cases, land ownership was cited as a critical criterion for the choice of the host, to avoid further challenges.

Recommendation: The choice of groups to be supported should take more into account the group financial capacity and business plan to ensure sustainability of the income generating activities, as well as their cohesion and ability to run an enterprise collectively.
Within the groups, it is important to allocate sufficient time for the members to discuss the choice of the host and provide space and decision-making processes that can allow for free expression of ideas (anonymous voting, etc).

Accompaniment of the groups

The Memorandum of Understanding (MOU) was intended to formalize cooperation between landowners, groups, and supporting institutions, establishing clear rules for water use, responsibilities, and benefit sharing, as well as standing as a business plan that would help the group anticipate their expenses and use of the benefits. However, in practice, the MOU process encountered significant challenges:

- Initial suspicion: Members feared the MOU might threaten their land rights, particularly in Laikipia where land tenure is sensitive. Sustained explanation and reassurance were required.
- Rushed timing: Early, unexpected rains compressed the MOU development timeline. Groups did not fully internalize the document's intent and did not feel genuine ownership of its provisions.
- Weak operationalization: Even after signing, many groups did not effectively implement the MOU's provisions regarding role allocation, water use scheduling, and benefit sharing.

The MOU process revealed that groups require more time and support to develop detailed business plans that outline operational frameworks, resource requirements, expected returns, and risk mitigation strategies.
During the study, some groups shared their concern that the duration of 3 years for free access to the land of the pond by the host was insufficient. The collective workshop enabled to expose that some groups were not remembering that there was a time-bond period of the MOU. These two cases reveal that the groups didn't feel ownership of the MOU and that its elaboration process was overlooked, as the initial duration of 3 years was indicative and was subject to groups' agreement.

Recommendation: Future initiatives must allocate adequate time and support for proper business planning before construction begins. MOUs should be developed through genuine participatory processes, written in local languages, and signed in the presence of local authorities (chiefs, extension officers, local administrators).
Then, a close accompaniment is needed during the implementation of the project to remind the group about its engagements, to help solving the challenges that may arise and to help the groups adapt their business plans if necessary.

Timing of implementation:

Beyond engaging the reflection and project development with more anticipation to ensure groups really consider the pond as their own enterprise, it has to be considered that a farm pond installation implies some climatic considerations: the excavation of the pond and liner installation can only be done in dry season. However, to prevent some technical challenges (cf technical lessons below), it is important to engage an expertise during the previous rain season to assess the filling potential of the proposed locations.

Recommendation: For areas that receive 2 rain seasons, the whole process should be planned over a period of 6 months at least, but in areas that receive only 1 rain season, it can take over a year.

Collective approach

Fert and CGA are convinced that farmer groups can bring relevant solutions and opportunities to their individual members, thus the choice of supporting groups to access water through farm ponds.

Initial thoughts that a duty roster system would ensure equitable labor participation and collective ownership proved overly optimistic. In practice, several factors undermined participation:

- The physical distance of ponds from some group members' homes created logistical barriers to regular participation.
- Weak accountability structures and inconsistent enforcement of duty rosters resulted in declining attendance.
- Aging membership limited capacity to undertake intensive physical labor, and younger members' engagement was often insufficient.
- Safety concerns, particularly among women in groups with deep ponds, discouraged water fetching participation.

As participation declined, some groups transferred operational responsibility to the host farmer (Mahiga Dincom) and in the case of Tumaini Poultry, the pond was appropriated by the host. While this ensured continuity, it concentrated benefits and reduced member engagement. The challenge lies in balancing the need for consistent operations with the aspiration for equitable, inclusive participation.

Nkatha Cia Mukungu group established clear by-laws and strong enforcement mechanisms. Members are fined KShs. 200 for missing assigned duties, and those unwilling to comply are advised to leave the group. This structure has ensured high participation, equitable benefit distribution, and continued productivity. This strategy is relevant for groups that have decided to manage the pond collectively.

Recommendation: Groups should assess their realistic capacity to manage labor-intensive ponds before construction. If membership is predominantly elderly or geographically dispersed, the groups should think of schemes that minimize manual labor requirements (e.g., gravity-fed systems, solar pumps, water storage tanks). For groups choosing centralized management, clear responsibilities and benefit-sharing agreements should be established in advance to maintain transparency and member satisfaction.

Stakeholders implication

Though the Ministry of Agriculture officers were thought by CGA as being the most appropriate external signatory of the MOU as they are the ones walking with the groups on their agricultural journey, many groups shared the opinion that they would have preferred a representant of the local administration to be more involved. Even if they are not signatory of the MOU, involving them and community leaders in the process, and engaging them to support the initiative throughout its lifecycle can prevent conflicts and/or solve disputes.

Recommendation: depending on each group/area, involving external neutral authorities (formal or informal) favors local ownership and accountability of the project, thus sustainability.

8.4. Technical design and Water Management

Site Selection and Water Availability

Technical performance varies significantly depending on site suitability and water availability. Groups such as Umoja CBO, Mituntu Leads Farmers, and Nkatha Cia Mukungu have been severely affected by prolonged drought and inconsistent rainfall. Extended periods without water expose pond liners to harsh

sunlight, increasing the risk of cracking and damage. This directly reduces the incomes generated by groups as ponds dry up before the following rainy season.

Ponds located on natural slopes with reliable runoff channels (Mahiga Dincom, Mugambi Dam, and Nkatha Cia Mukungu) perform substantially better than those in areas with variable rainfall or insufficient catchment design (Mituntu Leads Farmers).

Ponds that are located close to a river or a community water project offer an opportunity for easy refilling of the pond. This is especially valid for areas that receive only 1 rain season per year, as the pond capacity may not be able to hold water for almost a full year, depending on its usage.

In terms of hygiene of the water, Tumaini SHG and Umoja CBO deliberately avoid direct runoff collection, preferring community water project supplies for water purity for their fish farming. Therefore, the choice of engaging in fish farming has to be considered when settling on a pond location.

Nevertheless, community water can be also unreliable and insufficient. None of the groups have explored water purchase strategies through truck delivery, despite their potential profitability. The groups have lacked accompaniment on business planning to determine whether investing in water purchase for dry-season vegetable or fish production would be economically viable.

In addition, having the pond location assessed by an expert from the Ministry of Agriculture contributed to the success of most of the ponds in terms of filling.

Recommendation: Site selection should involve Ministry of Agriculture technical expertise to assess runoff potential. When timing permits, engineers should visit sites during the rainy season to evaluate actual water capture conditions. Groups should be informed about realistic water availability scenarios and should anticipate the potential need for refilling ponds during drought, including consideration of water purchase strategies when economically viable.

Pumping systems must be considered at the design stage:

A key lesson is the critical importance of anticipating pumping systems during the initial design phase. In most cases, pond construction focused on water harvesting and storage, while water lifting mechanisms were considered as an afterthought. This approach created significant operational challenges:

- Manual water fetching proved labor-intensive, time-consuming, and unsafe, particularly where ponds are deep (notably in Baraka Rwarera, where fear of falling limited participation).
- Most groups rely on the labor-intensive Moneymaker pump, requiring two strong individuals to operate. No group has yet acquired solar-powered pumps despite strong interest; they must lease from neighbors, increasing operational costs.
- The absence of storage tanks and/or the positioning of the pond in regards to the plots to be irrigated results in the need to pump frequently throughout the week, reducing efficiency and profitability of hiring pumping services.

Recommendation: Future designs should address pumping early by considering pond location relative to storage tanks, or by choosing a pond location that allows for gravity irrigation where possible. The successful experience of Nkatha Cia Mukungu, with a storage tank adjacent to the pond that uses gravity to bring water to the crops—demonstrates that such design considerations maximize operational efficiency and profitability.

Pond dimensions

Despite initial inclinations to construct large ponds for maximum water storage, field experience reveals that smaller ponds are preferred by smallholder farmer groups:

- Smaller ponds require lower investment costs and result in lower labor and maintenance demands.
- They exhibit reduced water losses through evaporation and are more compatible with affordable, manual or solar-powered pumping solutions.

However, smaller water storage capacity increases the risk of the pond drying up before the following rains, thus leading to the need to refill the pond. Large ponds can be more appropriate for groups willing to embrace large-scale fish farming.
Designing deeper but narrower ponds could be a solution to prevent excessive evaporation, but it may be constrained by the nature of the soil and the potential need for stronger machines.

Recommendation: farmer groups should be well sensitized on the advantages and constraints of the different types of ponds and accompanied in doing cost-benefits analysis for the location and dimensions of the pond they envisage.

Pond Durability

As mentioned above, water loss through evaporation is a cross-cutting challenge. Without shade, high temperatures cause substantial water loss and stress on pond liners. Shade nets have proven most effective, as tree shade can compromise hygiene through leaf fall and debris accumulation.
The case of Greenland SHG, here heavy El Niño rains in April 2024 destroyed the pond demonstrates the critical importance of properly designed overflow systems to prevent water from undermining the dam liner and causing structural failure.
Mahiga Dincom, Nkatha Cia Mukungu, and Baraka Rwarera established fencing to prevent livestock and wildlife damage, extending their infrastructure's lifespan.

Recommendation: the need for shading, and especially shade nets, should be anticipated and groups to be fully aware of the evaporation challenge. All ponds must include properly engineered overflow systems to manage excess water during heavy rainfall. These measures will significantly extend pond lifespan and protect group investments.
Fencing should also be planned for as it is a safety and durability measure.

Reproducibility of the initiative

Despite implementation challenges, several ponds have successfully served as income-generating equipment and learning and demonstration sites. Tumaini SHG, Mahiga Dincom, and Nkatha Cia Mukungu have attracted visits from neighboring farmers, community members, and academic institutions interested in learning about water management, agroecology, and organic farming practices.
However, the reproducibility of farm pond initiatives remains severely constrained by financial vulnerability. While communities have demonstrated strong interest in adopting the technology, their limited financial resources and weak technical knowledge are major barriers to replication.

Recommendation: CGA could carry out some advocacy towards more support for access to collective farm ponds, or develop a partnership with financial institutions for farmer-friendly financial tools. Collaborations with potential product buyers could also be explored.

9. CONCLUSION

The farm pond initiative in Laikipia and Meru has demonstrated significant potential to improve farmer livelihoods, food security, and environmental resilience. When well-managed, the ponds have generated tangible economic, social, and environmental benefits and have served as learning hubs for broader community adoption of sustainable water management and agroecological practices.

However, the initiative has also revealed some gaps between initial assumptions and field realities. Technical challenges related to water pumping, water availability, and pond design have compounded governance challenges originating from inconsistent group commitment and weak institutional capacity. The pilot has demonstrated that infrastructure alone is insufficient; sustainable outcomes require integrated attention to technical design, strong group governance, inclusive participation and consistent accompaniment.