PROGRESS REPORT

RIWAH PROJECT, AUGUST 2025

Testing and innovating low-cost, context specific water harvesting technologies for smallholder farmers in Uganda and Tanzania

Content

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Cover photo: *Mirembe Development Group, Wakiso District, Uganda. 1 of 100 farmer groups testing and innovating low-cost water, context specific water harvesting technologies in the RIWAH project.*

1. Introduction

The 3-year RIWAH-project has the development objective to increase resilience to climate change-related water shortages among smallholder farmer families in climate-vulnerable districts. Through the development of and advocacy for context-specific low-cost water harvesting technologies (WHT) it will contribute to sustainable water management sectors in Uganda and Tanzania. This is achieved through two outcomes; 1) Context specific low-cost WHTs innovated by 2000 smallholder farmer families organized in 100 farmer groups in five districts and 2) Low-cost WHTs for smallholder farmers are integrated in local adaptation plans in 5 districts. The main activities are targeting group-led innovation of low-cost WHT, participatory MEL on resilience efficiency, and facilitation of dialogue between smallholder farmers and relevant duty bearers at district government level to influence development of local adaptation plans to include action plans for water access for smallholder farmers with WHT as a specific solution.

The purpose of this report is to demonstrate the results from the first gathering of data from Farmer Family Learning Groups (FFLG) and individual households (HH). It focuses on their experiences with the RIWAH project, the implementation of WHT's and their challenges with water shortages.

1.1 Background

Smallholder farmer families ´ food and income security are vulnerable to and impacted by climate change because their economic activities rely mainly on crop production and livestock keeping. Once the periods of dry season as well as the extended drought periods caused by climate change set in, crop production is affected causing seasonal food insecurity due to crop failure caused by water scarcity. Simple and affordable WHT can increase water-use efficiency and improve access to water for farming in the dry seasons and periods of draught as well as contribute to quality of drinking water and enhance integrated water management at household-level. Thereby contributing to a solution to the water access challenge for the smallholder farmers, pointing a way forward for good governance in a sustainable water management sector in the two countries. Majority of smallholder farmers in the target districts neither have the technical capacity on WHT nor can they afford to purchase equipment for water harvesting and irrigation system to grow food in the dry season. Access to water is acknowledged as a right at country level, however local adaptation plans are still in development at district level. The objective of the project is to identify and innovate context specific WHTs, that are affordable for smallholder farmers, and through integration in local adaptation plans contribute to resilience towards water shortages. The project focuses on water access through water harvesting and storage, and the correct solutions of low-cost WHT systems will vary from community to community and district to district. If interested more

information about the project purpose, partners, target groups and interventions can be found here https://organicfflg.org/learning-centre/riwah-project/

1.2 Data

Data collection methods

Data collection in connection with monitoring and evaluation in the project consists of a balance of qualitative and quantitative data collected among target groups and stakeholders related to the programme's outcomes. Data collection was conducted on different levels, both FFLG's and individual households (HH).

The MEL task-group has developed a participatory MEL system, translated in required languages for quantitative data collection, an interview guide for qualitative data collection, and guidelines for desk top research. To secure reliability and validity in the data collection, the M&E officer from Caritas Kampala has conducted training among ESFROMA partners and master facilitators in the use of MEL system. In the uncertain, dynamic circumstances that characterize social change, the paths to achieve the objective and outcome are to a certain extent unpredictable, and predefined objectives and theories of change can be modified over time to respond to the changes in the context. In this project, applied cocreation is an intended action and the MEL system systematically harvests the innovations, intended and unintended outcomes of the interventions among FFLGs, collaboration with CSO and local government agencies.

The data collection process has resulted in two datasets: one at the FFLG-level and one at HH-level. Both datasets are collected in five districts - three in Uganda, one in Tanzania, and one in Zanzibar.

The HH-level dataset consists of 414 households, with 254 from Uganda, 80 from Tanzania, and 80 from Zanzibar. These households are distributed across 98 different FFLGs, with approximately four households represented in each group. Of the surveyed households, 66% consist of between 4 and 9 members, 21% consist of 1 to 3 members, and 12% have more than 10 members.

The FFLG-level dataset includes 104 focus group discussions (FGDs), with 64 conducted in Uganda, 20 in Tanzania, and 20 in Zanzibar.

Accountability and transparency through reports

This report aims to enhance accountability and transparency regarding the project's performance and impact, both in general and at district levels. We will continue to collect data to facilitate analysis and evaluation of the project's outcomes. Additionally, the report seeks to highlight the challenges and advantages faced by the target groups involved, enabling us to derive insights and foster learning throughout the implementation process.

2. Summary of key findings across the participating districts

The following section will present the general results for all districts on implementation of WHT, food security and the most common challenges.

2.1 Water access and progress in testing and implementing WHT

When asked about their primary water source, only 14% of households reported rainwater harvesting, while 43% identified wells as their main source. However, as shown in Table 2.1.1, the reported main water sources are often insufficient to meet the water needs for both livestock and crop production throughout the entire year.

***Table 2.1.1**: Main water source for livestock and crops throughout the year*

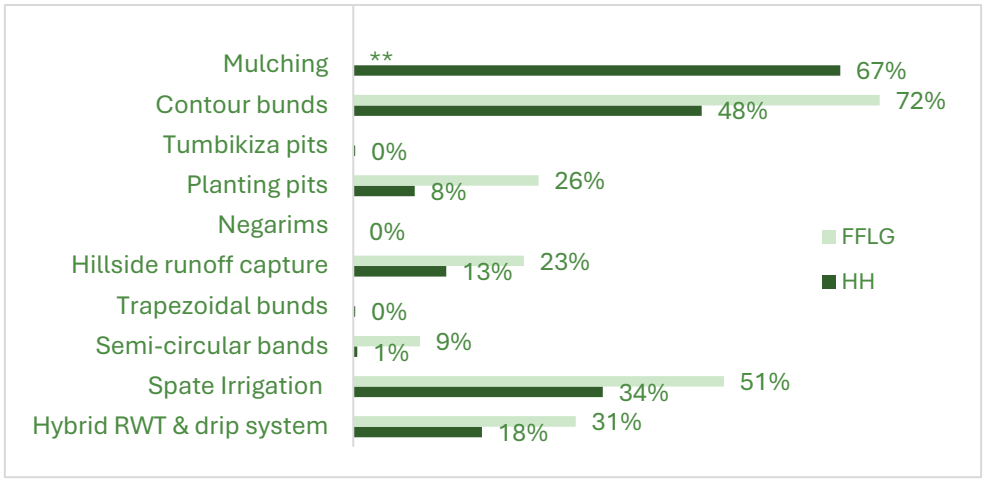
	Total	1-3 months	4-6 months	7-9 months	10-12 months
Borehole	10% (41 HH)	46% (19 HH)	12% (5 HH)	7% (3 HH)	34% (14 HH)
Dam /drilling	1% (3 HH)	0%	0%	0%	100% (3 HH)
Floodwater	0% (2 HH)	50% (1 HH)	50% (1 HH)	0%	0%
Harvesting rainwater	14% (59 HH)	71% (42 HH)	17% (10 HH)	2% (1 HH)	10% (6 HH)
*Others**	8% (32 HH)	47% (21 HH)	2% (1 HH)	2% (1 HH)	49% (22 HH)
River	11% (45 HH)	53% (28 HH)	8% (44 HH)	2% (1 HH)	38% (20 HH)
Tap sourced water (Government)	13% (53 HH)	64% (115 HH)	8% (15 HH)	3% (5 HH)	25% (44 HH)
Well	43% (179 HH)	75% (24 HH)	16% (5 HH)	0%	9% (9 HH)
Total	**100%**	**60%**	**10%**	**3%**	**27%**

Note: *Q3. What is the main current water source for livestock and crops?* and Q5. *For how many months per year are these sources providing you with water for livestock and crops?*

Although rainwater harvesting is not reported as the primary water source, 92% of households indicate that they actively harvest and store water. Furthermore, 87% have implemented WHTs within their households since 2025. At the group level, all FFLGs have adopted at least one type of WHT since January 2025, indicating widespread adoption across the participating groups. On average the farmer groups have

implemented 2 WHT technologies, and the average of the households is 1.5. Table 2.1.2 presents the most adopted on-farm management practices. The data indicates that contour bunds and spare irrigation are the most widely implemented technologies among both households and farmer groups. While mulching appears to be the most frequent practice at household level, data on its adoption within FFLG's is not available.

***Table 2.1.2**: type of on-farm water management system/practices:*



Note: Q13.1. If yes, mention the on-farm water management systems/practices and Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG?
N: 367 for HH and N: 104 for FFLG
*** no data available for mulching in FFLG's*

Table 2.1.3 indicates further that in approximately 75-80% of FFLGs or communities, at least one household has adopted the tested WHT. This demonstrates that the technologies are not only being introduced but are also actively trialed in practice. It is important to note, however, that the FFLGs and communities in Tanzania are still waiting for the raining season, and as a result, no households there have yet tested the WHTs. This situation will be explored further in the district-specific section.

***Table 2.1.3**: Number of Households that have adopted the tested WHT in the FFLG and*

	FFLG	**Community**
0 HH	21%	25%
1-5 HH	26%	25%
6-10 HH	32%	17%
Above 10 HHs	21%	33%

Note: Q4. How many Households have adopted the tested WHT in the community? FFLG-level. N: 104

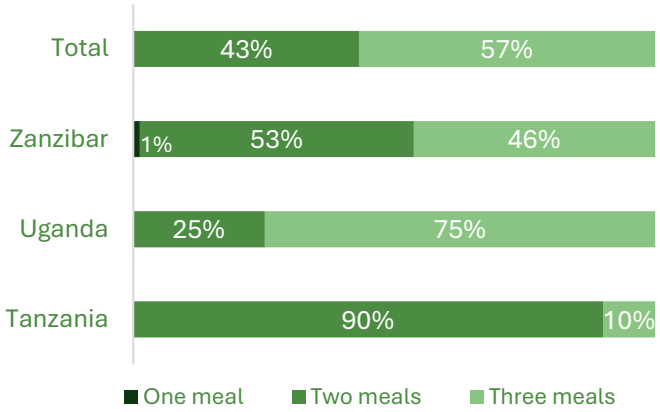
When examining the sources of information used to learn about WHT, the data shows that farmer groups primarily relied on workshops and training sessions (87%) and FFLG rotational visits (65%). Only five groups reported receiving information from government sources, and none utilized online resources. Other sources of information included NGOs, fellow farmers, radio and television.

These findings lead to several conclusions: First, it's encouraging to note that all groups have used at least one of the available sources of information, although 11 groups relied solely on FFLG rotational visits, and 31 groups exclusively on workshops or training sessions. Secondly, there remains a need to strengthen government involvement in the dissemination of WHT knowledge. Lastly, the lack of engagement with online resources suggests that investing efforts in online platforms may not be an effective strategy in this project. This can probably be explained by the lack of access to the internet through smartphones and computers for many households.

2.2 Food security

In general, the households had two or three meals per day in the last week of the interview. Positively only one household had one meal, but we also see that it's mainly in Uganda where three meals are common whereas Tanzania mainly gets two meals.

Figure 2.2.1: Number of meals per day in the last week



Note: Q14: Looking into the last week, how many meals did your family eat per day?

A closer examination of food variety reveals that over 90% of households had cereals, roots, and tubers as a part of their home meals within the past 24 hours. Additionally,

82% reported having vegetables, while half had access to fruits, sugar/honey as well as meat, poultry, or offal. To measure the level of food security we use the HDDS measure. This adds up how many of the food-categories the household has eaten in the last 24 hours. In total there are 11 categories, which is therefore the maximum score.

Table 2.2.1 shows the average HDDS scores and the minimum and maximum scores among the five districts and in total.

Table 2.2.1: HDDS scores in total and among the five districts.

	Average HDDS	Min. HDDS	Max. HDDS
Total	5.9	2	11
Chamwino	3.5	2	5
Kagadi	4.7	2	9
Kasese	5.5	2	10
Unguja Island	8.5	2	11
Wakiso	7.2	3	11

Note: Q14: Looking into the last week, how many meals did your family eat per day?

2.3 Challenges

Across all five districts, several recurring challenges have been identified. At the household level, 78% report difficulties accessing water for livestock and crops due to unreliable rainfall or drought. Additionally, 74% cite lack of water storage infrastructure. Among farmer groups, unreliable rainfall is also a common concern, alongside high costs, limited access to equipment and tools, and insufficient knowledge and training.

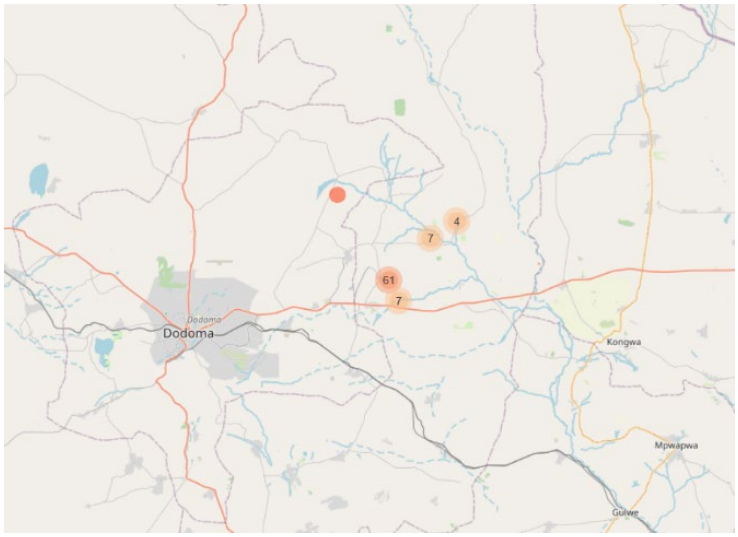
In the following sections, we will explore the specific challenges, adjustments, and advantages unique to each district.

3. Districts

The following five sections provide an in-depth examination of the specific implementation status, overarching vision and key challenges within each district in the project. This approach will contribute to a deeper understanding of local contexts and enable mutual learning across the districts. Each section will begin with a brief overview of the district-specific challenges, followed by the status of WHT implementation, the districts vision and main challenges. The section will finish by outlining the key advantages observed by different levels in the district.

3.1 Chamwino, Tanzania

In Chamwino 90% of the population are smallholder farmers and pastoralist keeping their animals locally. The significant number of these smallholder farmers in the district depend on ran fed farming system with an average annual rain of only 610 mm/year. With no use of modern and mechanized farming technologies and machineries farmers are relying on local methods of farming which account for subsistence production just for family consumption. People living in Chamwino district are involving in production of both commercial crops like sunflower, groundnuts, grapes, sesame, cashew nuts and food crops including Sorghum, Maize, Millet, bambala nuts, peas, cassava, diversified vegetables. Prolonged drought that affects the productivity combined with unpredicted and uncertain of rain pattern that sometimes causes abnormal flooding and destabilization of agricultural activities and production as well as environment degradation affects the yields. The target groups are vulnerable to and affected by the effects of climate change because their life and economic activities relies on farming activities both crop production and livestock keeping. Due the climate changes the communities have experienced soil erosion that reduces soil fertility and production capacity of the soil. Food insecurity resulted from the low yielding as well as poor quality crops produced. Lack of diversified food for nutrition purposes due to lack of water for producing some non-seasonal crops.



The data from Chamwino, Tanzania, was collected from 20 FFLGs and 80 households. Household sizes primarily range between 1-3 and 4-6 members, with most engaged in both crop cultivation and livestock. Common livestock includes chickens and ducks, while legumes and cereals are the predominant crops.

In Chamwino, only 10% of households report receiving three meals per day, while the remaining 90% receive two. These meals typically consisted of cereals, roots and tubers, vegetables, and milk in the last 24 hours of the interview. The average HDDS score per HH is 3.5 and the maximum score only 5, which is the lowest score out of the districts. Food shortages particularly appear from October to December, during which 97.5% of households experience limited access to food.

Regarding water-related responsibilities, 60-70% of households report that all members share the task of watering crops and livestock. In approximately 20% of households, this responsibility falls primarily to women, compared to only 5% where it is mainly the men's responsibility. However, the maintenance of existing WHTs is reported to be a shared responsibility among all household members in Chamwino.

Water access and progress in testing and implementing WHT

In Chamwino the main water source for households are wells (85%). Only 10% report it being rainwater harvesting and 5% from rivers. However, for 99% of households, these sources only provide sufficient water for livestock and crops for 1-3 months per year, representing the lowest availability compared to districts in Uganda and Zanzibar. Despite these limitations, 100% of households report harvesting and storing water, and all have implemented WHTs since 2025. In average each HH and FFLG have implemented 1 WHT. The most adopted technologies are mulching, contour bunds and planting pits. At FFLG level, 95% of groups report implementing contour bunds and 30% have adopted planting pits.

Table 3.1.1: *Implementation of WHT's in HH and FFLG in Chamwino and average HDDS*

	Implementation rate HH	**Average HDDS**	**Implementation rate FFLG**
Planting pits	4%	3.7	30%
Contour bunds	14%	3.9	95%
Mulching	98%	3.4	*

Note: Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG? and Q13. Since 2025 have you implemented any WHTs in your HH?
**no data available for mulching in FFLG's.*

However, none of the households have yet tested the WHT systems, as the rainy season has not begun yet. The groups are currently waiting for the rain, which is expected in November, and we will therefore first be able to see the result in the next data collection.

All 20 FFLGs have received information about WHTs through workshops or training sessions. Only three groups have participated in FFLG rotational visits, and none have accessed information through online resources or the government.

Vision for climate-resilient water access

In Chamwino, all FFLG's agree that the statement best describing their vision is: *"When we have consistent and reliable access to water year-round."* Additionally, they assess themselves as becoming robust to climate change-related water shortages by either 2026 or 2027.

Regarding self-assessed capacity for establishing and innovating WHTs, 95% of FFLGs rate their capacity as medium, while 5% rate it as low. Although this places Chamwino at the higher end compared to Uganda and Zanzibar, still none of the groups assess their capacity as high.

Challenges and advantages

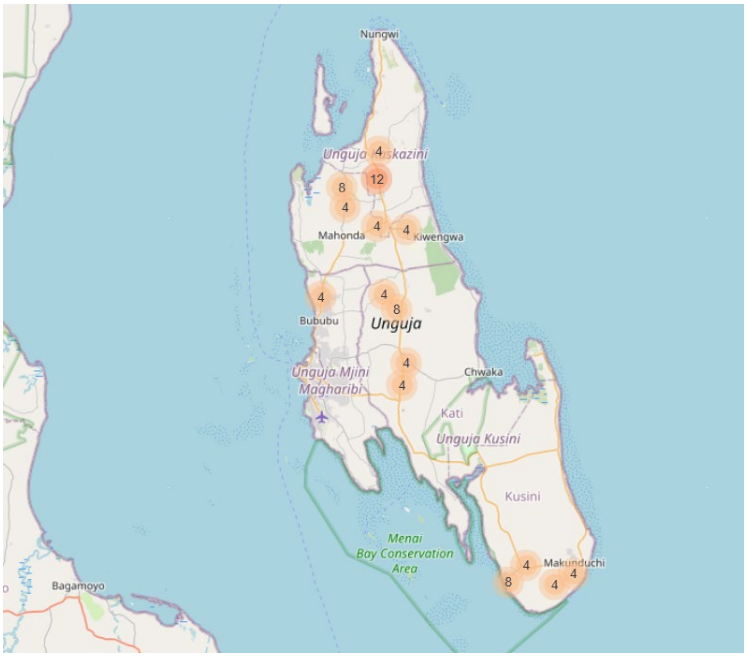
The primary challenge in accessing water for livestock and crops among all households in Chamwino is unreliable rainfall and drought. Additionally, 85% of households report a lack of water storage infrastructure and 70% experience poor water quality.
At the FFLG level, similar challenges are observed, particularly unreliable rainfall and the high cost of storage facilities. In response, it is encouraging to see that all FFLGs in Chamwino have taken proactive steps by implementing capacity-building initiatives and providing additional training focused on low-cost WHTs to support farmers in adopting and maintaining the technologies.

When asked about advantages of using harvested water for crops and livestock, all the FFLG's expressed expectations of enhanced crop yields, improved livestock productivity and health, and increased food security. Additionally, 95% of the groups anticipate reduced operational costs.

As previously mentioned, WHTs have not yet been tested in Tanzania due to the delayed rain season. This context highlights that the primary benefit of the RIWAH project this far has been the increased awareness and knowledge of low-cost WHTs among FFLGs, households, and the broader community. One FFLG also mentions the importance of continuing encouraging farmers to engage in water harvesting to improve farming and motivate them to produce more crops throughout the year.

3.2 Unguja Island, Zanzibar

Farmer families in Unguja Island in Zanzibar are affected by climate change due to the destruction of permanent trees caused by human activities including drilling of big dams by taking sands for construction in the cultivation areas and in some coastal areas, sea water has penetrated to farming land due to too much mangroves destruction. Due to that destruction, the district suffers in reduced areas for the food crops production, hence decreases food requirement in households. The significant number of smallholder farmers in the Zanzibar depend on rain-fed farming system with no use of modern and mechanized farming technologies and machinery but relying on local methods of farming which accounting for subsistence production just for family consumption. Rain comes late and for a short period. This directly impacts on the farming system since our kind of agriculture is rain-fed hence the farmers can no longer plant in the right time and sometimes when they plant the crops wither due to little rainfall. This situation decreases income generating sources.



The data from Unguja Island in Zanzibar includes 20 FFLGs and 80 households. Household sizes are primarily between 4–6 members (49%), 7–9 members (24%), and more than 10 members (22.5%). Among the households interviewed, 65% engage in both crop cultivation and livestock rearing, while 35% focus only on crops. Common livestock includes ducks, cattle, and goats, and the primary crops are vegetables, root tubers, and cereals.

Approximately half of the households receive two meals per day, while the other half receive three. Only one household report receiving just one meal per day. Compared to Uganda and Tanzania, households in Zanzibar consumed the most diverse range of foods in the last 24 hours of the interview. The most reported food varieties include cereals, root tubers, vegetables, fruits, meat, eggs, fish/seafood, and sugar/honey. The average HDDS per HH on Unguja Island is 8.5, which is the highest score compared to the other districts.
The responsibility for watering crops and livestock is generally shared among all household members with men more often responsible for livestock and women for crops. Maintenance of existing WHTs is a shared responsibility across all households.

Water access and progress in testing and implementing WHT

The main water source for households on Unguja Island is wells (50%), followed by tap water provided by the government (17.5%), and 19% report 'other', specifying it as 'rainfall'. Only 7.5% identify 'harvesting rainwater' as their main source. This could indicate that many farmers rely on rainfall but currently lack sufficient capacity to harvest it effectively.

Furthermore, more than half of the households (55%) receive water from their main source only 1-3 months per year. On the other hand, 22.5% have access to water for 10-12 months annually, which is very positive. This suggests the need to examine whether certain water sources provide more reliable access throughout the year. For example, the six households that harvest rainwater only receive water from it for 1-3 months annually. In contrast, half of the households using wells as their main source have access to water for 10–12 months. Therefore, it is not yet clear that WHT provides a more secure water source, which may be due to the short time since implementation and the unreliability of rainfall in certain periods

Even though only 7.5% report harvesting rainwater as their main water source, 98.75% of households are harvesting and storing water, and all 80 have implemented WHT since 2025. The most common practices are mulching, contour bunds, and hillside runoff capture. At the FFLG level, the most frequently implemented WHTs are contour bunds, hillside runoff capture and hybrid rainwater tanks with drip systems. In average the FFLG's have implemented 2 WHT's and 3 in the HH's.

Table 3.2.1: Implementation of WHT's in HH and FFLG in Unguja Island and average HDDS

	Implementation rate HH	Average HDDS for HH	Implementation rate FFLG
Hybrid RWT & drip system	35%	8.5	70%
Spate Irrigation	8%	5.7	30%
Semi-circular bunds	0%	//	5%
Trapezoidal bunds	1%	10	0%
Hillside runoff capture	48%	8.5	60%
Planting pits	5%	7.3	15%
Contour bunds	56%	9.6	60%
Mulching	99%	8.6	*

Note: Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG?/Tumbikiza pits and Q13. Since 2025 have you implemented any WHTs in your HH?
**no data available for mulching in FFLG's.*

Table 3.2.2 shows furthermore that a large share of households has already tested the WHT within FFLGs and the communities:

Table 3.2.2: *Number of households that have adopted the tested WHT in the FFLG/community*

	In the FFLG	In the community
0 HH	0%	0%
1-5 HH	13%	15%
6-10 HH	50%	5%
Above 10 HHs	35%	80%

Note: N: 20, Q4/Q5. How many Households have adopted the tested WHT in the FFLG/community

Almost all FFLGs (19 out of 20) have learned about WHT through workshops/training and FFLG rotational visits. Additionally, half of the groups have received information through UWAMWIMA, and one group through television.

Vision for climate-resilient water access

When asked which statement best describes their vision, half of the FFLGs from Unguja Island responded: *"When we have consistent and reliable access to water year-round."* Furthermore, 40% selected: *"When we can efficiently store and use rainwater and groundwater for all needs (agriculture, livestock, domestic use)."* This aligns with the FFLGs' self-assessment of being robust against climate change-related water shortages, when they have the capacity to store water throughout the year, including during dry seasons.

Unfortunately, only 75% of the FFLGs assess their capacity to establish and innovate WHTs as medium, while 25% rate it as low. This leads us into the next section, which explores the specific challenges faced in Zanzibar

Challenges and advantages

The main challenges for households in accessing water for livestock and crops are unreliable rainfall or drought (reported by 89% of households) and lack of water storage infrastructure (80%). Additionally, 60% report high costs related to water access, and several households mention other challenges such as electricity power cuts, theft, and disease.

For households, the main barriers to implementing WHT and harvesting and storing water are a lack of awareness and knowledge. At the FFLG level, similar challenges are observed, with the most common being limited knowledge and technical skills, cost implications, and lack of infrastructure.

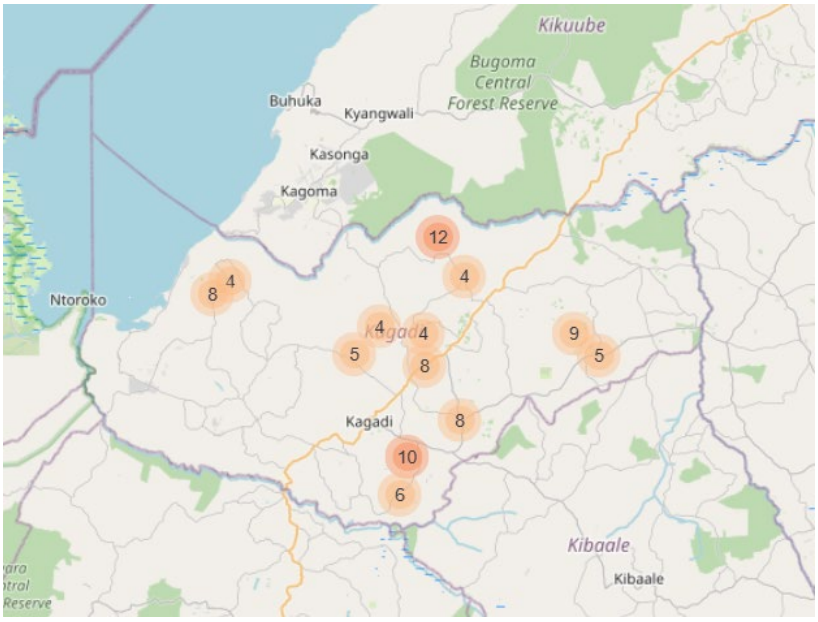
On a positive note, 95% of the FFLGs in Zanzibar have already made adjustments by implementing additional WHTs and establishing plot systems using bunds for water harvesting and conservation. It is also important to keep in mind that WHTs have only recently been introduced, and the knowledge shared is still new. Therefore, both households and FFLGs need time to adapt to the challenges and begin to experience the long-term benefits of WHT implementation.

All FFLGs on Unguja Island expressed a desire for enhanced crop yields and increased household income by using harvested water for production and livestock. Additionally, 95% aim to achieve reduced operational costs, and 90% seek improved food security. For the FFLGs, the most reported advantages include increased water access, improved crop production, enhanced knowledge, and the belief that WHT contributes to better living conditions and strengthens cooperation within the groups.

At the household level, the reported advantages are similar, with additional emphasis on increased income and food security. At the community level, the benefits include building a community with greater access to water for all uses, stronger community security, and improved cooperation.

3.3 Kagadi, Uganda

Prolonged dry season that lasts up to four months. The target group experiences climate change in terms of temperature with increasing frequency, intensity, and duration of heat waves that creates conditions for the multiplication of pests, reduces the availability of water for animals and crops in the gardens and thus crop failure. Erratic rainfall that has led to destruction of crops, increased flooding of rivers and washing away of bridges that farmers cross to access market for their produce. Agriculture is the only source of income and food for farmers, climate change like prolonged drought affects income of farmers and food security. Increasing temperatures has been experienced by group members and this has affected soil and drying of crops and loss of animals. Flooding of rivers has cut off roads failing the farmers to take their products to market.



The data from Kagadi, Uganda, comes from 24 FFLGs and 87 households. Household sizes are mainly between 4-6 members (39%), 7-9 members (23%), and more than 10 members (30%). A large majority (95%) of households have both livestock and crops.

The most common livestock includes pigs, ducks, and goats, while the primary crops are legumes, cash crops, root tubers, cereals, and vegetables.
In terms of food access, 68% of households receive three meals per day, while 32% receive two. The most consumed food varieties within the last 24 hours of the interview are cereals, root tubers, vegetables, and fruits. The average HDDS score is 4.7. Almost one-third of households report never experiencing food shortages, while nearly half face shortages between April and June, and one-fourth between January and March.
Regarding responsibilities for watering livestock and crops, in half of the households it is mainly the women who take on this role. Around 30% share the responsibility among all members, and in about 20% it is primarily the men. When it comes to maintaining existing water harvesting technologies, more than half of the household's report that this responsibility lies with the women.

Water access and progress in testing and implementing WHT

The main water source for households in Kagadi is wells (48%), followed by boreholes (27%), while only 7% report harvesting rainwater as their primary source. These sources provide water for livestock and crops year-round (10-12 months) for 44% of households, while 36% report access for only 1-3 months per year.

Data indicates that a significant proportion of households with access to water via boreholes and wells receive water 10-12 months throughout the year. The households in Kagadi tend to either have access for a short duration or for a long duration, with relatively few experiencing intermediate levels of access. Of the six households reporting harvesting rainwater as their main water source, only two are provided with water for 10-12 months, while three only are provided 1-3 months.

Nevertheless, a total of 91% of households report that they harvest and store water, and 84% indicate that they have adopted WHT since 2025. The most implemented methods include spate irrigation, mulching, and hybrid drip systems. At the FFLG-level, spate irrigation and hybrid rainwater harvesting and drip systems are the most prevalent WHTs.

Table 3.3.1: Implementation of WHT's in HH and FFLG in Kagadi and average HDDS

	Implementation rate HH	Average HDDS	Implementation rate FFLG
Hybrid RWT & drip system	33%	5.2	58%
Spate Irrigation	44%	4.7	67%
Hillside runoff capture	2%	5.5	21%
Planting pits	2%	3.5	13%
Contour bunds	2%	7	4%
Mulching	37%	4.7	*

Note: Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG? and Q13. Since 2025 have you implemented any WHTs in your HH?
**no data available for mulching in FFLG's.*

Notably, all FFLGs have implemented at least one form of WHT. In average the FFLG's have implemented 2 WHT's and 1 in the HH's. Furthermore, nearly all FFLGs and communities report that at least one household has tested the implemented WHTs. In most cases, this involves between 1 and 10 households

Table 3.3.2: *Number of households that have adopted the tested WHT in the*

Test of WHT	**In the FFLG**	**In the community**
0 HH	8,5%	4%
1-5 HH	50%	46%
6-10 HH	29%	29%
Above 10 HHs	12,5%	21%

Note: N: 24, Q4/Q5. How many Households have adopted the tested WHT in the FFLG/community

To acquire knowledge about WHT, FFLGs have primarily relied on workshops and training sessions (79%), as well as rotational visits among FFLGs focused on WHT (70%). Additionally, two FFLGs, both located in Kagadi Sub-County, have received information directly from the government.

Vision for climate-resilient water access

The FFLGs express varying perspectives on which statement best reflects their vision. 38% identify with the statement: *"When our community has the knowledge and capacity to adapt to changes in water availability due to climate change,"* while 29% align with: *"When we have consistent and reliable access to water year-round."*
In terms of self-assessed robustness against climate -related water shortages, the most significant factor cited is the adoption of effective organic farming practices and

increased tree planting through various ecosystem restoration methods, such as trench digging in gardens. Overall, the emphasis on tree planting is a widely recognized strategy among FFLGs in evaluating their resilience to climate-induced water challenges.
However, one-fourth of the FFLGs rate their capacity to establish WHT as low, while 75% report a medium level of capacity. This indicates that substantial challenges remain in the implementation and scaling of WHT across communities.

Challenges and advantages

The main challenges faced by households in Kagadi in accessing water for livestock and crops are lack of water storage infrastructure (60%) and unreliable rainfall or drought conditions (55%). Compared to other districts in the project, 55% is the lowest, which is a relatively positive indicator. Additionally, more than one-fourth of HH report high costs associated with water access and poor water quality. A specific challenge in Kagadi is the long distances many HH members, often women, who are primarily responsible for watering crops and livestock, must travel to collect water. As wells are the main water source for half of the HH, their vulnerability is closely tied to the location and condition of these wells or boreholes. This is particularly concerning given the reported issues with shallow or dug wells that yield limited water.

The primary reasons cited by HH for not harvesting and storing water or for not implementing WHT in 2025 include lack of capital, inadequate storage facilities, and limited knowledge. At the FFLG level, similar challenges persist, with high costs and insufficient knowledge being the most common barriers. This shows the potential for increased training and workshops to support farmers in Kagadi.

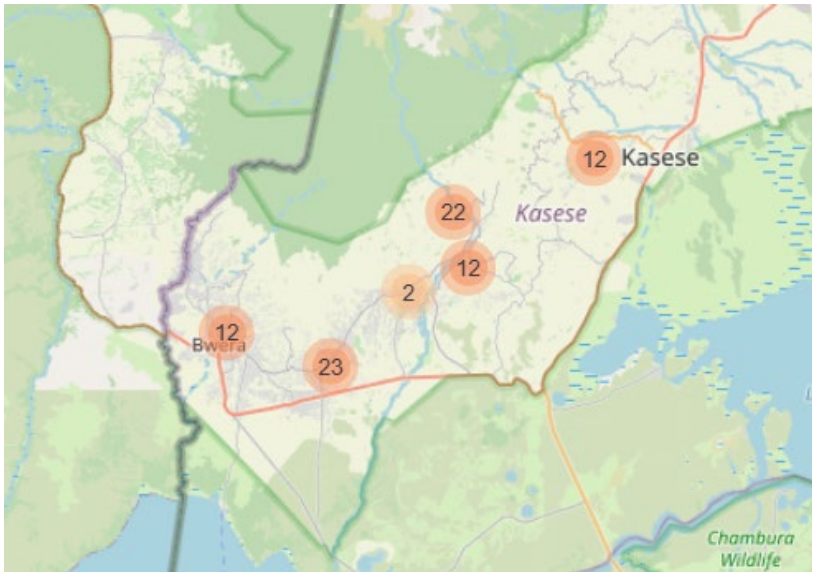
On a positive note, 88% of FFLGs in Kagadi have already made adjustments to their WHT practices, such as purchasing equipment (plastic tanks and drums), participating in additional training, and engaging in group savings initiatives. One FFLG has adopted a rotational work approach in order to protect the project. Among the FFLGs that has not made adjustments yet, one reports a lack of funds to purchase necessary materials, while others feel satisfied with their current use of existing technologies.

The most significant advantage of accessing harvested water for production and livestock is the improvement in livestock productivity and health. This is followed by increased food security and enhanced household income.

At the FFLG level, the key benefits include improved agricultural production, access to water for domestic use, and reduced labor demands at the household level. FFLGs mention that WHT has *"eased life, especially for children, by bringing water closer to gardens and homes,"* and that it has *"helped members to have the technologies though rotational labour."*
Households also report that WHT has *"provided space for activities like fishing and provided moisture that help sustain crop leading to improved food security."* At the community level, WHT has helped reduce overcrowding at wells and decreased theft in villages, as food security has improved.
In summary, WHT *"has increased agricultural productivity leading to more consistent food supply and increasing their production capacity and generating additional income"*.

3.4 Kasese, Uganda

The people of Kasese are predominantly subsistence farmers, growing food to feed their families. The major crops grown in the district include cassava, coffee, maize, cotton, banana plantations, sweet potatoes, and groundnuts on the lower lands. Despite their location along the warm-weather equator line in Uganda, the Rwenzori Mountains, also called the Mountains of the Moon, are covered with snow and glaciers on its peaks. Glaciers used to be permanent, however in recent years, climate change has caused the snow to recede and the glaciers to melt. Increased water flow in these rivers due mainly to changes in rainfall and land degradation caused disastrous flooding, soil erosion and mudslides. In other periods the area experience severe drought leads to drying up of crops as there is not enough or no water at all for production. Some livestock will die due to dried grazing grounds and inadequate water sources. Some streams of water dry up hence people drink poor quality water and or will travel long distance searching for water. Low yield, poor quality and low quantity harvests results in hunger at households. Poor balanced diet hence malnutrition. Rampant theft at households and in the surrounding villages. Deforestation as people look for ways of survival (fuel, construction, brick laying).



The data from Kasese, Uganda is based on 20 FFLGs and 83 households. Most HHs consist of 4-6 members (46%), followed by 7-9 members (31%), and more than 10 members (18%). A vast majority (99%) of farmers engage in both crop cultivation and livestock rearing. The primary livestock includes goats, pigs, and ducks, while the main crops are root tubers, cash crops, legumes, cereals, as well as vegetables, bananas, cocoa, and fruits.

Regarding food security, 65% of HHs report receiving three meals per day, while 35% receive two. The most common food varieties include cereals, roots and tubers, fruits, vegetables, fish and seafood, and meat, poultry, and offal. While 18% of HHs never experience food shortages, nearly half report shortages between January and March, and one-third between July and September. The March-June rain season, which previously supported agricultural activities, has become increasingly unpredictable over the past decade due to climate change and rising temperatures. As a result, farmers now rely more heavily on the October-December rains.

In 34% of HHs, women are primarily responsible for watering crops and livestock, while in approximately 60% of HHs, this responsibility is shared among all members. Only 5% of HHs report men as the primary responsible.
At the FFLG level, the responsibility for maintaining existing WHT is shared among all members in nearly half of the groups. In one-fourth of FFLGs, women are the main responsible, while only 5% report men as the primary responsible.

Water access and progress in testing and implementing WHT

None of the households interviewed in Kasese report harvesting rainwater as their primary water source for livestock and crop production. Instead, 47% rely mainly on water from the river, while 39% access tap water supplied by the government. The Nyamwamba River, which runs through Kasese District, has historically been a vital water source for both agricultural and domestic use. However, as previously noted, the river is increasingly affected by seasonal flooding and drought, which is a risk to water availability.

Even though no HH identifies WHT as their main water source, 92% report harvesting and storing water, and 75% have implemented WHT since 2025.

Table 3.4.1: Implementation of WHT's in HH and FFLG in Kasese and average HDDS

	Implementation rate HH	Average HDDS	Implementation rate FFLG
Hybrid RWT & drip system	7%	7.7	10%
Spate Irrigation	34%	6.3	50%
Semi-circular bands	2%	7	25%
Hillside runoff capture	2%	6	15%
Planting pits	0%	//	5%
Tumbikiza pits	1%	4	0%
Contour bunds	71%	5.9	95%
Mulching	5%	5.5	*

Note: Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG? and Q13. Since 2025 have you implemented any WHTs in your HH?
**no data available for mulching in FFLG's.*

As shown in table 3.4.1 the most adopted methods include contour bunds and spate irrigation. At the FFLG level, similar trends are observed, with contour bunds, spate irrigation, and semi-circular bunds being the most common. In average the FFLG's have implemented 2 WHT's and 1 in the HH's.

Furthermore, as shown in Table 3.4.2, nearly half of the FFLGs or communities have more than 10 HHs, who have tested the WHTs.

Table 3.4.2: *Number of households that have adopted the tested WHT in the*

Test of WHT	In the FFLG	In the community
0 HH	0%	0%
1-5 HH	10%	20%
6-10 HH	40%	35%
Above 10 HHs	50%	45%

Note: N: 20, Q4/Q5. How many Households have adopted the tested WHT in the FFLG/community

More than half of the FFLGs in Kasese have learned about WHTs through workshops and training sessions (60%) and rotational visits among FFLGs (65%). In addition, three FFLGs have received support and learning from government sources, two from Nyakabingo Sub-county and one from Kyarumba Town Council. Other sources of learning include fellow farmers a NGO, and the radio.

Vision for climate-resilient water access

The FFLGs in Kasese on the statement that best reflects their vision: *"When we can efficiently store and use rainwater and groundwater for all needs (agriculture, livestock, and domestic use.)"* They assess themselves as robust in the face of climate-related water shortages when agroforestry practices are in place and all members have fully adopted WHT, enabling them to harvest, store, and utilize rainwater effectively. This is seen as a way toward creating a manageable environment that supports household income and food security.

Kasese's FFLGs also report the highest self-assessed capacity for establishing and innovating WHT among the districts in the project. Specifically, 80% rate their capacity as medium, 10% as high, and only 10% as low.

Challenges and advantages

The primary challenges faced by households in Kasese in accessing water for livestock and crop production include a lack of water storage infrastructure (93%) and unreliable rainfall or drought conditions (76%). Additionally, long distances to water sources are frequently mentioned as a significant barrier. Among HHs that do not harvest and store water, the most common reasons cited are the lack of containers, equipment, and gutters.

At the FFLG level, similar challenges persist. The main obstacles to establishing and utilizing WHT are the lack of equipment and technical skills. Furthermore, the rocky terrain in parts of Kasese brings difficulties in implementing certain WHT methods.

Despite these challenges, 60% of FFLGs in Kasese have made adjustments to their WHT practices. These include constructing water harvesting pits, planting agroforestry trees, and training other community members on WHT. FFLGs that have not yet made adjustments report ongoing financial constraints and note that they are awaiting scheduled training sessions planned for August 2025.

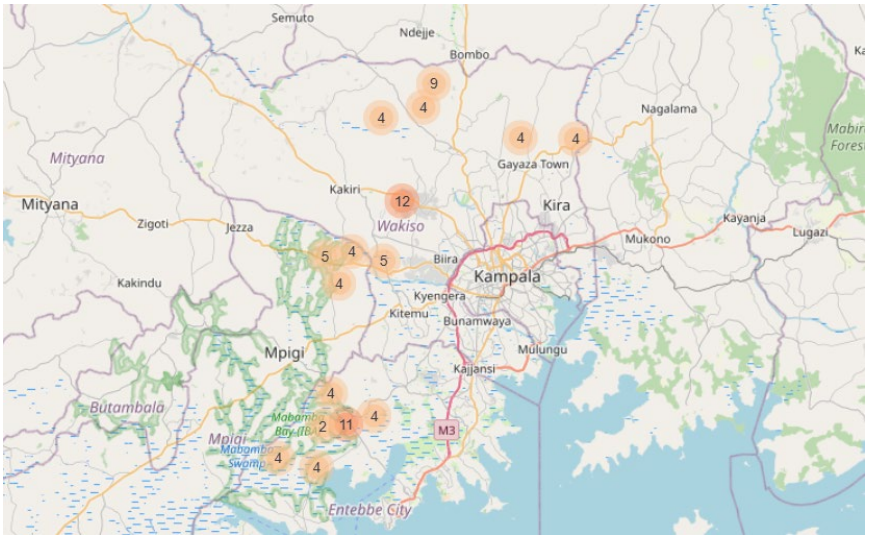
Almost all FFLGs in Kasese would like to achieve enhanced crop yields, improved food security, increased household income, and better livestock productivity and health by using harvested water. Additionally, 80% of FFLGs express a desire to reduce operational costs.

FFLGs also highlight the social and organizational advantages of the FFLG approach. It has fostered increased trust among members, strengthened group unity, and enhanced collective bargaining power. Among households, the key benefits include increased agricultural production, higher income, improved health, and reduced water bills.
At the community level, similar advantages are reported, with additional emphasis on soil and water conservation. Communities have generally welcomed WHT initiatives and shown strong support for their implementation.

3.5 Wakiso, Uganda

Unreliable rainfall and change in rainfall patterns. The long rains used to come in March to May whilst the short rains October to November. This has changed to the rain comes late in May and for a short period. This directly impacts on the farming system since this kind of agriculture is rain-fed hence the farmers can no longer plant in the right time and sometimes when they plant the crops whither due to little rainfall. Flooding of lowlands and rivers, for example, river Mayanja which originates from Wakiso and feeds into Lake Victoria has been flooding since 2010 during the rainy season. Because the land is left bare, rainwater is collected downstream into the rivers. This condition exacerbates flooding and hence bursting of the river which impacts the nearby farming communities by causing losses of having their gardens washed away. During the rainy season some

areas of Wakiso are abandoned by the residents due to their houses being submerged in water caused by flooding.



The data from Wakiso, Uganda is based on interviews with 20 FFLGs and 84 households. Most HHs consist of 4-6 members (46%), followed by 7-9 members (30%) and 1-3 members (18%). The majority (93%) of HHs are engaged in both crop cultivation and livestock. The primary livestock includes pigs, ducks, goats, and cattle, while the main crops are vegetables, legumes, root tubers, and cereals.

In terms of food consumption, 65% of HHs report receiving three meals per day, while 35% receive two. The most common food types include cereals, roots and tubers, fruits, vegetables, meat, and fish. The average HDDS score in each household in Wakiso is 7.2, which is the second highest score among the districts. 18% of the households never experience food shortages, while 44.5% report shortages between January and March, and 37% between July and September.

In approximately 85% of HHs, the responsibility for watering crops and livestock is shared among all members. In around 10% of HHs, this responsibility falls primarily to children. Across all 20 FFLGs, the responsibility for maintaining existing WHT is shared among all household members.

Water access and progress in testing and implementing WHT

In Wakiso, the main water sources for livestock and crop production among households are rainwater harvesting (46%) and wells (31%), which is a positive indicator for the project. Additionally, 79% of HHs report that they harvest and store water, and 86% have implemented WHT since 2025. However, only 17% of HHs report that their main water source provides water for 10-12 months per year. In contrast, 68% receive water for only 1-3 months annually. Among those with year-round access, nearly half rely on wells. Rainwater harvesting typically provides water for only 1-6 months per year.

The most adopted WHT's include contour bunds and spate irrigation. At the FFLG level, WHT implementation is also widespread. The most used methods include contour bunds, spate irrigation, and planting pits. In average the FFLG's have implemented 3 WHT's and 2 in the HH's.

Table 3.5.1: Implementation of WHT's in HH and FFLG in Wakiso and average HDDS

	Implementation rate HH	Average HDDS	Implementation rate FFLG
Hybrid RWT & drip system	2%	8.5	0%
Spate Irrigation	64%	6.5	90%
Semi-circular bunds	0%	//	15%
Hillside runoff capture	6%	9.4	15%
Planting pits	26%	7.1	60%
Contour bunds	70%	7.6	100%
Mulching	63%	7.9	*

Note: Q1. Since January 2025 which water harvesting technologies have you established or tested in your FFLG? and Q13. Since 2025 have you implemented any WHTs in your HH?
**no data available for mulching in FFLG's.*

Furthermore, as shown in Table 3.5.1, most FFLGs or communities have between 1-10 HHs that have tested WHT in practice.

Table 3.5.2: *Number of households that have adopted the tested WHT in the FFLG/community*

Test of WHT	**In the FFLG**	**In the community**
0 HH	0%	25%
1-5 HH	50%	40%
6-10 HH	40%	15%
Above 10 HHs	10%	20%

Note: N: 20, Q4/Q5. How many Households have adopted the tested WHT in the FFLG/community

Almost all FFLGs in Wakiso have learned about WHT through workshops and training sessions (100%) and FFLG rotational visits (85%). None reported using online resources or receiving support from government sources.

Vision for climate-resilient water access

The FFLGs in Wakiso expressed a range of visions for their future water management goals. The most selected statements were: *"When our community has the knowledge and capacity to adapt to changes in water availability due to climate change"* and *"When we can efficiently store and use rainwater and groundwater for all needs (agriculture, livestock, domestic use)."*

This aligns with their self-assessment of robustness to climate-related water shortages. The most common response was: *"When we have enough water stored and we don't have to panic during the dry season."* Others emphasized the importance of sustainable systems that ensure reliable water access across seasons, and the diversification and functionality of WHTs such as tanks and groundwater recharge systems. Some responses were more specific, referencing timeframes ranging from 3-6 months to the end of 2026.

When asked about their capacity to establish and innovate WHT, 70% of FFLGs rated their capacity as medium, while 30% rated it as low. This indicates that while progress has been made, further support is needed to build the skills and confidence required for the full implementation and innovation of WHT.

Challenges and advantages

The most common challenges reported by households in Wakiso in accessing water for livestock and crop production are unreliable rainfall or drought (73%) and a lack of water storage infrastructure (55%). Additionally, 44% of HHs cite high costs of water access. Other specific challenges include long distances to water sources and high electricity charges.

The primary reasons for not harvesting and storing water are the lack of storage facilities and financial resources. For HHs that have not yet implemented WHT, the main barriers are the lack of equipment and the fact that some are still awaiting training.

At the FFLG level, similar challenges are reported, including lack of equipment and technical skills. Additional issues include limited labor availability and space. One FFLG noted: *"Due to population growth, land is becoming scarce and so hard for some*

families to build big water harvesting structures. But smaller options like tanks on rooftops have been established in some homes".

On a positive note, 90% of FFLGs in Wakiso have already made adjustments to their WHT practices. These include purchasing tools, supporting group members with implementation and organizing follow-up activities. Members also contribute by sharing their tools and supporting each other on scheduled dates. Farmers have chosen the simplest and most locally appropriate harvesting methods such as small household tanks and roadside water capture systems. Each member is encouraged to have at least one system at the household level.

The FFLGs that have not yet adjusted report that farmers are still in the process of implementing the WHTs introduced during training, and in some cases, that farmers are not yet fully familiar with the FFLG approach.

The most reported advantage among FFLGs in Wakiso is increased household income (85%). Other key goals include enhanced crop yields and improved food security.

In addition, the FFLG's also report improved food security, increased knowledge sharing and group savings. One FFLG mentions that: "*Before the introduction of the techniques, we faced regular water shortages, especially during the dry seasons, which affected our homes and farms. Implementing WHTs like rooftop tanks and contour trenches, we have seen improvements*." Moreover, working together to build and maintain WHT's has strengthened the unity among the group members.

At the household level, the most reported advantages are improved crop yields and easier access to water during dry seasons. One HH shared that "*Families are better prepared for dry seasons because they can store water ahead of time for irrigation and feeding livestock"*.

At the community level the advantages are mainly increased food production, but multiple also mention that water harvesting has helped the community to work more together and are stronger in facing drought. Further one reports that *"Water is closer to homes, reducing the burden of women and children moving long distances"*.

4. Conclusion and learning points

The first round of data collection from the RIWAH project across the five districts, Chamwino (Tanzania), Unguja Island (Zanzibar), Kagadi, Kasese, and Wakiso (Uganda), demonstrates considerable progress in the implementation of low-cost water harvesting technologies among smallholder farmer families. Despite multiple and varying climate-related and geographical conditions and challenges, the project has successfully facilitated the adoption of context-specific WHTs, with nearly all FFLGs and a large majority of households reporting implementation since 2025.

Even though WHT is still new technologies for many farmer groups, and the results therefore are too early to conclude about, we see optimism about advantages in the interviews. However, this doesn't mean that the farmers are still not facing crucial challenges in successfully relying on rainwater harvesting as their main water source for crops and livestock. Unreliable rainfall, lack of infrastructure, high costs and lack of sufficient knowledge are general factors that still need work.

This report can therefore bring some useful learning points for the way forward in the RIWAH project: *First, Capacity building*: Even though adoption rates of WHT are high, many FFLG's still assess their capacity as low or medium. This can be accommodated by further training and knowledge sharing. *Second, lack of infrastructure*: addressing the lack of storage facilities and improving the access to equipment for individual households is important for spreading the use of WHT. The FFLG who reported sharing equipment and scheduling joint workdays among local farmers remains a good example of a possible solution. *Third, Government support*: The local government is still not playing a crucial part in spreading information about WHT. Getting them more involved would get the project more legitimacy and influence.

In conclusion, the RIWAH project is a strong foundation for climate-resilient water management among smallholder farmers. The project holds significant potential to further improve food- and water security and the livelihoods in the participating districts.