



FP034

Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda

Impact evaluation engine report

June 2026

IEU's Learning-
Oriented Real-Time
Impact Assessment
programme



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June 2026

Learning-Oriented Real-Time Impact Assessment Programme (LORTA)

Impact Evaluation Endline Report for FP034: Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda

Executive Summary

This impact evaluation assesses FP034, a wetland restoration project implemented across eastern and south-western Uganda. Using a quasi-experimental design complemented by qualitative evidence, the study examines whether restoration activities and associated livelihood support improved household welfare and resilience. Project households show greater recognition of wetland degradation pressures, broader crop diversification, and greater uptake of proactive climate adaptation measures. These early-stage changes did not translate into measurable improvements in income, asset accumulation, or food security. Project households reported lower total income in some specifications and a higher likelihood of relying on distress coping in response to shocks, even as some forward-looking adaptation behaviours increased. Qualitative evidence suggests that the livelihood transition pathway remained incomplete, with delays in livelihood support, uneven quality and scale of alternatives, and operational and oversight constraints limiting households' ability to offset the opportunity costs of reduced wetland use. Overall, the findings suggest that integrated wetland restoration-livelihood programmes require realistic sequencing, timely and context-appropriate livelihood support, and stronger adaptive management if ecological restoration and household welfare objectives are to converge over time.



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First Edition

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Abbreviations

ATT	Average treatment effect on treated
C4ED	Center for Evaluation and Development
CAPI	Computer-assisted personal interview
CDO	Community Development Officer
DID	Difference-in-differences
DLG	District local government
DWRM	Directorate of Water Resources Management
FGD	Focus group discussion
FIES	Food insecurity experience scale
FP	Funding proposal
GIS	Geographic information system
GCF	Green Climate Fund
GDP	Gross domestic product
HDDS	Household dietary diversity score
HFIA	Household food insecurity access score
ICC	Intra-cluster correlation
IEU	Independent Evaluation Unit
IPWRA	Inverse probability weighted regression adjustment
KII	Key informant interview
KMO	Kaiser–Meyer–Olkin
LDC	Least developed country
LORTA	Learning-Oriented Real-Time Impact Assessment
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MAHFP	Months of adequate household food provisioning
MDES	Minimum detectable effect size
MWE	Ministry of Water and Environment



NDP	National development plan
PCA	Principal components analysis
PDM	Parish development model
PES	Payment for ecosystem services
POM	Predicted outcome mean
SMS	Short Message Service
TOC	Theory of change
UGX	Ugandan Shilling
UNDP	United Nations Development Programme
UNMA	Uganda National Meteorological Authority
UWA	Uganda Wildlife Authority



I. Introduction

Uganda's wetlands are under increasing pressure from climate variability and unsustainable land use, threatening both ecosystem health and the livelihoods of approximately four million people who depend on them. Wetlands provide essential ecosystem services, including water storage, flood regulation, groundwater recharge, and support to agricultural production. They also function as productive livelihood assets, supplying land for cultivation, grazing areas, water, fish, fuelwood, and other wetland products. As wetlands degrade, both their ecological functions and their contribution to rural livelihoods weaken, increasing exposure to floods, droughts, food insecurity, and income shocks among households that depend on them.

FP034 was designed in response to these linked ecological and livelihood risks. The Green Climate Fund (GCF), together with the United Nations Development Programme (UNDP) and the Government of Uganda, has supported “FP034: Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda”, operational since 2017. The project aims to restore over 64,000 hectares (ha) of degraded wetlands, support households in adopting improved agricultural practices and alternative livelihoods and strengthen community resilience to climate shocks across eastern and south-western Uganda. Its theory of change assumes that restoring degraded wetlands, when combined with viable alternatives to unsustainable wetland-based activities, can reduce pressure on ecosystems while improving household welfare and long-term climate resilience.

The challenge that FP034 addresses is not unique to Uganda. The *Global Wetland Outlook 2025* reports that remaining wetlands cover approximately 1.4 billion ha globally, while at least 400 million ha have been lost since 1970 and nearly a quarter of remaining wetlands are in a degraded state. The report also estimates the median annual value of wetland ecosystem services at International \$ 7.98 trillion in 2023 prices (equivalent to around 7.5 per cent of global gross domestic product (GDP)). This valuation captures the benefits wetlands provide through services such as water regulation, flood protection, food and other provisioning services, biodiversity support, carbon storage, and wider contributions to human well-being. Wetlands are therefore increasingly relevant to climate adaptation finance, not only as ecosystems to be conserved and restored, but as natural infrastructure that supports climate resilience and rural livelihoods.

The global wetland challenge is also a development problem. In many low-income settings, wetlands function as productive assets, supplying food, irrigation water, grazing land, and fuelwood. Their degradation has direct welfare implications, increasing income volatility and exposure to climate risks among households with limited access to credit, insurance, or formal labour markets. At the same time, wetland restoration and management measures may restrict access to these resources, creating short-term livelihood trade-offs if viable alternatives are not available. This tension between protecting ecosystems and sustaining rural livelihoods lies at the heart of wetland policy and shapes the design of integrated conservation and development programmes such as FP034.

Evidence from the broader conservation-livelihood literature remains mixed. Integrated conservation and development programmes have often advanced environmental objectives without necessarily delivering sustained poverty reduction, and alternative livelihood interventions often add income sources without replacing the resource-dependent activities they were intended to reduce.¹ A recurring challenge is that livelihood alternatives or incentives may be too small and insufficiently credible to offset opportunity costs and short-term welfare losses associated with reduced resource access. Evidence from payments for ecosystem services similarly suggests that direct, conditional incentives can reduce environmentally harmful resource use, but that conservation effects do not necessarily translate into large household welfare gains. Jayachandran et al. (2017) show that a payment-for-ecosystem services programme in Uganda, evaluated through a randomized controlled trial, substantially reduced deforestation but had no detectable effect on household income. These

¹ Christopher B. Barrett, Alexander J. Travis and Partha Dasgupta, “On biodiversity conservation and poverty traps”; Dilys Roe and others, “Are alternative livelihood projects effective at reducing local threats to specified elements of biodiversity and/or improving or maintaining the conservation status of those elements?”



issues are directly relevant to GCF-supported adaptation investments that seek to restore ecosystems while strengthening the livelihoods and resilience of the communities that depend on them.

This report presents findings from the endline impact evaluation of FP034 conducted under the LORTA programme. The evaluation assesses whether an integrated wetland restoration and livelihood support project contributed to improved household livelihoods, resilience, and reduced pressure on wetland ecosystems. The endline household survey was conducted in late 2024 across treatment and comparison communities and was complemented by focus group discussions (FGDs) and key informant interviews (KIIs). Because treatment wetlands had already received substantial implementation by the time household data collection began in 2023, the evaluation does not observe a clean pre-treatment household baseline. The main analysis therefore uses a quasi-experimental design based on retrospective community characteristics, household characteristics, and pre-project wetland indicators. Panel difference-in-differences estimates for the 2023–2024 reinterviewed sample are presented as robustness checks. The evaluation is further triangulated with qualitative evidence, the interim evaluation of FP034, and the UNDP Office of Audit and Investigations audit.

The endline results point to a mixed and transitional pattern. Households in treatment areas show some changes consistent with the early stages of the programme pathway, including greater recognition of wetland degradation pressures, broader crop diversification, and greater uptake of proactive climate adaptation measures. However, these changes did not translate into measurable improvements in crop income, expenditure, food security, or livestock assets by the endline survey. Treatment households also reported lower total income in the main specification, lower housing-related physical capital, and greater reliance on distress coping responses. Taken together, the findings suggest that households in treatment areas were beginning to adjust their practices, but these adjustments had not yet translated into stronger livelihoods, improved food security, or reduced reliance on distress coping by the endline survey.

Qualitative and implementation evidence helps explain why early and intermediate changes were not followed by stronger welfare outcomes. Three mechanisms appear to have weakened the project pathway in practice. First, delays and uneven delivery prolonged the intended transition period between wetland vacation and viable livelihood replacement. Second, livelihood alternatives were not adequate, locally suitable and capable of generating comparable livelihood returns over time. Third, operational and oversight constraints limited follow-up, beneficiary tracking, and timely course correction during implementation. These mechanisms were further shaped by community trust, perceived fairness, land scarcity, market conditions, and other contextual constraints discussed later in the report.

The findings are relevant for GCF-supported adaptation investments that combine ecosystem restoration, livelihood support, and household resilience objectives. They suggest that ecosystem restoration, livelihood substitution, and household resilience operate on different timelines and require active management during the transition period. For future nature-based adaptation programming, the case underscores the importance of sequencing restoration and livelihood support realistically, ensuring that livelihood alternatives are economically viable and locally suitable, and maintaining implementation systems capable of tracking affected households and correcting delivery gaps before short-term pressures undermine longer-term resilience objectives.

II. Country Context

Uganda is a low-income, landlocked country in East Africa, with diverse landscape from savannahs to snow-capped mountains and extensive freshwater bodies including Lake Victoria. The country remains one of the world's least developed countries (LDCs), and its economy is heavily dependent on agriculture, contributing roughly 24 per cent of GDP and employing about 68 per cent of the labour force.² Most poor households work in subsistence farming or the informal sector,

² World Bank, "Uganda Country Climate and Development Report."



reflecting limited structural transformation from agriculture into higher-productivity sectors. This economic structure makes Uganda particularly vulnerable to external shocks.

Uganda is highly vulnerable to climate variability and change. In recent decades, extreme weather events such as floods, landslides, and droughts have become more frequent, disproportionately affecting rural communities with low adaptive capacity. According to the ND-GAIN Country Index, Uganda ranks as the 32nd most vulnerable country to climate change and the 164th most ready to address these risks, placing it among countries with high climate vulnerability but relatively low adaptive readiness. Climate impacts are already hitting the poorest households hardest – 80 per cent of Uganda’s poorest households exposed to climate hazards have experienced income losses due to climate shocks. These losses come from reduced crop yields, livestock deaths, infrastructure damage, and health impacts during extreme events. Climate change is thus not only an environmental issue for Uganda but a developmental challenge. Estimates suggest that without additional climate action, Uganda’s GDP could be 3 per cent lower by 2050 than it would otherwise, due to climate-related damages.³

Wetlands are a critical component of Uganda’s natural environment. Historically, wetlands covered about 13 per cent of the Uganda land area in the early 1990s. Healthy wetlands act as natural buffers against climate shocks by mitigating the effects of floods and droughts. Uganda’s wetlands are also important for livelihoods, and an estimated 4 million people (nearly 10 per cent of Uganda’s population) live close to wetlands in Uganda and derive many livelihood activities from these vital ecosystems. Wetland-dependent activities include fishing, rice farming, brickmaking, and harvesting of wetland products.

Despite their importance, Uganda’s wetlands are under acute pressure from both human activities and climate change. Expansion of agriculture, urbanization and settlement growth, and other land-use changes have placed increasing pressure on wetlands across the country. Climate stressors like drought contribute to this pressure. For example, during dry spells, farmers often turn to wetland areas for cultivation, further degrading the ecosystem. As a result, there has been a steep decline in Uganda’s wetland cover over the past few decades. Uganda has lost over 40 per cent of its wetlands since 1994, and by 2021, wetlands were estimated to cover only around 9 per cent of the country’s land area.

Uganda has responded to these environmental and developmental pressures through a progressively strengthening climate policy framework. Long-term national development priorities are articulated in Vision 2040, the country’s overarching development strategy, and operationalized through national development plans (NDPs), which recognize climate change as a cross-cutting risk to economic growth, livelihoods, and natural resource sustainability.⁴ Within this framework, the National Climate Change Policy (2015) and the Climate Change Acts of 2021 and 2023 establish the legislative basis for coordinating climate action across ministries and local governments, while the Ministry of Finance serves as the national designated authority for external climate finance, including from the GCF. At the sector level, the “National Adaptation Plan for the Agricultural Sector” prioritizes resilient cropping and livestock systems, conservation agriculture, improved water harvesting, and strengthened extension services.⁵ Wetland conservation sits at the intersection of these national priorities, linking ecosystem health with agricultural resilience and community livelihoods. Alongside this climate policy framework, the Government of Uganda has also pursued broader decentralized development initiatives aimed at strengthening livelihoods and service delivery at the local level, most notably through the Parish Development Model (PDM), a nationwide programme designed to promote local economic transformation through parish-level planning, agricultural extension, and livelihood support. While not a climate-specific initiative, the PDM forms part of the institutional landscape shaping how communities engage with livelihood, land-use, and natural resource management interventions. It is within this policy framework that the GCF, together with

³ World Bank, “Uganda Economic Update: 26th Edition: Cultivating Prosperity through Agro-Industrialization.”

⁴ Republic of Uganda, National Planning Authority, “Uganda vision 2040.”

⁵ Republic of Uganda, Ministry of Agriculture, Animal Industry and Fisheries, “National Adaptation Plan for the Agricultural Sector.”



UNDP and the Government of Uganda, designed and financed “FP034: Building Resilient Communities, Wetland Ecosystems and Associated Catchments in Uganda.”

III. Project Intervention

FP034 is a nine-year project implemented in Uganda from 2017 to 2026, financed by the GCF with co-financing from the Government of Uganda and UNDP. With UNDP as the accredited entity, the project is implemented by Uganda’s Ministry of Water and Environment (MWE) in partnership with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Uganda National Meteorological Authority (UNMA). It operates in 24 target districts across eastern and south-western regions in Uganda that host extensive wetland areas and some of the country’s most climate-vulnerable communities. The intervention is expected to directly benefit about 800,000 people living in and around the targeted wetlands and to indirectly strengthen the resilience of up to 4 million people nationwide who depend on wetland ecosystem services for their livelihoods.

The project is organized around three inter-related outputs. First, the project seeks to restore and improve the management of wetland hydrology and associated catchments. Second, it aims to support improved agricultural practices and alternative livelihood options for households living in and around wetland systems. Third, it seeks to strengthen access to climate-related information for farmers and other target communities. Together, these outputs are intended to reduce the climate risks facing wetland-dependent livelihoods by restoring ecosystem functions, reducing pressure on degraded wetlands, and improving households’ capacity to make climate-resilient livelihood decisions.

The project design responds to three main barriers. The first is weak understanding and management of wetland agro-ecological and hydrological systems, which limits effective restoration and sustainable use. The second is inadequate support for resilient agriculture and livelihood diversification, including weak extension services, limited market access, and insufficient access to economically viable alternatives to wetland-dependent activities. The third is inadequate climate information systems, which limits the ability of institutions and households to anticipate climatic risks and adjust production and livelihood decisions accordingly. The project’s three outputs correspond directly to these barriers and are intended to operate in a mutually reinforcing sequence. Restoration and management of wetlands under Output 1 were intended to create the ecological and institutional conditions for livelihood adaptation under Output 2, while Output 3 was intended to support both restoration and livelihood decisions through improved climate information. This sequencing informs the theory of change and the interpretation of the impact evaluation findings.

- (a) **Component 1 focuses on restoring the ecological and hydrological functioning of degraded wetlands and associated catchment areas.** Implementation begins with the identification, mapping, and demarcation of targeted wetlands, followed by site-specific assessments to determine the most appropriate restoration measures. These measures include rehabilitation of degraded wetland areas, replanting native vegetation, and where appropriate, constructing water management structures to re-establish natural water flows. By restoring wetlands, the project seeks to improve essential ecosystem services such as groundwater recharge and flood control, which in turn support agriculture and reduce disaster risk for local communities.
 - (i) A central feature of Component 1 is that restoration is not treated only as a physical or ecological intervention. It also includes community engagement, awareness-raising, and support for local wetland management arrangements. District authorities and implementing agencies engage community leaders and wetland users to explain the objectives of restoration, clarify permitted and discouraged activities within restored wetlands, and encourage voluntary compliance with wetland management measures. Community-based wetland management plans are intended to strengthen local participation and provide a basis for sustaining restoration gains after initial implementation. The component is led by the MWE, with involvement from relevant national agencies, district local governments, and technical partners.



- (b) **Component 2 complements wetland restoration by supporting improved agricultural practices and alternative livelihood options for communities living in and around wetland and catchment areas.** The component targets households whose livelihoods depend directly or indirectly on wetlands, including those expected to reduce or stop unsustainable wetland use as restoration activities proceed. Its purpose is to reduce pressure on wetland ecosystems by providing households with more resilient and economically viable livelihood pathways outside restored or protected wetland areas.
- (i) The design of Component 2 is informed by local livelihood needs and by the Alternative Livelihood Study conducted in 2018. Training and support are intended to be flexible and demand-driven, with livelihood packages adapted to community preferences, agro-ecological conditions, and market opportunities. These options include climate-resilient agricultural practices, crop diversification, livestock rearing, fish farming, vegetable production, small enterprise development, and other income-generating activities. The component also includes support to farmer groups, cooperatives, and community-based organizations, as well as entrepreneurship and business development training. In practice, the effectiveness of Output 2 depends not only on whether households receive training, but also on whether the promoted livelihood options are affordable, locally appropriate, marketable, and capable of offsetting the benefits households previously derived from wetland-based activities.
- (c) **Component 3 supports community-level climate adaptation by improving access to timely, reliable, and actionable climate-related information.** Climate forecasts are tailored to different user groups, including farmers, fishers, and non-agricultural households, and disseminated in local languages through multiple communication channels, including SMS, radio, extension services, and digital platforms.

Although FP034 is organized around three interrelated outputs, **this impact evaluation focuses primarily on household outcomes linked to components 1 and 2:** wetland restoration and management, and support for improved agricultural practices and alternative livelihoods. Component 3 is treated as an enabling component and is assessed where it is reflected in household access to, and use of, climate-related information. In the project design, the components were intended to operate as an integrated sequence: restoration, demarcation, and wetland-user inventories under Component 1 would inform livelihood support under Component 2, while Component 3 would provide climate information to support both restoration planning and household agricultural and livelihood decisions.

3.1 Theory of Change

The project's theory of change can be understood through three interrelated pathways: wetland restoration and management; improved agricultural practices and alternative livelihoods; and strengthened access to climate and early warning information. The underlying logic is that restoring wetlands can improve ecosystem functioning and climate resilience, while livelihood support can reduce dependence on unsustainable wetland-based activities and strengthen food security and income generation. Climate information supports these pathways by improving households' and institutions' ability to anticipate risks and make climate-resilient agricultural, livelihood, and wetland-management decisions.

- (a) **The first pathway of change runs through wetland restoration and improved management.** By identifying, demarcating, and rehabilitating degraded wetlands and associated catchments, the project is expected to improve hydrological functioning and restore ecosystem services. Community engagement and wetland management plans are expected to raise awareness, clarify rules around wetland use, and increase compliance with restoration measures. In the short to medium term, this pathway is expected to contribute to reduced degradation pressure, improved water retention, better regulation of water flows, and stronger local management of restored wetland areas. Over time, these ecological and



institutional changes are expected to support more stable agricultural conditions and reduce climate-related risks for surrounding communities.

- (b) **The second pathway runs through improved agricultural practices and alternative livelihoods.** Restoration alone may not be sustainable if households continue to depend on wetland cultivation or other unsustainable wetland-based activities for income and food security. Output 2 therefore aims to make livelihood transition feasible by supporting households to adopt more resilient production systems and diversify their income sources. Improved agricultural practices are expected to increase productivity and reduce climate sensitivity, while alternative livelihood options are expected to reduce dependence on restored or protected wetlands. In the short to medium term, this pathway is expected to generate changes in agricultural practices, livelihood choices, production diversity, and household engagement in non-wetland-based income activities. In the longer term, these changes are expected to contribute to more stable incomes, improved food security, and reduced pressure on wetland ecosystems.
- (c) **The third pathway runs through climate-related information.** Improved access to timely, reliable, and actionable climate information is expected to strengthen decision-making by both households and institutions. For households, this may affect the timing of planting, harvesting, irrigation, livestock management, and other livelihood decisions. For institutions, better climate information may support planning, preparedness, and management of climate-related risks. In the project's theory of change, Output 3 functions as an enabling mechanism that supports both wetland restoration and livelihood adaptation.

Taken together, the theory of change implies both a causal and a temporal sequence of expected changes. Under Output 1, the project first seeks to reduce damaging wetland use and restore hydrological and ecological conditions in degraded wetlands and associated catchments. These changes are expected to create the basis for Output 2, under which households are supported to adopt improved agricultural practices and alternative livelihood options that reduce reliance on unsustainable wetland use. The baseline assessment noted that, once damaging practices are removed and water retention features are restored, wetlands may require saturation over four rainy seasons, corresponding to approximately two years, before recovery of flora and fauna and visible restoration effects can be expected. It further noted that positive effects from alternative livelihood support may require at least one additional year to become apparent. On this logic, measurable effects from the combined restoration and livelihood pathway would be expected to emerge progressively, becoming more observable around three years after restoration activities begin in a given area.⁶

This sequencing has implications for how evaluation findings should be interpreted. Earlier changes are expected in awareness, participation, and exposure to training and climate information. Intermediate changes are expected in wetland use, uptake of improved agricultural practices, livelihood diversification, and household production strategies. Longer-term changes are expected in household welfare and resilience, including income, food security, asset accumulation, and reduced vulnerability to climate shocks. Given that the endline data collection took place in late 2024, the evaluation is positioned to assess whether early and intermediate changes, and some emerging welfare effects, have materialized. However, the extent to which final outcomes are observed depends on whether restoration, livelihood support, and climate information were delivered in the intended sequence, and whether households were able to manage the transition period between reduced wetland access and the realization of new livelihood benefits.

The theory of change also depends on several assumptions. First, communities must understand and accept the rationale for wetland restoration, including restrictions on unsustainable wetland use. Second, alternative livelihood options must be economically viable, locally appropriate, and sufficiently attractive to offset the opportunity costs of reduced wetland access. Third, implementing agencies and district-level actors must have the capacity and coordination needed to deliver

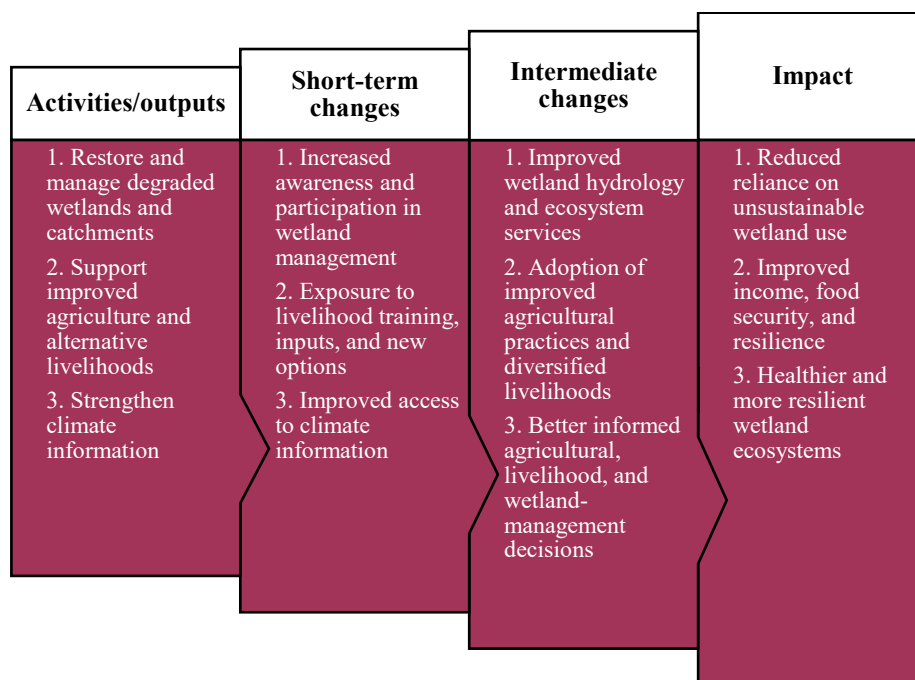
⁶ Independent Evaluation Unit, Green Climate Fund, "Impact evaluation baseline report for FP034: Building resilient communities, wetlands ecosystems and associated catchments in Uganda" (LORTA Programme).



restoration, extension, livelihood, and climate-information activities consistently. Fourth, households must be able to manage the transition between the short-term costs of changing wetland use and the slower realization of benefits from restoration and livelihood diversification. Finally, external shocks such as droughts, floods, market disruptions, or health crises may affect both ecological recovery and households' ability to adopt and sustain new practices.

This theory of change, summarized in Figure 1, provides a framework for interpreting the impact evaluation findings in two ways. It identifies the outcomes that should be examined across the results chain, from awareness and behavioural change to welfare and resilience. It also clarifies the conditions under which implementation progress is expected to translate into sustained household-level and ecological benefits.

Figure 1. Theory of change



Source: LORTA team

3.2 Project Implementation

Based on information reported in the 2023 annual performance report (APR), the project had made substantial implementation progress before the endline data collection. By the end of 2023, FP034 was in its seventh year of implementation. Since project inception, a total of 46,664.03 ha of degraded wetlands had been restored against an end-of-project target of 64,370 ha. Progress on associated catchment restoration was more limited, with 2,045 ha restored against a target of 11,630 ha. The APR notes that catchment restoration remained slower than planned, partly because the technical and operational model for catchment rehabilitation took longer to test and refine.

Under Component 2, livelihood interventions had reached 13,121 households by the end of 2023. In 2023 alone, 4,218 beneficiaries received alternative livelihood interventions, including livestock distribution, fish-farming support, and enterprise development activities. The APR reports that in 2023 the project supplied 170 in-calf cows, 532 pigs, 1,769 improved goats, and 7,650 chickens, together with start-up feed and equipment. Under Component 3, the APR reports that the project had reached 68 per cent of the target population with improved climate-related information.

The APR also identifies several operational challenges that are relevant for interpreting implementation progress and evaluation results. These included delays in restoration associated with



the directive to use concrete pillars rather than live markers during demarcation, grace periods allowing farmers to harvest crops before demarcation, land ownership disputes affecting catchment restoration, heavy rainfall linked to El Niño that disrupted field activities, adaptation challenges related to improved livestock breeds, and vandalism of hydrometeorological infrastructure. At the same time, the APR suggests that the revised implementation arrangement approved in 2022, which gave District Local Governments a more direct implementation role, improved district ownership and is expected to strengthen delivery in subsequent years.

3.3 Evaluation questions

The main research questions guiding this impact evaluation are derived from the project's theory of change, which posits that wetland restoration, livelihood support, and improved access to climate information can reduce harmful wetland use while strengthening household resilience through more sustainable production systems and diversified livelihoods. Consistent with the project's sequenced design, the evaluation examines effects across five outcome domains, ranging from awareness and behavioural change to agricultural production, economic welfare, food security, and resilience.

- (a) **Awareness, perceptions, and engagement with wetlands**
 - (i) To what extent did the project influence households' awareness of, perceptions toward, engagement with, and reported use of wetlands?
 - (ii) Did the project affect households' perceptions of wetland condition, wetland benefits, and drivers of wetland degradation?
- (b) **Adoption of project-supported practices**
 - (i) To what extent did project support lead to the adoption of improved agricultural practices?
 - (ii) Did households take up alternative livelihood activities promoted by the project?
 - (iii) Did access to and use of climate information systems increase among households in project areas?
- (c) **Agricultural production and diversification**
 - (i) Did the project affect agricultural production patterns, including land cultivated and the number of parcels farmed?
 - (ii) To what extent did the project influence crop portfolio diversification and livestock ownership?
 - (iii) Were there observable effects on selected indicators of agricultural productivity?
- (d) **Economic welfare and food security**
 - (i) Did changes in production and livelihood strategies translate into improvements in household economic welfare?
 - (ii) Were there changes in household expenditure, asset accumulation, and standard indicators of food security?
- (e) **Resilience to shocks and adaptive capacity**
 - (i) To what extent did the project affect households' reliance on short-term coping strategies in response to shocks?
 - (ii) Are observed changes in coping and adaptation responses consistent with strengthened household resilience?



IV. Impact evaluation strategy

The impact evaluation builds on the design and methodological framework developed in the baseline report.⁷ It applies a quasi-experimental design to estimate the effects of the wetland restoration project on household-level outcomes. Because implementation had already begun in treatment wetlands by the time the 2023 survey was conducted, the evaluation does not observe households before exposure to the project. The analysis therefore estimates project effects by comparing households in project wetlands with households in similar, non-project wetlands, rather than by measuring household-level changes from a clean pre-treatment baseline.

The following sections describe how treatment and comparison wetlands were selected and how comparability between households in the two groups was strengthened through matching and regression adjustment.

4.1 Selection of treatment and comparison wetlands

To support government engagement in the evaluation design and strengthen transparency in site selection, the selection of treatment and comparison wetlands was conducted through a consultative process. In February 2023, the LORTA team facilitated a four-day in-person workshop involving government officials and stakeholders from relevant ministries and agencies.

The workshop served two purposes. First, it clarified evaluation terminology across disciplines and strengthened shared understanding of the methodological approach. Second, it allowed the LORTA team, UNDP and government stakeholders to discuss the transparency and feasibility of different approaches to wetland matching. Stakeholders expressed concern that propensity score matching at the wetland level would not be sufficiently transparent. The consultations also confirmed that restoration activities had already progressed across most wetlands, limiting the feasibility of baseline ecological matching and pointing to the need for a more transparent and context-informed selection approach.

As a result, wetland selection was based on expert consultation rather than algorithmic matching. Selection criteria included regional balance between eastern and south-western Uganda, the level of project implementation across components, and practical considerations related to budget and field access. With the support of geographic information system (GIS) analysis, each selected treatment wetland system was paired with a comparison wetland system located within the same district but in a different catchment area. In total, eight treatment wetlands and eight comparison wetlands were selected for the impact evaluation. Table 1 presents the final list of treatment and comparison sites.

Table 1. Selected treatment and comparison sites for impact evaluation

Region	District	Treatment wetland system	Comparison wetland system
Eastern	Bukedea	Lwere/Komorototo	Kapia/Okula
Eastern	Kumi	Oladoti/Kakores	Obura
Eastern	Namutumba	Mazuba mini-Mpologoma	Nabinyonyi–Kimenyulo
Eastern	Ngora	Agu	Agwiki
South-western	Bushenyi	Nyaruzinga	Mbachi

⁷ Independent Evaluation Unit, Green Climate Fund, “Impact evaluation baseline report for FP034: Building resilient communities, wetlands ecosystems and associated catchments in Uganda” (LORTA Programme).

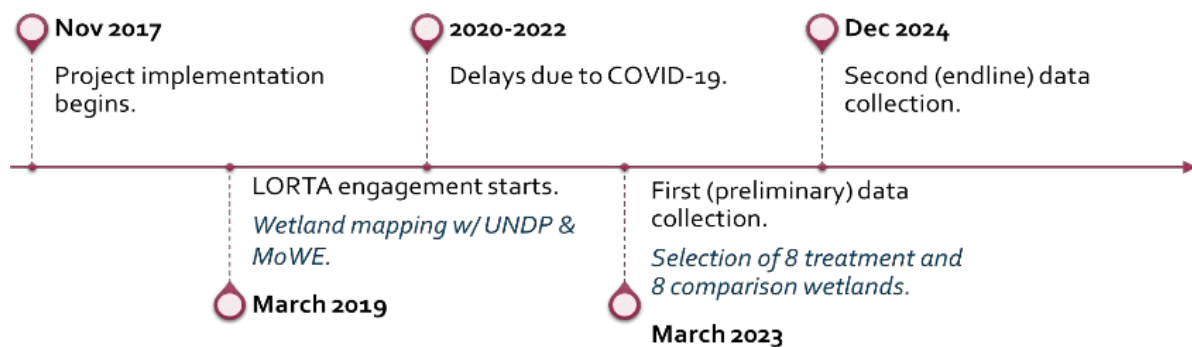


Region	District	Treatment wetland system	Comparison wetland system
South-western	Kisoro	Chotsa Bay–Mulehe Mutanda	Mulindi–Echuya/Muchoya
South-western	Mitooma	Nyamuhizi–Kagogo	Nchwera
South-western	Rubirizi	Kidubule–Ibamba–Nyakagyera–Ngoro	Chambura

Source: UNDP project team

Figure 2 illustrates the key intervention and impact evaluation milestones. Project implementation began in 2017, with pilot restoration activities conducted in 2018 and the first large-scale restoration sites selected in 2019. For the purposes of the impact evaluation, treatment and comparison wetlands were identified in early 2023 through the consultative selection process described above. Preliminary household survey data were collected shortly thereafter. Endline data collection took place in December 2024, allowing sufficient time for restoration and livelihood activities implemented in earlier years to begin generating observable effects. The timeline helps clarify when households may have been exposed to project activities relative to the household surveys.

Figure 2. Timeline for impact evaluation activities



Source: LORTA team

Note: MoWE=Ministry of Water and Environment

4.2 Matching strategy and estimation approach

Because wetlands receiving project interventions were purposively selected and implementation had already begun when the impact evaluation was designed, treatment and comparison areas may differ along observable characteristics. To improve comparability between households in treatment and comparison wetlands, the impact evaluation applies a quasi-experimental matching approach combined with regression adjustment, which estimates treatment effects by comparing households with similar observable characteristics.

1. Matching variables

Matching is based on three groups of characteristics that capture pre-existing differences between treatment and comparison areas:

- (i) **Household characteristics**, including demographic and socioeconomic factors such as education level of the household head, household composition, marital status, and land ownership.
- (ii) **Community characteristics**, based on retrospective information collected from community leaders during the endline survey. These variables capture pre-project



conditions in 2019, including the importance of wetlands for local livelihoods, the number of crops grown in the community, and challenges faced by households.

- (iii) **Wetland ecological characteristics**, including indicators of wetland degradation derived from satellite data from 2015 to 2016, prior to project implementation. The satellite-derived wetland degradation variable was constructed from pre-project wetland use/cover classifications. Following the Les Rams ecological assessment methodology, built-up areas and tree plantations were treated as high-degradation classes, farmlands as moderate degradation, and grasslands, papyrus, open water, and woodlands as low-degradation classes.

Combining these three sources of information allows the evaluation to approximate baseline conditions even though baseline household data were not collected before implementation began.

Balance tests confirm that the matching procedure substantially reduces differences between treatment and comparison households across these characteristics. Figure A - 1 illustrates the reduction in standardized differences between the two groups after weighting.

2. Estimation approach

After identifying comparable households, the evaluation estimates project impacts using inverse probability weighted regression adjustment (IPWRA). This approach first estimates the probability that a household belongs to a treatment wetland based on the matching variables described above. These probabilities are then used to weight the comparison group so that it more closely resembles the treatment group in terms of observed characteristics.

The weighted sample is subsequently analyzed using regression to estimate the average treatment effect on treated (ATT) households. Combining weight with regression adjustment helps reduce bias arising from observable differences between treatment and comparison households. In practical terms, this approach allows the evaluation to estimate how outcomes for households in treatment wetlands differ from the outcomes that similar households would likely have experienced in the absence of the project.

Because treatment wetlands were purposively selected after implementation had begun, treatment and comparison areas may still differ along observable and unobservable characteristics. The matching and weighting procedure reduces differences across observed characteristics of households, communities, and wetlands. However, differences arising from unobservable factors cannot be fully ruled out. Impact estimates should therefore be interpreted as treatment effects conditional on observed characteristics and considered alongside the qualitative evidence and contextual analysis presented in this report.

As a robustness check, the evaluation also estimates panel doubly robust difference-in-differences models with inverse probability weighting (DRDID-IPW) for the subset of households interviewed in both 2023 and 2024. These models compare changes in outcomes over time between treatment and comparison households while reweighting on observed characteristics. Because the 2023 survey was conducted after implementation had already begun in project wetlands, these estimates should not be interpreted as the full impact of the project since inception. Rather, they capture incremental differential change between 2023 and 2024 during a later stage of implementation.

4.3 Mixed-methods approach

The impact evaluation adopts a mixed-methods and multi-source design. Quantitative household survey data provide quasi-experimental estimates of project effects at the household level, while qualitative data help interpret these results by examining implementation dynamics, behavioural responses, and contextual factors that are not fully captured through survey data.

Qualitative data were collected through FGDs and KIIs and analyzed using ATLAS.ti software. Coding was aligned with the evaluation questions and key indicators used in the quantitative analysis,



enabling comparison and triangulation across data sources. FGDs were primarily used to capture community and household experiences related to wetland restoration, livelihood changes, and behavioural responses to project activities. KIIs focused on implementation processes, including coordination arrangements, resource constraints, planning, and delivery of project components. Together, these qualitative sources help explain patterns observed in the quantitative results.

Satellite-based indicators of vegetation and water coverage, together with ecological monitoring data on fauna, flora, and water quality, were collected as part of the broader endline assessment. The Les Rams technical report uses satellite imagery from 2015/2016, 2022, and 2024 to assess wetland use/cover changes, degradation status, and vegetation health, and also reports biodiversity and water-quality findings. This impact evaluation report does not present these ecological results as causal impact estimates. Instead, it focuses on household-level outcomes and implementation dynamics, while using the pre-project satellite-derived wetland degradation indicator as part of the matching strategy and drawing selectively on ecological findings where they provide relevant context for interpreting site-level wetland conditions.

The mixed-methods approach strengthens interpretation of the findings, but each source has limitations. Qualitative evidence may be affected by recall bias, selection bias, and non-representativeness, while ecological and satellite-based evidence is observational in nature and may reflect site-specific conditions, classification choices, or seasonal variation. These sources are therefore used to contextualize and interpret the household impact estimates rather than to establish causal attribution on their own.

V. Date collection

5.1 Endline data collection

Household sampling was originally conducted during the preliminary assessment in March 2023 using a two-stage clustered design. First, a list of all villages within parishes covered by each wetland system was compiled to form the sampling frame, from which six villages were randomly selected. Second, approximately 17 households were randomly selected within each selected village for the household survey.

This preliminary assessment identified and interviewed 1,667 eligible households. The endline survey, conducted in December 2024, aimed to revisit these households to assess project impacts at endline. A total of 1,454 households were successfully reinterviewed. To maintain the planned sample size, households that could not be revisited were replaced using the same sampling approach. The final endline dataset therefore includes 1,510 households.

Data collection relied on a structured household questionnaire administered using computer-assisted personal interviewing tools. The survey captured information across multiple thematic modules covering household demographics, livelihoods, agricultural production, food security, resilience to shocks, and wetland use. Key modules included household demographic characteristics and living conditions; income sources and expenditures; agricultural production and sustainable land management practices; livestock activities; food consumption and food security; shocks and coping strategies; access to climate information; and household assets. The survey also collected detailed information on households' interactions with wetlands, including the types of wetland resources used, perceived changes in wetland conditions, and participation in project-supported activities such as wetland restoration, sustainable land management practices, and alternative livelihood programmes.

The questionnaire further included a short survey experiment designed to examine how households respond to different messages related to wetland conservation and livelihood transitions. During the endline survey, each respondent was randomly assigned to receive one of four messages: a neutral message about wetland conservation, a message emphasizing ecological benefits of wetlands, a message highlighting long-term economic benefits of conservation, and a message describing



potential short-term economic incentives through a payment for ecosystem services (PES) mechanism. The experiment was designed to explore how different framings of conservation benefits influence perceptions of wetlands and willingness to engage in conservation-related behaviours.

Following the message, respondents answered a set of standardized follow-up questions measuring trust in the government policies related to wetland conservation and preferred policy approaches for wetland conservation. These questions allow the analysis to compare responses across randomly assigned message groups and identify which types of messaging are most effective in encouraging support for wetland conservation and livelihood transitions.

5.2 Qualitative data collection

Qualitative data for this impact evaluation consisted of FGDs and KIIs. These data were analyzed primarily to triangulate quantitative findings, provide contextual insights, and support interpretation of the dynamics underlying observed changes. Rather than being analyzed as a standalone component, qualitative evidence was used throughout the impact evaluation to complement, deepen, and help explain quantitative results, particularly in relation to implementation challenges, bottlenecks, and community- and district-level factors influencing project outcomes.

FGDs and KIIs were conducted in eight districts aligned with project implementation areas: four in eastern Uganda (Bukedea, Kumi, Namutumba, and Ngora) and four in south-western Uganda (Rubirizi, Mitooma, Kisoro, and Bushenyi). Qualitative data were collected in both 2023 and 2024, with two exceptions: Preliminary FGDs were not conducted in Bukedea (treatment) and Bushenyi (treatment), and preliminary KIIs were not conducted in Mitooma.

FGDs were held with community members living near wetlands and engaged in agricultural activities within wetland catchment areas. KIIs were conducted with district-level officials, including District Natural Resources Officers (NROs), Agricultural Production Officers (APOs), and Community Development Officers (CDOs), to capture institutional perspectives on wetland management, agricultural practices, and project implementation.

Participants were purposively selected with the support of local leaders based on their familiarity with wetland use, agricultural practices, and climate information systems. FGDs were designed to include a mix of men and women, youth and elderly participants, and both direct and indirect wetland users. In treatment areas, groups included both project beneficiaries and non-beneficiaries who were aware of project activities.

FGDs typically comprised 8–12 participants and followed a semi-structured format to encourage inclusive participation. Discussions were conducted in local languages with interpretation as needed, documented in English, and reviewed daily by field supervisors. KIIs followed similar documentation procedures.

VI. Evaluation results

6.1 Awareness, perception and wetland engagement

Treatment households show suggestive evidence of greater recognition of wetland degradation pressures, while wetlands remain central to livelihoods in both treatment and comparison areas.

The first set of evaluation questions examines whether the project influenced households' awareness, perceptions, and engagement with wetlands. In the project's theory of change, awareness is considered as an enabling mechanism rather than a final outcome. Increased awareness of wetland conditions, the consequence of degradation, and the drivers of environmental change is expected to support behavioural responses such as improved land management, compliance with wetland restoration measures, and adoption of alternative livelihoods.



Because awareness is difficult to measure directly, the evaluation uses proxy indicators capturing households' recognition of climate- and environment-related impacts affecting wetlands, as well as their identification of drivers of wetland degradation. These indicators should be interpreted as measures of salience and recognition rather than direct measures of project knowledge. Interpretation is also informed by the fact that several wetland awareness and wetland-use indicators were already high at the 2023 household survey, which was conducted after implementation had begun in some treatment areas.

Across both treatment and comparison households, respondents reported a range of climate- and environment-related impacts affecting wetlands, including declines in wetland benefits (70 per cent), drought (52 per cent), drying of wetland vegetation (46 per cent), and reduced water levels (37 per cent). These responses indicate that environmental pressures on wetlands are widely recognized across communities, not only in project areas. After adjusting for observable characteristics, treatment households report approximately 0.53 additional impacts on average relative to comparison households, against a comparison mean of 1.67 impacts. This difference is statistically significant at the 10 per cent level, providing suggestive evidence that households in treatment areas may be somewhat more attentive to environmental stressors affecting wetlands.

Households were also asked to identify the main drivers of wetland degradation in their communities. The most commonly reported drivers across the sample include cultivation in wetlands (32 per cent), grazing in wetlands (23 per cent), burning of wetland vegetation (20 per cent), and channelling of water from wetlands (18 per cent). Limited awareness was also mentioned by around 16 per cent of respondents. The descriptive patterns are broadly similar across treatment and comparison areas, although treatment households report slightly lower incidence of cultivation and grazing pressures but somewhat higher reports of vegetation burning.

Consistent with the capability to identify drivers of wetland degradation, treatment households report a slightly larger number of drivers of wetland degradation. On average, treatment households report 0.56 additional drivers relative to comparison households, against a comparison mean of 1.16 drivers. This difference is also statistically significant at the 10 per cent level. Taken together, the two awareness indicators point in the same direction, suggesting greater recognition of wetland degradation pressures among treatment households. The panel robustness checks reported in the appendix show a similar directional pattern but given the weak significance levels and high recognition of wetland pressures across both groups, the findings should be interpreted as evidence of increased salience rather than strong evidence of a large awareness effect.

Qualitative evidence from FGDs helps explain how communities perceive environmental changes affecting wetlands. Across both treatment and comparison communities, participants frequently described environmental pressures affecting wetlands, including drought, flooding of gardens, delayed rainfall, and prolonged dry seasons. Wetlands were commonly perceived as playing an important role in regulating water availability, with respondents describing them as “storing water” and “reducing floods”. In several treatment districts, participants also reported observable ecological changes in restored wetland areas, including increased vegetation cover, higher water levels, and improved water retention, with some respondents describing “regeneration of grass and papyrus” and “restored biodiversity”. At the same time, perceptions were not uniformly positive across locations. Some participants reported continued pressures such as grazing, increased mosquitoes or wildlife, and localized reductions in wetland size. Descriptive satellite-based analysis from the Les Rams ecological assessment similarly points to heterogeneous site-level trajectories, with some treatment wetlands showing signs of natural vegetation recovery or reduced farmland, while others continued to experience farmland expansion or vegetation decline. Overall, these accounts suggest that perceptions of wetland condition vary across sites, reflecting differences in local ecological conditions, restoration progress, and community experiences.

Wetlands remain central to livelihoods in both treatment and comparison communities, and treatment households report engaging in a slightly greater number of wetland-based activities.



Before presenting the results, it is important to note that wetland use must be interpreted carefully in this context. Prior to project implementation, the feasibility study documented strong dependence on wetlands for a wide range of livelihood activities, including crop cultivation (particularly rice), livestock grazing, fishing, papyrus harvesting, water collection, brick making, and sand mining. While many of these activities are essential for livelihoods, several of them, particularly agricultural conversion, brickmaking, sand mining, and unregulated grazing, were identified during the feasibility study as major drivers of wetland degradation. At the same time, the project design acknowledged that certain customary, low impact uses (such as regulated fishing, sustainable papyrus harvesting and domestic water collection) could continue under controlled access arrangements. For this reason, interpretation of wetland activities must be nuanced and context-specific, as the same activity may be either sustainable or harmful depending on how and where it is practiced.

The evaluation first examines whether households report using or benefiting from nearby wetlands. Treatment households are estimated to be 3 percentage points less likely than comparison households to report benefiting from wetlands, but this difference is small and statistically insignificant relative to the high adjusted comparison mean of 87 per cent. In substantive terms, this suggests that wetlands continue to play a central role in livelihoods across both treatment and comparison areas.

Qualitative evidence supports this interpretation. Participants across districts described a wide range of wetland-based activities, including rice cultivation, grazing, fishing, and harvesting of grass or papyrus. When asked how community use of wetlands had changed over the past five years, many respondents in treatment communities reported continued use of wetlands, and in some cases increased use. Others described more regulated grazing practices or reduced reliance on wetlands for water collection and farming following sensitization and restoration efforts. These mixed accounts suggest that the project may have influenced how some wetland activities are practiced, but did not eliminate households' dependence on wetlands.

While the likelihood of benefiting from wetlands remains similar across groups, the results differ when examining the number of wetland-based activities reported by households. Treatment households report, on average, 0.71 additional activities relative to comparison households, against a comparison mean of 1.86 activities, and this difference is statistically significant at the 5 per cent level. Rather than indicating reduced reliance on wetlands, this pattern points to a shift in the composition or diversification of wetland use.

Qualitative evidence helps explain this result. In several treatment FGDs, participants reported returning to wetland-based activities because alternative livelihoods had been delayed, cultivable land outside wetlands was limited, or new livelihood activities were not yet sufficient to support a viable transition away from wetland cultivation. Respondents noted that “people have gone back to the wetland”, even in restored areas, because “the livelihoods given were not equivalent to what we used to get from rice”. At the same time, some respondents described changes in the types of activities practiced, including increased harvesting of grass for mulching, fish farming along wetland fringes, and grazing alongside continued crop cultivation. Taken together, the evidence suggests that the increase in reported wetland activities may reflect a combination of continued dependence on wetland resources, diversification within wetland-based livelihoods, and short-term livelihood adjustments where alternative livelihood support was delayed, insufficient, or not yet viable.

The Les Rams ecological assessment provides additional context for these mixed patterns. Based on satellite-derived wetland use and cover analysis, the report documents heterogeneous trajectories across evaluated sites. Some treatment wetlands showed signs of reduced farmland or recovery of natural wetland vegetation, while others continued to experience farmland expansion, vegetation decline, or renewed encroachment. The report also notes continued wetland encroachment in parts of eastern Uganda, including extensive rice cultivation in selected wetland areas, which was observed to affect biodiversity. These findings are descriptive and are not interpreted as causal impact estimates. However, they are consistent with the household survey and FGD evidence that wetland restoration progress and wetland-use patterns varied substantially across sites.



Table 2. Estimated effects on wetland awareness and engagement at endline

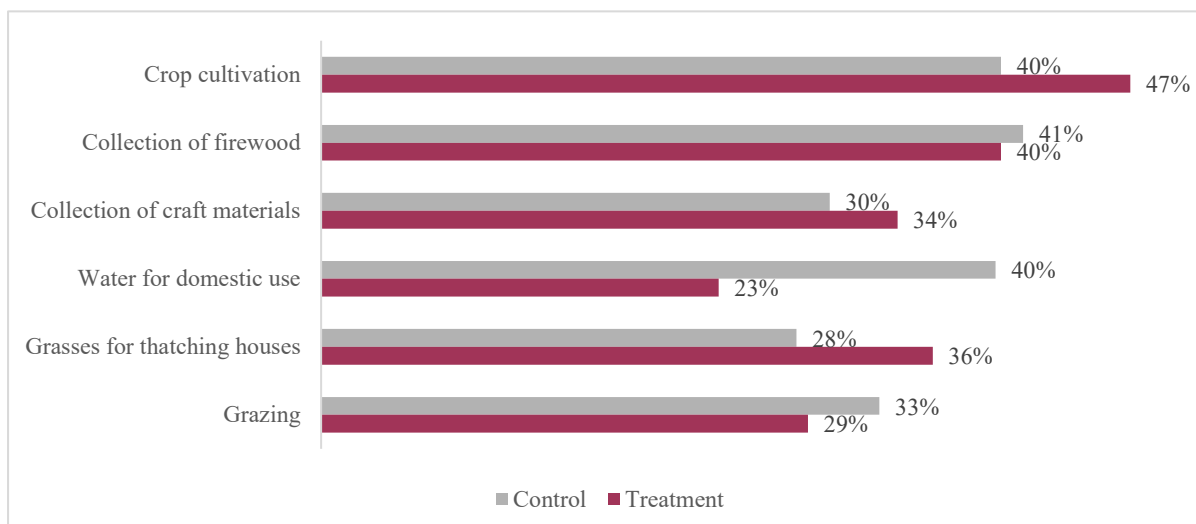
	ATT	POM	Total	Treated	Control
Wetland awareness					
Number of reported climate change-related impacts on wetland	0.53* (0.31)	1.67	1,510	810	700
Number of drivers of wetland degradation	0.56* (0.33)	1.16	1,510	810	700
Wetland activities					
Do you use or benefit from a nearby wetland?	-0.03 (0.04)	87.04	1,510	810	700
Number of activities practiced in wetlands	0.71** (0.29)	1.86	1,510	810	700

Source: LORTA Endline Household Survey, 2024.

Note: Results are estimated using IPWRA on endline household data. ATT refers to the estimated average difference for households in treatment areas relative to their adjusted counterfactual. POM (predicted outcome mean) is the adjusted mean for the comparison group, expressed in the original unit of the outcome variable (per cent for binary variables). Standard errors are in parentheses. The last three columns report the number of observations (total, treated, control). *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

Figure 3 provides the descriptive context on the types of wetland activities reported by treatment and comparison households at endline. Across both groups, crop cultivation and firewood collection remain the most common activities, followed by collection of craft materials, grasses for thatching, grazing, and domestic water use. These patterns reinforce the conclusion that wetlands continue to serve multiple livelihood functions in both treatment and comparison communities. The differences shown in Figure 3 are descriptive and should not be interpreted as statistically significant treatment effects.

Figure 3. Share of households reporting selected wetland activities at endline, by treatment status





Source: LORTA Endline Household Survey, 2024.

Note: Percentages show the share of households reporting each activity. Categories are not mutually exclusive, as households may report more than one wetland activity. Differences shown are descriptive and should not be interpreted as statistically significant treatment effects.

6.2 Adoption of alternative livelihoods and improved agricultural practices

Treatment households were no more likely than comparison households to adopt improved agricultural practices, engage in alternative livelihoods, or receive climate information.

This section examines behavioural changes directly linked to the project's livelihood and climate-information pathways.⁸ In line with the project's theory of change, Component 2 assumed that households, once sensitized to wetland degradation and climate risks and provided with technical and material support, would shift toward more climate-resilient production practices and less environmentally harmful livelihoods. Component 3 was intended to complement this pathway by improving access to climate information for agricultural and livelihood decisions.

The endline IPWRA estimates do not show statistically significant effects across the main behavioural adoption indicators. Treatment households were 2 percentage points less likely to report adopting new agricultural practices through the project and 6 percentage points more likely to report using sustainable land management practices with project support, but neither difference is statistically significant. The panel robustness checks also do not show a significant differential increase in sustainable land management practices between 2023 and 2024. Taken together, the cross-sectional and panel estimates do not indicate a measurable average increase in adoption of improved or climate-resilient agricultural practices among households in treatment areas.

Qualitative evidence helps explain why measurable effects on agricultural practice adoption may be limited. FGDs indicate that many of the promoted practices were already known or used before the project, reducing the scope for large additional gains. Across both treatment and comparison communities, participants often reported little change in farming practices over the past five years. Where changes were mentioned, they were generally localized or modest, such as increased use of manure or fertilizers among some vegetable growers. Respondents also pointed to persistent production constraints, including limited land, pests and diseases, declining soil fertility, and prolonged dry seasons, which may have limited sustained adoption of improved practices.

The evaluation also finds no statistically meaningful effect on uptake of alternative livelihoods through the project. Treatment households were 3 percentage points more likely than comparison households to report engagement in alternative livelihood activities, but this difference is not statistically significant. Qualitative evidence suggests that households were aware of a range of possible alternatives, including livestock rearing (pigs and goats), fish farming, grass harvesting, boda-boda riding, and small businesses. However, participants frequently reported delays in the delivery of project support, limited coverage, and low returns relative to income previously derived from wetland use. In several sites, respondents also reported that livestock provided through the project were sick, poorly adapted to local conditions, or costly to maintain. These constraints appear to have limited households' ability to move away from wetland-based activities in a sustained way.

The UNDP Office of Audit and Investigations report similar findings with the livelihood impact evaluation results at endline. Although a Livelihood Restoration Plan was developed in 2020 in line with FAA Clause 9.02(e), implementation did not consistently follow the prescribed site-specific planning process. The audit documented persistent delays in delivery, the absence of a complete and verifiable beneficiary list, and limited mechanisms to track coverage and results of livelihood

⁸ These indicators capture uptake of practices promoted under the project. They differ from the broader climate adaptation behaviours analyzed in the resilience section, which reflect households' general responses to climate variability and are not limited to project-supported practices.



restoration activities, constraining the project’s ability to deliver alternative livelihoods at scale and to assess who benefited and how.

The evaluation finds no significant effect on receipt of climate information. Treatment households were 2 percentage points more likely to report receiving climate information through the project, but the estimated difference is not statistically significant. FGDs suggest that climate information was commonly accessed through radio, television, and, in some cases, churches, and was used mainly to inform planting and harvesting decisions. At the same time, participants noted that such information was not consistently used in decision-making because of limited access and concerns about the reliability and accuracy of forecasts. Several respondents stated that climate information had not led to noticeable changes in farming or wetland management practices.

Taken together, the evidence does not show that the project generated measurable behavioural change in the form of greater adoption of climate-resilient agricultural practices, stronger uptake of alternative livelihoods, or improved use of climate information among treated households relative to comparison households. The qualitative findings suggest that these results reflect a combination of implementation delays, limited reach and intensity of project support, and structural livelihood constraints facing households.

Table 3. Estimated effects on adoption of project-supported practices at endline

	ATT	POM	Total	Treated	Control
Adoption of new agricultural practices	-0.02 (0.06)	25.99	1,510	810	700
Use of sustainable agricultural practices	0.06 (0.10)	44.06	1,510	810	700
Adoption of alternative livelihoods	0.03 (0.06)	18.43	1,510	810	700
Receiving climate information	0.02 (0.10)	55.52	1,510	810	700

Source: LORTA Endline Household Survey, 2024.

Note: Results are estimated using IPWRA on endline household data. All outcomes in this table are binary. ATT refers to the estimated percentage-point difference for households in treatment areas relative to their adjusted counterfactual. POM is the adjusted mean for the comparison group, expressed as a percentage share. Standard errors are in parentheses. The last three columns report the number of observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

6.3 Agricultural production and diversification

Cross-sectional endline estimates suggest a more diversified crop portfolio among treatment households, but do not provide robust evidence of productivity or livestock asset gains.

This section examines whether the project led to observable changes in agricultural land use, crop diversification, agricultural productivity, and livestock ownership. Under the project’s theory of change, wetland restoration and livelihood support were expected to reduce pressure on wetlands while helping households adopt more sustainable and climate-resilient production strategies. Table 4 presents estimated impacts on land allocation, crop diversification, agricultural yield, and livestock ownership.



At endline, treatment households cultivate significantly less land than comparison households in the cross-sectional IPWRA estimates. They cultivate about 0.68 fewer parcels than the adjusted comparison mean of 2.85 parcels, and about 1.04 fewer acres than the adjusted comparison mean of 3.55 acres. These reductions are consistent with restoration and relocation measures that restricted cultivation in wetlands. From a project design perspective, a decline in cultivated area is not inherently inconsistent with Component 2, which aimed to reduce pressure on restored wetlands by supporting households to sustain production and income without continued expansion into wetland areas.⁹

Qualitative evidence helps explain how some households experienced these land constraints. Respondents in several treatment communities described reduced access to wetland cultivation, limited availability of agricultural land, delays in livelihood support, and insufficient support during the transition away from wetland-based production. These accounts suggest that the intended sequencing was not always experienced as a smooth transition. For affected households, reduced access to wetland cultivation appears to have taken effect before alternative livelihood options were fully established or generating reliable returns.

At the same time, treatment households grow about 1.69 more crops than comparison households, relative to an adjusted comparison mean of 4.03 crops. This result suggests that households in treatment areas have broader crop portfolios at endline, despite cultivating less land on average. Descriptive patterns suggest that this diversification partly reflects greater cultivation of vegetables such as tomatoes, pumpkin, eggplant, and cabbages, while staple crops such as maize and rice remain widely grown across both treatment and comparison areas. Box 1 situates this crop diversification result within the broader production and market context, including the risks and livelihood constraints that may affect whether more diversified crop portfolios translate into income gains.

The evaluation next examines whether this broader crop portfolio was associated with measurable productivity gains. The available yield indicator is an aggregate agricultural yield measure, transformed using the inverse hyperbolic sine (IHS) transformation to retain zero values and reduce the influence of extreme observations. The estimated treatment effect is positive but not statistically significant. This result should be interpreted cautiously: crop-specific yield estimates could not be reported with sufficient precision because sample sizes for individual crops differ substantially. The aggregate yield indicator therefore provides only a broad summary measure of agricultural productivity. The results do not indicate a measurable average productivity gain at endline, but they do not rule out crop-specific changes among particular crops or locations.

The evaluation also does not detect a statistically significant effect on livestock assets. The estimated effect on livestock units is small and statistically insignificant, and the panel robustness check similarly shows no significant differential change in tropical livestock units between 2023 and 2024. This suggests that the project did not generate a measurable average increase in livestock assets by endline. Descriptive patterns suggest some variation in livestock composition, with higher goat ownership and lower cattle ownership in treatment areas, consistent with project-supported livestock distribution.

Qualitative evidence points to several reasons why livestock support may not have translated into measurable asset gains. Respondents described limited livestock training before livestock distribution, concerns about the suitability and health of some livestock, high maintenance costs, and weak follow-up support. Some respondents viewed livestock as a slower-return and riskier livelihood option, particularly in a context where households were already facing livelihood pressures following restoration and access restrictions. KIIs similarly highlighted limited district-level capacity for supervision and extension services, which constrained the sustainability of livestock provision.

⁹ Reduced cultivated area does not necessarily imply reduced dependence on wetlands. As shown in the previous section, households in treatment areas continued to engage in wetlands through multiple activities, suggesting a shift in the composition of wetland use rather than a reduction in overall engagement.



Table 4. Estimated effects on agricultural production and livestock

Outcome	ATT	POM	Total	Treated	Control
Agricultural land use					
Number of parcels cultivated by household	-0.68* (0.27)	2.85	1,226	635	591
Land area cultivated in acres	-1.04* (0.51)	3.55	1,166	606	560
Crop diversification and productivity					
Total number of crops grown by household	1.69* (0.41)	4.03	1,226	635	591
Total yield from agriculture (kilogram per acre, IHS-transformed)	0.92 (0.57)	6.97	1,510	810	700
Livestock ownership					
Tropical livestock units owned by household	-0.10 (0.30)	2.00	495	248	247

Source: LORTA Endline Household Survey, 2024.

Note: Results are estimated using IPWRA on endline household data. ATT refers to the estimated average difference for households in treatment areas relative to their adjusted counterfactual. POM is the adjusted mean for the comparison group, expressed in the original unit of the outcome variable, except for the IHS-transformed yield indicator, which is reported on the transformed scale. Standard errors are in parentheses. The last three columns report the number of observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

Box 1. Interpreting crop diversification in a constrained production and market environment

Note: Analysis draws on descriptive statistics reported during the endline household survey and qualitative evidence from FGDs and KIIs. Figures do not represent causal estimates.

At endline, treatment households reported more diversified crop portfolios than comparison households, consistent with the project’s crop-diversification pathway. Whether this translated into higher or more stable income depends on the production and market constraints described below.

Households in both treatment and comparison areas reported widespread agricultural risks. Pests and diseases affected about 87 per cent of households in both groups, around half reported unreliable rainfall, nearly 40 per cent reported prolonged dry spells, and about one-third cited low soil fertility. In treatment areas, these pressures were compounded by reduced access to wetland cultivation before alternative livelihood options were fully in place.

Market conditions further shaped the potential returns from diversification. Price volatility was reported more frequently in treatment areas (63 per cent) than in comparison areas (51 per cent), although this difference should be interpreted descriptively. Respondents and district stakeholders also pointed to poor roads, high transport costs, and limited facilitated market access as constraints affecting the commercialization of diversified production.

This context is important for interpreting the apparent shift toward vegetables in treatment areas. Vegetables may offer higher returns than some staple crops, but they are also more input-intensive, more perishable, and more dependent on reliable transport and market access. The diversification finding should therefore be



interpreted as evidence of adjustment in crop portfolios, but not by itself as evidence of higher or more stable agricultural income. Without stronger market linkages, transport options, and post-harvest support, diversification into more perishable crops may have limited welfare gains.

6.4 Income and food security

At endline, treatment households report lower total income and lower housing-related physical capital than comparison households, alongside qualitative evidence of financial pressure during the livelihood transition. These patterns are not accompanied by statistically significant differences in crop income, expenditure, or food-security indicators.

This section examines whether agricultural adjustment and livelihood support translated into changes in household income, income diversification, expenditure, assets, and food security. Under the project's theory of change, these are later-stage household welfare outcomes, and their realization depends in part on whether households can replace or supplement wetland-based production with viable and sufficiently profitable livelihood options.

Table 5 shows that treatment households report lower total household income over the past 12 months than comparison households. Because reported income includes many zero observations and is highly skewed, income variables are estimated using the IHS transformation, which allows zero values to be retained while reducing the influence of extreme observations. The estimated effect on total income is negative and statistically significant at the 10 per cent level, providing suggestive evidence that treatment households had lower overall income at endline. The panel robustness checks point in the same direction, although the evidence is not uniform across income specifications. Among households interviewed in both 2023 and 2024, the untransformed monthly income estimate is negative and statistically significant in the restricted sample, while the IHS-transformed and log-transformed estimates are also negative but not statistically significant.

Other economic indicators are more mixed. The estimated effect on crop-farming income is close to zero and statistically insignificant, suggesting that the lower total income result is not driven by a measurable decline in crop income alone. Reported household expenditure is also lower among households in treatment areas, but not statistically significant. The number of income-generating activities is slightly higher, but again statistically insignificant. Taken together, the results point to income pressure among households in treatment areas, but not to a uniform deterioration across all income, expenditure, and livelihood-diversification indicators.

The housing-related physical capital index, constructed from wall, roof and floor materials, toilet type, kitchen type, and number of rooms, is also significantly lower among households in treatment areas at endline. This should be interpreted as an endline difference in housing quality rather than evidence of a project-related change in assets. The panel robustness check points in the same negative direction, but the estimate is not statistically significant.

Qualitative evidence is consistent with the pattern of income pressure, while also pointing to uneven livelihood gains. Respondents in treatment communities described financial strain during the livelihood transition, particularly in meeting school, food, and medical expenses. At the same time, some groups reported localized improvements in income or food access through activities such as fish farming, livestock, small enterprises, and boda-boda riding. These accounts suggest that alternative livelihoods generated benefits for some households, but unevenly and not at a scale sufficient to produce statistically significant average effects on income diversification or crop income.

**Table 5. Estimated effects on income, expenditure, and physical capital**

Outcome	ATT	POM	Total	Treated	Control
Number of income generating activities (12 months)	0.25 (0.17)	1.39	1,510	810	700
Total income from all income sources in the past 12 months (UGX, IHS-transformed)	-1.12* (0.40)	14.51	1,361	719	642
Total household income from crop farming (UGX, IHS-transformed)	0.02 (0.37)	12.85	1,028	533	495
Expenditure reported by households (UGX, IHS-transformed)	-0.26 (0.38)	13.89	1,510	810	700
Housing-related physical capital index	-7.51* (3.09)	70.04	1,510	810	700

Source: LORTA Endline Household Survey, 2024.

Note: UGX = Ugandan Shilling. Results are estimated using IPWRA on endline household data. ATT refers to the estimated average difference for households in treatment areas relative to their adjusted counterfactual. POM is the adjusted mean for the comparison group. Income and expenditure outcomes are reported using the IHS transformation; ATT and POM for these outcomes are therefore reported on the transformed scale and should not be interpreted directly as UGX values. The housing-related physical capital index captures housing quality and number of rooms, with higher values indicating stronger housing-related physical capital. Standard errors are in parentheses. The last three columns report the number of observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

Food-security outcomes remain broadly similar across treatment and comparison households.

Food security is assessed using two complementary indicators. The household dietary diversity score (HDDS) measures the number of food groups consumed by the household during the survey recall period and serves as a proxy for dietary diversity. The food insecurity experience scale (FIES) captures households' reported experiences of food access constraints over the previous 12 months, including whether households had to reduce food consumption or faced difficulties accessing sufficient food.

Although earlier results suggest weaker economic conditions among treatment households on some income and physical capital indicators, the evaluation does not detect statistically significant differences in either indicator between treatment or comparison groups (Table 6). The comparison-group mean HDDS of 5.53 food groups and FIES score of 2.36 suggest moderate dietary diversity and mild food insecurity on average. The estimated treatment effects on both indicators are small and statistically insignificant, indicating that the income pressures documented earlier were not associated with measurable differences in food consumption or reported food insecurity at endline. The panel robustness checks are consistent with this finding. Among households interviewed in both 2023 and 2024, the estimated differential changes in HDDS and FIES are not statistically significant.

Several factors may explain this pattern. Households may have adjusted non-food consumption, relied on own production, informal income, or social support to maintain food access during the transition period. Crop diversification may also have contributed to maintaining food availability or dietary variety. However, the evaluation does not directly isolate these mechanisms, so these explanations should be treated as contextual interpretations rather than causal findings.

**Table 6. Estimated effects on food-security indicators**

Outcome	ATT	POM	Total	Treated	Control
Household dietary diversity score	0.24 (0.53)	5.53	1,510	810	700
Food insecurity experience scale - 12 months	0.18 (0.38)	2.36	1,361	810	700

Source: LORTA Endline Household Survey, 2024.

Note: Results are estimated using IPWRA on endline household data. ATT refers to the estimated average difference for households in treatment areas relative to their adjusted counterfactual. POM is the adjusted mean for the comparison group, expressed in the original unit of the outcome variable. Higher HDDS values indicate greater dietary diversity, while higher FIES values indicate greater food insecurity. Standard errors are in parentheses. The last three columns report the number of observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

6.5 Coping mechanisms and adaptive capacity

Treatment households report greater use of distress coping strategies and greater uptake of proactive climate adaptation measures, pointing to an uneven resilience pattern at endline.

This section examines whether households in treatment areas differed from comparison households in how they responded to shocks and climate-related stress. In this evaluation, resilience is assessed through two related dimensions: households' ability to manage shocks without resorting to welfare-reducing coping strategies, and their adoption of forward-looking measures intended to reduce vulnerability to future climate risks. The analysis therefore distinguishes between short-term coping responses to shocks and broader climate adaptation behaviours.

This distinction is grounded in the development literature on household coping and resilience measurement, which uses reported coping behaviours as observable indicators of how households manage shocks when direct welfare measures may not fully capture stress responses (Corbett, 1988; Maxwell, Caldwell and Langworthy, 2008). In this literature, reliance on welfare-reducing or erosive strategies is interpreted as evidence of constrained resilience, because such responses may protect short-term survival while undermining future welfare, human capital, or productive capacity. Conversely, resilience is also assessed through positive adaptive or transformative responses, including forward-looking changes in practices, assets, or livelihood strategies that reduce vulnerability to future shocks (Béné et al., 2017).

Most households across both treatment and comparison areas reported experiencing shocks during the previous 12 months, underscoring the relevance of resilience in this context. At endline, 90 per cent of households reported at least one shock in the previous 12 months, most commonly crop pests and diseases (58 per cent), unreliable rainfall or droughts (50 per cent), and livestock pests and diseases (29 per cent). Reported shock exposure was broadly similar across groups, with 89 per cent of treatment households and 90 per cent of comparison households reporting at least one shock. This suggests that differences in coping responses are unlikely to be explained only by whether households experienced shocks.

The endline survey collected information through two sets of questions. First, households were asked how they responded to shocks experienced in the past 12 months. The primary shock-response outcome is distress coping, defined as welfare-reducing responses to shocks, such as reducing the number or size of meals, selling durable assets, selling land, distress sale of livestock, sending children to live elsewhere, or reducing spending on health and education. These strategies are



interpreted as signs of constrained absorptive capacity because they may reduce current welfare, deplete assets, or undermine future human capital.

Second, households were asked what actions they had taken to cope with or adapt to climate change. The primary climate-response outcome is proactive climate adaptation defined as forward-looking measures such as constructing trenches or soil conservation structures, installing water storage or irrigation systems, applying mulching or organic manure, planting improved seed varieties, adopting cover crops or agroforestry, and using climate information to guide agricultural decisions. These measures are interpreted as indicators of adaptive capacity because they are intended to strengthen longer-term resilience to climate variability.¹⁰ Because households may report multiple responses, the analysis presents both the share of households adopting each strategy and the average number of strategies used.

Treatment households are significantly more likely to rely on distress coping in response to shocks. On average, they report 0.18 additional distress coping actions relative to comparison households and are 15 percentage points more likely to report using at least one distress coping strategy. The panel DRDID-IPW robustness checks support this finding. Among households interviewed in both 2023 and 2024, treatment households recorded a statistically significant differential increase in the number of distress coping strategies and a weakly significant increase in the likelihood of using any distress coping strategy. Because the 2023 survey occurred after implementation had already begun, these estimates should be interpreted as evidence of incremental changes during a later stage of implementation rather than full project impacts. Nevertheless, the direction of the panel estimates is consistent with the endline results and strengthens the interpretation that treatment households remained more reliant on welfare-reducing responses to shocks.

Treatment households also report greater engagement in proactive climate adaptation measures. On average, they report 0.42 additional proactive measures relative to comparison households and are 15 percentage points more likely to report implementing at least one such measure. This is consistent with the project's theory of change, under which improved agricultural practices, climate information, and livelihood support were expected to encourage more climate-resilient decision-making.

Taken together, the findings point to an uneven resilience pattern. Treatment households report greater uptake of proactive climate adaptation measures, but they also rely more on distress coping when shock occurs. The results therefore suggest that adaptive behaviours may have increased without a corresponding improvement in households' short-term economic buffering capacity. In resilience terms, the findings point to stronger evidence of adaptive capacity than absorptive capacity: treatment households appear more likely to adopt forward-looking climate-risk management practices, but they also remain more reliant on welfare-reducing responses to manage shocks.

This pattern is consistent with the sequencing risk discussed in the theory of change and with the livelihood transition constraints described in earlier sections. For restoration and livelihood programmes, the main design implication is that livelihood support needs to be delivered early enough, and at sufficient scale, to help households manage the period between reduced reliance on wetland-based activities and the point at which alternative livelihood options become operational and generate reliable returns. Stronger follow-up support and temporary income-smoothing measures may help reduce reliance on welfare-reducing coping strategies while supporting a more durable shift toward sustainable livelihoods.

¹⁰ Unlike the indicators in section 6.2, the adaptation measures analysed here capture broader household responses to climate variability, including drought and floods, and are not limited to practices promoted under the project.



Table 7. Estimated effects on coping and adaptation strategies

Outcome	ATT	POM	Total	Treated	Control
Shock coping responses					
Number of distress coping mechanisms	0.18* (0.10)	0.30	1,510	810	700
Used any distress coping mechanisms	0.15** (0.08)	24.94	1,510	810	700
Climate adaptation measures					
Number of proactive adaptation measures	0.42* (0.26)	0.87	1,510	810	700
Used any proactive adaptation measures	0.15** (0.07)	28.22	1,510	810	700

Source: LORTA Endline Household Survey, 2024.

Notes: Results are estimated using IPWRA on endline household data. Households that reported no shocks in the previous 12 months were coded as zero for coping responses, as they did not report any coping actions during the period. The coping variables therefore capture observed coping behaviour across the full sample rather than coping conditional on experiencing a shock. ATT refers to the estimated average difference for households in treatment areas relative to their adjusted counterfactual. POM is the adjusted mean for the comparison group, expressed in the original unit of the outcome variable; for binary outcomes, POM is expressed as a percentage share. Standard errors are in parentheses. The last three columns report the number of observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.

Box 2. Exploratory survey experiment on wetland policy framing

To complement the main impact analysis – and motivated by the project’s interim evaluation findings that limited community trust was an important barrier to wetland restoration – the endline survey embedded a brief randomized messaging experiment on wetland policy framing. The experiment tested whether different descriptions of wetland conservation affected households’ stated perceptions of whether government wetland policy was effective in protecting wetlands and benefiting communities.

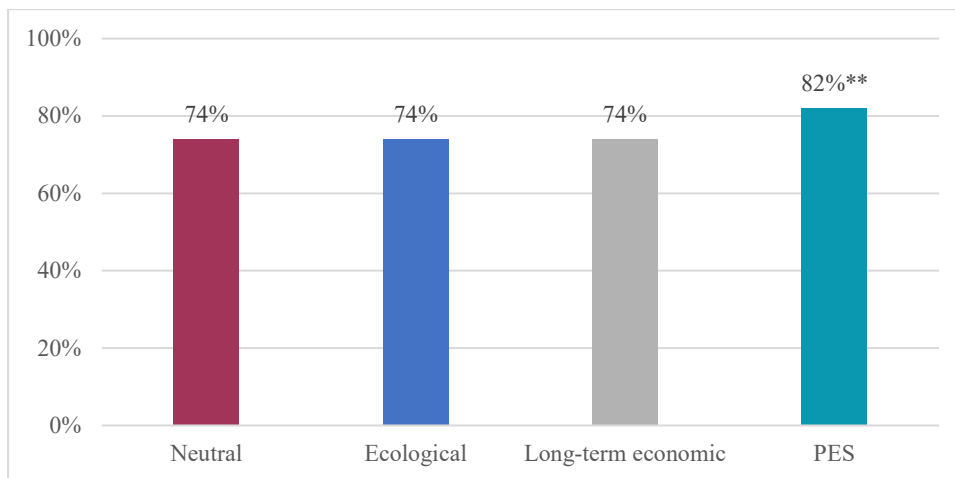
Respondents were randomly assigned to one of four short messages. The control group received a neutral message on the general importance of wetlands. The three treatment groups received messages emphasizing, respectively, ecological benefits, long-term economic benefits, or the possibility of direct financial rewards through a PES mechanism.

As shown in Figure 4, across the neutral, ecological, and long-term economic framings, approximately 74 per cent of respondents viewed government wetland policy as effective. Differences across these three framings were statistically indistinguishable. By contrast, the PES framing increased the share of respondents viewing the policy as effective to 82 per cent, a statistically significant increase relative to the other message groups.

The finding should be interpreted as evidence on stated perceptions, not as evidence on behavioural change or the feasibility of PES. It suggests that households may respond more favourably to conservation messages when these acknowledge the household-level economic trade-offs associated with reduced wetland access. Where restoration affects existing livelihood activities, communication may be more credible if it clearly explains both the expected conservation benefits and the concrete support households can realistically expect.



Figure 4. Share of respondents who viewed government wetland policy as effective



Source: LORTA Endline Household Survey, 2024.

Notes: Bars show the share of respondents who reported that the government wetland policy would be effective, by randomly assigned message group. Statistical significance is assessed relative to the neutral message group. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels, respectively.

VII. Understanding the result pattern: Implementation and contextual factors

The programme’s theory of change posits a sequence: (i) enforcement and restoration measures reduce household reliance on wetlands; (ii) alternative livelihoods help households transition away from unsustainable wetland-based activities; and (iii) sustained livelihood diversification translates into improved income, food security, and resilience to climate shocks. Treatment households show some changes consistent with the early stages of the pathway, including greater recognition of wetland degradation pressures, broader crop diversification, and greater uptake of proactive climate adaptation measures. However, these changes did not translate into measurable gains in income, expenditure, food security, or livestock assets at endline, and treatment households also reported greater reliance on distress coping when shock occurred. This section draws on qualitative and implementation evidence to locate where and why this transition stalled. The aim is not to establish separate causal estimates, but to identify the implementation mechanisms most consistent with the observed result pattern, and to draw out implications for programme design and adaptive management.

Analytical approach

The analysis draws on three complementary sources of evidence. First, KIIs were conducted with district-level implementers across eight project districts — Bukedea, Kumi, Namutumba, and Ngora in the eastern region, and Rubirizi, Mitooma, Kisoro, and Bushenyi in the south-western region. KII respondents at district level included Natural Resources Officers (NROs), Community Development Officers (CDOs), and Agriculture Production Officers (APOs), the three departments responsible for coordinating wetland restoration, community engagement, and livelihood support. Second, FGDs were held with community members in eight treatment wetland sites and eight comparison wetland sites across the same districts. KIIs and FGDs were conducted in two rounds, in 2023 and 2024. The 2023 round, which had not previously been analyzed, generated more detailed narrative responses on implementation experience and is therefore the primary source for the verbatim quotations cited in this section. The 2024 endline round produced shorter responses that largely confirmed rather than introduced new findings on the implementation issues discussed below.

Third, the section draws on implementation evidence from the interim evaluation and the UNDP audit. The interim evaluation is particularly relevant because it identified several implementation risks



before endline, including delays in fund release, weak coordination among MWE, MAAIF and UNMA, insufficient community trust, and the need to implement wetland restoration and livelihood activities simultaneously so that communities would not wait for alternative livelihood options after vacating wetlands. The UNDP audit provides further evidence on livelihood restoration planning, beneficiary tracking, implementation delays, and oversight gaps. These sources are used to triangulate and contextualize the interview evidence, not as additional impact estimates.

All KII and FGD transcripts were coded in ATLAS.ti using an inductive coding approach. The qualitative evidence was used in an explanatory manner to identify common themes and mechanisms contributing to the observed evaluation results, including mechanisms relevant to the project's theory of change. Codes were organized into five analytical categories: (i) livelihood design, delivery, and sustainability; (ii) operational, logistical, and resource constraints; (iii) institutional and coordination challenges; (iv) community engagement and social acceptance; and (v) contextual factors. The most frequently coded categories were the first two; full distribution is provided in annex A5. These coding frequencies describe the qualitative material and should not be read as indicating the share of households affected or the causal weight of each factor.

The discussion below is organized around three mechanisms identified through analysis of the qualitative evidence: (i) the timing and sequencing of livelihood support, (ii) the quality and suitability of livelihood alternatives, and (iii) operational capacity and adaptive management. Two cross-cutting conditions, community acceptance and the broader environmental and socio-economic context, shaped the scope for behavioural change throughout.

7.1 Mechanism 1: Timing and sequencing of livelihood support

The most consistent finding across KIIs, FGDs, and the interim evaluation is that alternative livelihood support was delivered substantially later than enforcement and restoration measures. The interim evaluation found that, by mid-term, livelihood activities under Output 2 were significantly behind schedule, while wetland restoration under Output 1 had progressed further. Delays in fund disbursement and procurement meant that many households reduced or lost wetland-based income before alternatives became available. KII respondents in both regions traced the delay to slow and uneven release of funds from the centre. This sequencing mismatch had direct behavioural consequences. KIIs in both regions described households initially complying with restrictions but subsequently returning to wetland use when promised support was delayed:

- (a) *“Delayed delivery of promised alternative livelihood support to farmers who had voluntarily vacated the wetland, this prompted them to go back to the demarcated areas, also, supervision was not possible by the district due to lack of resources...Also, alternative livelihoods were not delivered as promised and to the expectation of the community, this forced farmers to go back to the wetlands for survival to carry out brick making, charcoal burning and over fishing.” (District technical officers, eastern region.)*

FGD participants in treatment communities described the same dynamic from the household side:

- (b) *“The project has increased poverty within the region due to limited access to land and shift in the source of incomes in the name of alternative sources of livelihoods. Poverty is high - chased us from wetlands yet it's planting season.” (Treatment FGD, eastern region.)*

The UNDP audit provides related system-level evidence on this sequencing issue. Although a Livelihood Restoration Plan was approved in January 2020, site-specific livelihood plans were not consistently prepared, and implementation was delayed for several years, initially because of COVID-19 mobility restrictions and subsequently because of implementation and oversight gaps that persisted beyond the pandemic period. This is consistent with KII and FGD accounts that livelihood restoration lagged behind restrictions on wetland use, creating a transition period in which some households faced reduced access to wetland-based income before alternative livelihoods were fully in place.



7.2 Mechanism 2: Quality and suitability of livelihood alternatives

Where livelihood support did arrive, respondents in both KIIs and FGDs repeatedly described it as insufficient in quality or scale, or poorly suited to local environmental and livelihood conditions, compared with the wetland-based activities it was intended to replace. Concerns raised across districts fell into three recurring patterns: livestock that did not survive in local conditions, livelihood inputs that were not adequate in scale, and training that was inadequate or poorly sequenced relative to delivery.

On livestock quality and adaptation, multiple KIIs reported that animals supplied under the project arrived diseased or were poorly suited to local agro-ecological conditions. KIIs in the south-western region reported that 30 to 40 per cent of poultry distributed died from disease and management challenges shortly after delivery. KIIs in the eastern region described similar issues with goats and pigs, including disease and reproductive failure shortly after distribution:

- (c) *“Goats supplied were diseased and infested with brucellosis. There was no facilitation in terms of drugs, structures, fencing. Livelihoods were not enough which created disputes making some go back to the wetlands.” (District officers, eastern region.)*
- (d) *“Alternative livelihoods such as pigs and goats should be obtained from the local area because they’re used to the local climate. Otherwise, the ones given died because they were not used to the local area.” (Treatment FGD, south-western region.)*

On the scale of support, KII and FGD evidence converges on the perception that livelihood inputs were too limited to support a viable transition away from wetland-based cultivation, prompting some farmers to return to the restored wetland. Respondents frequently stated that larger or more productive livelihood packages, such as cattle or other higher-return options, would have been better aligned with the income and subsistence benefits households previously derived from wetland cultivation.

- (e) *“Inputs were not enough to cover the livelihoods of the farmers... Farmers who lost 2 gardens of crops were compensated with 1 piglet which was not equivalent to what was lost.” (District Agriculture Production Officer, south-western region.)*
- (f) *“The people that received alternative livelihoods have gone back to the wetland. This is because the livelihoods (goats) were not equivalent to the benefits we get from [...] wetland.” (Treatment FGD, eastern region.)¹¹*

On training and sequencing, KIIs across districts reported that training was frequently delivered after livelihoods had been distributed, rather than as preparation for receipt. Combined with limited follow-up support and absence of inputs such as veterinary drugs, animal shelter, or fencing, this contributed to the post-delivery losses described above. FGDs reinforced these concerns, with several treatment groups characterizing training as insufficient to sustain new livelihood activities once initial inputs had been depleted or lost.

Taken together, these accounts point to a second, distinct constraint in the livelihood transition pathway. Even where support was delivered, some livelihood packages appear to have been limited, poorly adapted to local conditions, or insufficiently supported after delivery to serve as durable income alternatives to wetland-based activities. This provides one plausible explanation for why observed practice-level responses did not translate into stronger livelihood, food security, or coping outcomes by the endline survey.

7.3 Mechanism 3: Operational capacity and adaptive management

The first two mechanisms were shaped by underlying weaknesses in operational capacity, oversight, and adaptive management. KIIs across six districts reported limited operational budgets, insufficient

¹¹ The terms “compensated” or “equivalent” are reproduced here as respondent language and reflect perceptions expressed during qualitative interviews. They should not be interpreted as implying an entitlement to compensation.



resources for monitoring and supervision, and weak feedback loops between district implementers and central coordination. The interim evaluation linked these to structural bottlenecks: delays in annual work plan approval, slow and uneven fund disbursement, and limited involvement of district governments in activity planning. In practice, these constraints translated into missed agricultural seasons, delayed training and sensitization, and reduced supervision and follow-up at the local level.

KIIs raised similar concerns about decision-making and information flow. Respondents reported that districts received centrally determined activities with limited scope to shape planning or feed operational issues back upward:

- (g) *“There are a lot of gaps because everything is decided at the centre and the district is thought last and always at the receiving end. Lower officers are not involved in planning, and communication is by Whatsapp or phone calls.” (District Natural Resources Officer, eastern region.)*
- (h) *“Implementation is centrally managed and it’s hard to make follow ups on the planned activities and that’s why most of livelihoods delivered did not match the needs of the people and not environmentally friendly.” (Community Development Officer, eastern region.)*

KIIs further reported that operational funding for district-level monitoring and supervision was largely absent for extended periods. Several respondents indicated that no operational budget had been provided for field staff to travel to project sites, leaving supervision and follow-up to depend on whether other district resources could be redirected. One respondent described coordination meetings, which had taken place at district and local council level at the start of the project, as currently “hardly held unless there’s an issue to handle or implement” because no funds were allocated for them. Respondents in the eastern region linked these gaps to poor standards of work at restoration and irrigation sites and to the distribution of livelihoods that were not suited to local agroecological conditions.

- (i) *“There is no proper coordination of the project. The project workplans are not followed because, till to date, most of the livelihoods have not been delivered, yet people vacated the wetlands...Coordination meetings rarely take place because there are no funds.” (Agriculture Production Officer, south-western region.)*
- (j) *“There are no operational funds directed towards monitoring and supervision of the project activities, or further training on the management of the livelihoods.” (Natural Resources Officer, south-western region.)*

The UNDP audit identifies similar weaknesses in oversight, monitoring and beneficiary verification. Prior to 2024, oversight missions were infrequent and covered only a subset of sites, producing multi-year gaps during which implementation issues went unidentified or uncorrected. The audit also noted the absence of a project-wide system to track beneficiary distribution or verify whether individuals affected by wetland restoration had received intended benefits. In addition, field visits found livelihood investments that were abandoned or non-functional in some districts, and in other cases used primarily by landowners rather than the intended beneficiaries. These findings align with KII accounts of limited district-level supervision, weak feedback loops, and insufficient resources for follow-up support. They suggest that the constraints described in the first two mechanisms were not only problems of timing or package design, but also reflected weaknesses in the systems needed to monitor delivery, verify beneficiary reach, and adapt implementation when problems emerge.

Reading the interim evaluation, audit and endline evidence together points to a further observation. Several constraints identified at endline, including delayed livelihood delivery, quality and suitability issues, weak coordination, and limited beneficiary tracking, had also been identified earlier in implementation. This suggests that while key risks were recognized mid-implementation, the systems to translate those lessons into timely adjustments in delivery remained limited.



7.4 Cross-cutting conditions

Two further factors shaped the feasibility of the programme pathway throughout implementation.

3. Community engagement and acceptance

The programme pathway depended on communities understanding the rationale for wetland access restrictions, and on alternative livelihoods being sufficiently relevant and accessible for households to take up in practice. However, evidence from KIIs and FGDs indicates that community engagement was not consistent across sites and that community needs and preferences were not always fully reflected in project design and implementation. Respondents reported limited involvement in planning processes, insufficient sensitization, and delays or mismatches in the delivery of livelihood support.

Treatment FGDs in the south-western region noted that reduced access to wetland-based activities without timely livelihood support affected how some communities perceived the project and wetland conservation measures. KIIs also suggested that communities were more involved in implementation than in planning, limiting the extent to which livelihood activities could be tailored to local priorities.

- (k) *“Community was stopped from cultivating and grazing animals in the wetland and advised to form groups through which support would be extended, but since then, nothing has been extended.” (Treatment FGD, south-western region.)*
- (l) *“The communities were not involved in the planning but were involved in the implementation of project activities. The planning would have been better if the communities had first been involved and asked what they want, rather than coming with pre-determined activities whose budget could not be adjusted.” (KII, south-western region.)*

These accounts suggest that community engagement was an important condition for aligning project activities with local needs and for strengthening community understanding of and support for wetland restoration measures.

4. Environmental and socio-economic context

A second cross-cutting condition was the wider socio-economic and geographic context in which the wetland restoration measures were implemented. KIIs and FGDs frequently cited land scarcity, population pressure, and limited availability of viable livelihood alternatives outside the programme as constraints on households' ability to move away from wetland-based activities. KIIs in the south-western region also raised a concern about project boundaries. Respondents noted that wetland restrictions were implemented in some project districts while similar wetland uses continued in neighbouring districts, creating pressure on households in project areas and the risk that wetland use would be displaced across district boundaries rather than reduced overall.

- (m) *“People are still going back to the wetland. This is because the land is not enough, and yet, there are demands for school fees and health care.” (Treatment FGD, eastern region.)*
- (n) *“Land in the area was limited. The project required 10 acres to establish the demonstration site for irrigation but managed to get only 4 acres.” (Natural Resource Officer, eastern region.)*
- (o) *“The project is in [R], leaving out the neighbouring district of [K], where people are still utilising the wetlands for the same activities which were prohibited in [R].” (Community Development Officer, south-western region.)*

Taken together, the qualitative evidence points to a transition gap between reduced wetland use and the establishment of viable alternative livelihoods. Delays in delivery, gaps in quality and scale, and weaknesses in operational capacity and adaptive management appear to have contributed to situations in which some households experienced the costs of reduced wetland access before durable alternatives were in place. Community engagement and structural constraints further shaped how this transition gap was experienced across sites. The evidence suggests that, where restoration measures affect existing livelihood practices, the timing and suitability of livelihood support, together with the



capacity to monitor and adapt delivery during implementation, are important conditions for whether practice-level changes are accompanied by stronger livelihood and resilience outcomes.

VIII. Discussion

The endline results show changes in some early and intermediate outcomes, but limited evidence of improvement in household welfare outcomes. Treatment households identified more wetland degradation pressures and drivers than comparison households, grew a broader range of crops, and reported greater uptake of proactive climate adaptation measures. These results are consistent with parts of the project pathway related to awareness, agricultural adjustment, and adaptation behaviour. At the same time, the evaluation found limited evidence that these changes improved household welfare by endline. There were no measurable gains in expenditure, crop income, food security, or livestock assets, and total income did not improve; in some specifications, treatment households reported lower total income. Treatment households also reported greater reliance on welfare-reducing distress coping strategies. Taken together, these findings suggest that practice-level changes occurred, but households in treatment areas continued to face livelihood pressures and vulnerability to shocks.

Section 7 helps explain why early and intermediate changes were not followed by stronger welfare outcomes. The evidence points to three implementation mechanisms. First, livelihood support was delayed relative to wetland restoration and access restrictions, creating a transition gap in which some households had reduced access to wetland-based activities before alternative livelihood support was available. Second, where livelihood support was delivered, some alternatives were not sufficiently suited to local conditions, or were too limited in scale and follow-up support, to help households make a viable transition toward non-wetland-based livelihoods. Third, operational and oversight systems had limited capacity to track beneficiary coverage, follow up on livelihood support, and correct delivery problems during implementation. Together, these mechanisms help explain why observed changes in awareness, farming practices, and adaptation behaviour had not translated into stronger livelihood and welfare outcomes by endline.

The central implication is that integrated wetland restoration and livelihood programmes need to be designed and managed as transition processes. For ecosystem restoration projects that affect existing livelihood practices, livelihood support can play an important role in helping households adjust their livelihood strategies as restoration measures are introduced. The effectiveness of such programmes therefore depends on realistic sequencing, timely delivery, livelihood options that reflect local conditions and community needs, sufficient follow-up support, and systems that can monitor and adjust implementation during delivery. Table 8 summarizes the implications for GCF as an institution and for the design and implementation of similar projects.

Table 8. Learnings for the GCF and project design

Learning	For GCF (Institution-level learning)	For project design and implementation
Track the transition from restoration to household outcomes	Results monitoring and supervision should distinguish early pathway changes, such as awareness, wetland-use practices, and adaptation behaviour, from later household outcomes, such as income, food security, and coping responses. For projects that affect access to natural resources, supervision should also consider transition-risks, including delays in livelihood support, gaps in beneficiary reach, limited post-delivery functionality, and increased reliance on welfare-reducing coping strategies.	Wetland restoration, access management and livelihood support should be sequenced through an explicit transition plan. Where changes in wetland access may affect existing livelihood activities, project design should identify when livelihood support is expected to become available, how it will be delivered and followed up, and whether temporary income-smoothing or shock-buffering support may be needed during the transition period.



Learning	For GCF (Institution-level learning)	For project design and implementation
Treat livelihood support as a sustained package	During funding proposal review and implementation monitoring, GCF should consider whether proposed livelihood activities are credible in the local context and sufficiently supported to help households move toward alternative livelihood activities in practice. This includes attention to local livelihood strategies, agro-ecological suitability, market access, input and service requirements, expected time to generate returns, and arrangements for follow-up support.	Livelihood support should be delivered as a sustained package rather than a one-off transfer. Inputs should be combined with timely training, extension or veterinary support, market linkages where relevant, and post-delivery follow-up. Livelihood options should be selected and adapted with attention to local conditions, community needs and preferences, and the practical support households require to sustain new activities.
Verify implementation readiness before and during delivery	For projects that combine ecosystem restoration with livelihood support, project design and implementation reporting should more clearly assess whether the delivery arrangements are operationally ready and sufficiently resourced. This includes whether there is adequate budget and staffing for field-level coordination, monitoring, supervision and follow-up; whether the roles of national and local actors are clear; whether funds and inputs can reach intended beneficiaries in time; and whether implementation systems can identify and address delivery problems during implementation.	Multi-component projects should translate national-level design into operational district-level delivery plans. These plans should clarify responsibilities, secure timely operational funding, track beneficiary coverage, enable field monitoring, and establish feedback loops for resolving delivery gaps. Implementation systems should be able to identify delivery problems early and adjust support before delays or transition pressures weaken the project pathway.
Strengthen community engagement in planning and delivery	For projects that change access to natural resources, community engagement should be considered an important implementation condition. Supervision should consider whether communities are meaningfully engaged in planning where feasible, whether beneficiary selection and grievance mechanisms are clear and accessible, and whether communities receive clear information on wetland access measures and the expected timing and nature of livelihood support.	Projects should involve communities early enough for local needs and preferences to inform the selection, timing and delivery of livelihood activities. Beneficiary selection should be transparent, and communication should clearly explain the rationale for wetland restoration measures, the expected timing and nature of livelihood support, and any limits to what the project can provide.

Source: LORTA team.

Overall, the findings show both the promise and the implementation challenge of combining wetland restoration with livelihood support. The limited welfare effects at endline underscore the importance of managing the transition from wetland-based livelihoods to viable alternatives. Future investments can build on these lessons by sequencing restoration and livelihood support more realistically, tailoring livelihood options to local conditions, strengthening field-level delivery and follow-up, and explicitly managing short-term transition pressures. With these conditions in place, integrated wetland restoration programmes are better positioned to support ecosystem recovery while strengthening livelihood and resilience outcomes over time.



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Annex

A1. Sample tracking, attrition, and replacement households

During the preliminary household survey conducted in 2023, 1,667 eligible households were identified and interviewed. At endline, 1,454 of these households were successfully reinterviewed, implying an attrition rate of 12.78 per cent. The final endline cross-sectional dataset includes 1,510 households after replacement households were added using the original sampling approach, primarily within the same communities, to preserve sample coverage.

Replacement households are included in the main endline IPWRA analysis but are not included in the household panel used for DRDID-IPW robustness checks. The panel robustness checks are therefore estimated only for households interviewed in both 2023 and 2024.

Table A - 1 summarizes the documented reasons why baseline households could not be successfully reinterviewed. Reasons were available for 170 of the 213 baseline households not reinterviewed at endline; the remaining 43 cases could not be linked to a verified tracking or replacement reason in the available records. Among cases with documented reasons, the most common reasons were permanent migration and temporary absence from the village at the time of survey.

Table A - 1. Documented reasons for household replacement or unsuccessful tracking

Reason	Frequency	Percentage
Moved/migrated permanently	68	40.00
Temporarily away from village	62	36.47
Death	12	7.06
Refusal	18	10.59
Others	10	5.88
Total	170	100.00

Source: LORTA Endline Household Survey, 2024.

Note: Percentages are calculated among cases with documented replacement or tracking reasons.

Attrition analysis

Attrition was relatively limited. Of the 1,667 households interviewed during the 2023 preliminary survey, 1,454 were successfully reinterviewed at endline, while 213 were not reinterviewed, corresponding to an attrition rate of 12.78 per cent. Table A - 2 compares baseline characteristics between households successfully reinterviewed at endline and those interviewed only in 2023.

Overall, attrited and non-attrited households are broadly balanced across observed baseline characteristics. No statistically significant differences are found for most demographic, household composition, education, land ownership and community-role variables. The only statistically significant difference is distance to the nearest market: households not reinterviewed at endline were located slightly closer to markets at baseline. This suggests that attrition is not strongly associated with most observed baseline characteristics, although unobservable differences cannot be ruled out.

Because replacement households were included in the main endline IPWRA analysis, attrition is most relevant for the household panel used in the DRDID-IPW robustness checks. Those panel estimates are therefore interpreted with this limitation in mind.



Table A - 2. Baseline characteristics by attrition status

Variable	Reinterviewed at endline	Not reinterviewed at endline	Number of observations	p-value
Age of household head	48.11 (0.75)	49.95 (2.74)	1,283	0.452
Male-headed household	0.716 (0.018)	0.688 (0.033)	1,335	0.410
Household size	10.05 (1.43)	8.99 (1.32)	1,522	0.472
Married	0.805 (0.019)	0.765 (0.030)	1,666	0.229
Years in residence	32.17 (1.64)	30.99 (2.33)	1,590	0.515
Education level of household head	2.245 (0.042)	2.352 (0.197)	1,666	0.566
Owens residence land	0.917 (0.013)	0.897 (0.023)	1,652	0.415
Distance to health centre (hours)	1.280 (0.188)	1.024 (0.121)	1,644	0.104
Distance to market (hours)	1.356 (0.222)	1.033 (0.128)	1,645	0.049**
Distance to town (hours)	1.136 (0.224)	0.955 (0.136)	1,643	0.264
Distance to tarmac road (hours)	1.445 (0.148)	1.242 (0.180)	1,650	0.214
Holds local government role	0.120 (0.019)	0.104 (0.031)	1,623	0.532

Source: LORTA Preliminary Household Survey, 2023.

Note: The table compares baseline characteristics of households successfully reinterviewed at endline with baseline households not reinterviewed at endline. Means and standard errors are reported using 2023 baseline values. P-values test differences between reinterviewed and non-reinterviewed households. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels.



A2. Matching diagnostics and common support

The IPWRA matching and weighting procedure used 10 variables capturing pre-project ecological conditions, retrospective community characteristics, and selected household characteristics. These variables were selected to improve comparability between households in treatment and comparison wetlands given that treatment wetlands were purposively selected and implementation had already begun before household survey work started.

Table A - 3 lists the matching variables used in the IPWRA model. Figure A - 1 presents standardized differences for these variables before and after weighting. Values closer to zero indicate better balance between treatment and comparison households. The diagnostics show that weighting substantially reduced observable imbalance across the matching variables, with post-weighting standardized differences generally close to zero and within the 0.25 threshold. As with all matching approaches, this improves balance on observed characteristics but cannot rule out differences in unobserved factors.

Table A - 3. Matching variables used in the IPWRA analysis

Variable	Domain	Definition/construction	Source
CL data: Community took part in wetland initiatives before 2019	Community-level retrospective	Indicator for whether the community had taken part in wetland protection or management initiatives before 2019.	Community leader survey, retrospective module
CL data: Number of challenges faced by community in 2019	Community-level retrospective	Count of challenges reported by community leaders as affecting the community before 2019.	Community leader survey, retrospective module
Wetland degradation_2015/2016 (%)	Satellite/ ecological	Pre-project measure of wetland degradation, expressed as the percentage of wetland area classified as degraded using 2015/2016 satellite imagery.	Satellite-based wetland assessment
CL data: Number of different crops grown in community in 2019	Community-level retrospective	Count of different crops reported as commonly grown in the community before 2019.	Community leader survey, retrospective module
CL data: Wetland is important to community in 2019	Community-level retrospective	Retrospective measure of the perceived importance of wetlands to the community before 2019.	Community leader survey, retrospective module
CL data: Main source of livelihood for community in 2019	Community-level retrospective	Main livelihood source reported for the community before 2019.	Community leader survey, retrospective module
Household head education level	Household	Highest education level completed by the household head.	Household survey
Total adults (>17 years) in household at endline	Household	Number of household members aged 18 years or older at endline.	Household survey, endline

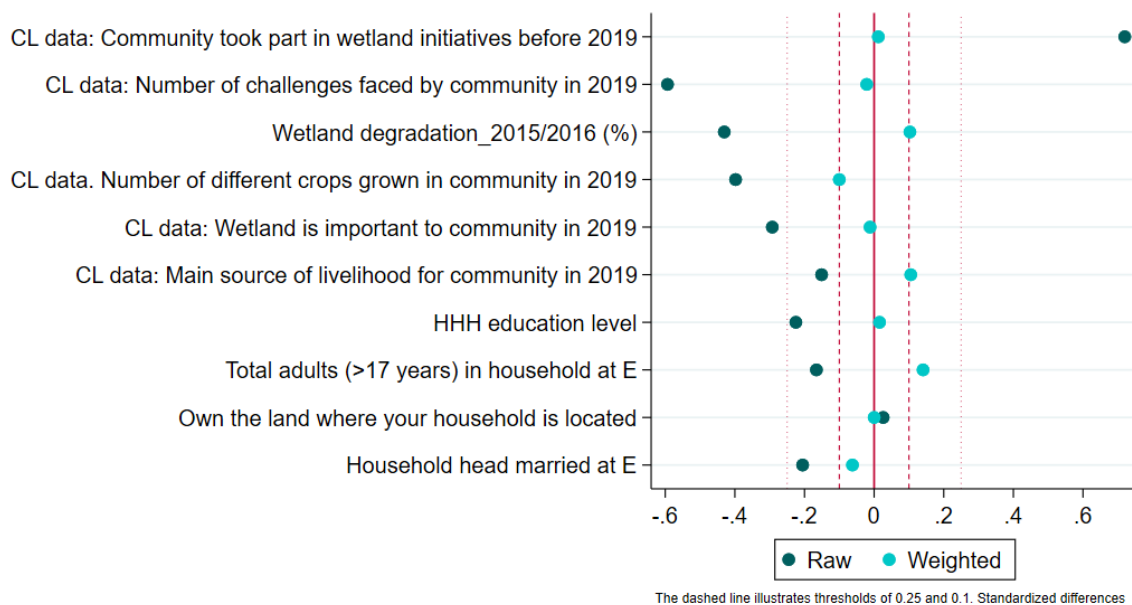


Variable	Domain	Definition/construction	Source
Own the land where your household is located	Household	Indicator for whether the household owns the land on which the dwelling is located.	Household survey
Household head married at endline	Household	Indicator for whether the household head was married at endline.	Household survey, endline

Source: LORTA team.

Note: CL = community leader; HHH = household head; E = endline. The table lists the 10 variables used for matching and weighting in the IPWRA analysis. Community-level variables are based on retrospective information collected from community leaders, while wetland degradation is derived from pre-project satellite imagery. Household variables capture basic household characteristics used to improve comparability between treatment and comparison households.

Figure A - 1. Bias reduction through IPWRA weighting



Source: LORTA team.

Note: Points show standardized differences between treatment and comparison households before and after IPWRA weighting for the 10 matching variables listed in Table A - 2. Values closer to zero indicate better balance. The dashed vertical lines indicate standardized-difference thresholds of 0.10 and 0.25. CL = community leader; HHH = household head; E = endline.

A3. Robustness check

Table A - 4 to Table A - 7 present panel robustness checks using DRDID-IPW for households interviewed in both 2023 and 2024. These estimates compare changes in outcomes over time between households in treatment and comparison areas, while reweighting on observed characteristics.

Because the 2023 household survey was conducted after implementation had already begun in selected treatment wetlands, these estimates should not be interpreted as full project impacts from a clean pre-treatment baseline. Rather, they capture incremental differential changes between 2023 and



2024 during a later stage of implementation. Replacement households are excluded from the panel estimates.

Overall, the panel robustness checks are broadly consistent with the main endline findings. They show positive differential changes in households' recognition of wetland degradation pressures and climate- or environment-related impacts affecting wetlands. They do not show statistically significant differential improvements in sustainable land management practices, access to climate information, land cultivated, crop diversification, agricultural yield, livestock ownership, food security, or transformed income measures. The income estimates are negative across specifications, but only the untransformed restricted monthly income estimate is statistically significant. The coping results show statistically significant differential increases in distress coping among treatment households, while productive coping does not increase significantly.

Table A - 4. Robustness checks: awareness, behaviour, land use, and wetland activities

Outcome	ATT	2023 Mean	Total	Treated	Control
Number of degradation drivers identified	0.53* (0.28)	1.71	2,906	1,558	1,348
Number of wetland impacts identified	0.80** (0.34)	1.78	2,906	1,558	1,348
Use of SLM practices	-0.02 (0.09)	0.24	2,906	1,558	1,348
Access to climate information	0.09 (0.09)	0.21	2,906	1,558	1,348
Land cultivated (acres)	-0.64 (0.93)	3.98	1,958	956	1,002
Number of land parcels	0.21 (0.23)	3.38	1,972	958	1,014
Number of wetland activities	0.27 (0.30)	1.58	1,972	1,558	1,348

Source: LORTA Preliminary Household Survey, 2023, and LORTA Endline Household Survey, 2024.

Note: ATT estimates are from DRDID-IPW models using household panel data from 2023 and 2024. Estimates represent the additional change in treatment households relative to comparison households. The 2023 mean refers to the comparison-group mean in 2023. Standard errors, clustered at village level, are in parentheses. The observation columns report household-wave observations. For binary outcomes, ATT and the 2023 comparison mean are reported in probability units. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels. Because the 2023 survey occurred after implementation had already begun, these estimates capture incremental changes during a later stage of implementation rather than full project impacts. SLM = sustainable land management.

**Table A - 5. Robustness checks: agricultural production, livestock, and food security**

Outcome	ATT	Baseline Mean	Total	Treated	Control
Number of crops cultivated	0.27 (0.74)	4.69	2,906	1,558	1,348
Agricultural yield (IHS-transformed)	1.25 (0.82)	5.07	2,906	1,558	1,348
Tropical livestock units	0.18 (0.13)	0.91	2,906	1,558	1,348
Household dietary diversity score	-0.25 (0.75)	6.75	2,906	1,486	1,336
Food insecurity experience scale (12 months)	-0.60 (0.44)	0.93	2,906	1,328	1,308

Source: LORTA Baseline Household Survey, 2023, and LORTA Endline Household Survey, 2024.

Note: ATT estimates are from DRDID-IPW models using household panel data from 2023 and 2024. Estimates represent the additional change in treatment households relative to comparison households. The 2023 comparison mean refers to the comparison-group mean in 2023. Standard errors, clustered at village level, are in parentheses. The observation columns report household-wave observations. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels. Because the 2023 survey occurred after implementation had already begun, these estimates capture incremental changes during a later stage of implementation rather than full project impacts.

Table A - 6. Robustness checks: household income and housing quality index

Outcome	ATT	2023 Mean	Total	Treated	Control
Monthly income (untransformed, UGX)	-674,559 *** (223,377)	366,088	1,864	942	922
Monthly income (IHS-transformed)	-0.58 (0.44)	11.98	1,864	942	922
Monthly income (log-transformed)	-0.57 (0.43)	11.32	1,864	942	922
Housing-related physical capital index	-10.04 (8.22)	107.75	2786	1508	1278

Source: LORTA Baseline Household Survey, 2023, and LORTA Endline Household Survey, 2024.

Note: ATT estimates are from DRDID-IPW models using household panel data from 2023 and 2024. Estimates represent the additional change in treatment households relative to comparison households. The 2023 comparison mean refers to the comparison-group mean in 2023. Standard errors, clustered at village level, are in parentheses. The observation columns report household-wave observations. The untransformed income estimate is reported in UGX for the restricted income sample. IHS- and log-transformed estimates are reported on the transformed scale and should not be interpreted directly as UGX values. *, **, and *** denote statistical



significance at the 10 per cent, 5 per cent, and 1 per cent levels. Because the 2023 survey occurred after implementation had already begun, these estimates capture incremental changes during a later stage of implementation rather than full project impacts.

Table A - 7. Robustness checks: coping strategies

Outcome	ATT	2023 Mean	Total	Treated	Control
Any distress coping strategy	0.14* (0.08)	0.30	2,906	1,558	1,348
Number of distress coping strategies	0.26** (0.11)	0.45	2,906	1,558	1,348

Source: LORTA Baseline Household Survey, 2023, and LORTA Endline Household Survey, 2024.

Note: ATT estimates are from DRDID-IPW models using household panel data from 2023 and 2024. Estimates represent the additional change in treatment households relative to comparison households. The 2023 comparison mean refers to the comparison-group mean in 2023. Standard errors, clustered at village level, are in parentheses. The observation columns report household-wave observations. For binary outcomes, ATT and the 2023 comparison mean are reported in probability units. *, **, and *** denote statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels. Because the 2023 survey occurred after implementation had already begun, these estimates capture incremental changes during a later stage of implementation rather than full project impacts.

A4. Data quality assurance and ethics

Endline data collection was implemented using computer-assisted personal interviewing (CAPI) in Kobo Toolbox. A team of 43 enumerators participated in two days of field-based training covering survey protocols, questionnaire administration, informed consent, and tablet use. A pilot in a nearby village with similar characteristics to the study sites was used to refine question wording, confirm survey duration, and identify remaining programming issues.

Throughout fieldwork, high-frequency data quality checks were conducted to monitor interview completeness, duplicate records, missing values, outliers, and internal consistency across key variables. The evaluation followed standard ethical principles, including voluntary participation, informed consent, anonymity, confidentiality, and minimization of harm. Fieldwork also faced routine operational challenges, including respondent absence, migration, and limited availability of some key informants.

A5. Qualitative coding framework

Qualitative data coding of KIIs and FGDs was analyzed using an inductive coding approach. This approach employed qualitative evidence in an explanatory manner to identify common themes and mechanisms contributing to the observed evaluation results. All qualitative data was coded and analyzed using ATLAS.ti software.

For section 7, KIIs were coded with a single, predefined coding framework that was applied consistently across preliminary and endline datasets to ensure analytical comparability, despite differences in questionnaire design. Codes were refined to ensure consistency, conceptual clarity, and analytical distinctiveness across categories.

Criteria for category assignment of factors contributing to observed results

Codes were assigned to analytical categories based on the dominant mechanism described in the qualitative evidence (as transcribed by KoboToolbox). Questions and responses that were asked about implementation challenges or project components are included for analysis. However, questions and responses related to recommendations (i.e. “What improvements could be made,” “What are the

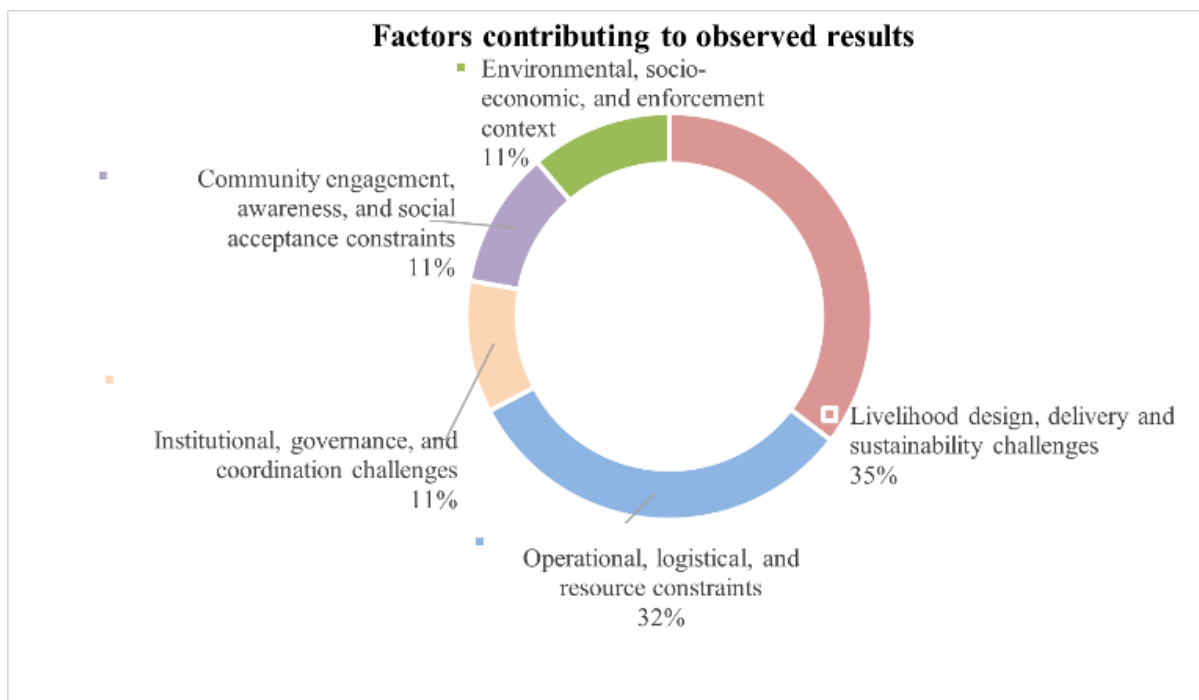


recommendations for project and/or government support,” etc.) were not included in the analysis as they reflect forward-looking perspectives rather than evidence on implementation processes or contributing factors to observed results. Each response or segment of a response was assigned to one primary category to avoid double counting. For responses or segments that had explanatory links to another category than the assigned code, the dynamic was interpreted in section 7.

Categories were designed to distinguish factors related to implementation capacity, resources, and enabling conditions from factors related to design, sustainability, or adequacy of project activities. Where multiple factors were mentioned within a single response, coding prioritized the factor most directly linked to the relevant stage of the project result chain, as defined in Table A - 8.

Figure A - 2 summarizes the distribution of coded references across the five analytical categories. The most frequently coded categories were livelihood design, delivery, and sustainability (35 per cent of coded references) and operational, logistical, and resource constraints (32 per cent), followed by institutional, governance, and coordination challenges (11 per cent), community engagement, awareness, and social acceptance (11 per cent), and environmental, socio-economic, and enforcement context (11 per cent). These frequencies describe the qualitative material analyzed; they should not be interpreted as the share of households affected by each type of constraint, as a measure of causal importance, or as a ranking of drivers of the observed result pattern

Figure A - 2. Distribution of coded references across analytical categories



Source: LORTA team.

Table A - 8. Qualitative coding framework used in section 7

Code (category)	Definition	Inclusion criteria	Exclusion criteria
Livelihood design, delivery, and sustainability challenges	Factors related to design, suitability, sequencing, delivery, and post delivery sustainability of	<ul style="list-style-type: none"> Delays or incomplete delivery of livelihoods Mismatch between local environment, socio- 	<ul style="list-style-type: none"> Resource or facilitation limitations Poverty, land scarcity



Code (category)	Definition	Inclusion criteria	Exclusion criteria
	alternative livelihood interventions	<p>economic conditions, livelihood types</p> <ul style="list-style-type: none"> • Insufficient training, extension services, follow-up • Limited viability of livelihood • Poor quality or diseased inputs • Financial burden on farmers 	
Operational, logistical, and resource constraints	Factors related to the availability of financial, human, and logistical resources required to implement, manage, and monitor project activities	<ul style="list-style-type: none"> • Lack of operational funds • Shortage in staff and equipment • Limitation in transportation and facilitation • Factors related to project progress and efficiency • COVID-19-related disruptions and movement suspensions 	It is important to note that responses relating to high initial cost for wetland users for alternative livelihood is excluded in this category. This is because it is considered a livelihood design and sustainability challenge, as alternative livelihood options were interpreted to be unviable from its design rather than a resource constraint.
Community engagement, awareness, and social acceptance factors	Factors related to awareness, perceptions, trust, participation, and behavioural acceptance at the community level	<ul style="list-style-type: none"> • Community engagement in planning • Sensitization and training of wetland users • Community resistance and negative perceptions • Mistrust arising from project-related factors • Gender-related norms affecting uptake 	Political interference
Environmental, socio-economic, and enforcement context	Broader structural and contextual factors shaping implementation conditions and behavioural responses, including enforcement of project components	<ul style="list-style-type: none"> • Political interference (misaligned information or guidance on project activities) • Existing poverty, food insecurity • Land scarcity, population pressure • Land ownership • Weak enforcement for continued compliance 	Political interference is treated as an enforcement-related constraint rather than a social acceptance issue because it directly weakens regulatory authority and compliance incentives, irrespective of community attitudes



Code (category)	Definition	Inclusion criteria	Exclusion criteria
			or willingness to change behaviour
Institutional, governance, and coordination challenges	Factors related to decision-making structures, coordination mechanisms, and information flows between national, regional, and district levels	<ul style="list-style-type: none"> • Centralized planning and decision making • Limited involvement with district-level stakeholders • Weak feedback loops and coordination • Informal and limited communication • Limited access to project-related information and documentation 	<ul style="list-style-type: none"> • Operational constraint related to information sharing and coordination • Political factors affecting project-related enforcement

Source: Key informant interviews and focus group discussions.

A6. Messaging experiment

The four messages used in the randomized messaging experiment described in Box 2 are presented below.

- (a) Control group: **Neutral message**
 - (i) Message: “Our wetland conservation program is focused on preserving the wetlands in your community. We are working to ensure that these natural areas are protected for future generations.”
- (b) Treatment group 1: **Ecological benefits message**
 - (i) Message: “Wetlands are crucial for a healthy environment. They provide homes for many plants and animals, purify our water, and help control floods. By conserving wetlands, we are protecting these natural services that benefit everyone. Your participation in our conservation program helps safeguard these vital ecosystems.”
- (c) Treatment group 2: **Long-term economic benefits message**
 - (i) Message: “Protecting wetlands not only preserves the environment but also supports the local economy. Healthy wetlands can improve soil fertility, increase crop yields, and provide opportunities for sustainable tourism. By participating in our conservation efforts, you are investing in the long-term economic prosperity of your community.”
- (d) Treatment group 3: **Short-term economic benefits message (Payment for Ecosystem Services)**
 - (i) Message: “An international organization is considering introducing a Payment-for-Ecosystem-Services (PES) scheme in Uganda to reward communities for conserving wetlands. Under this scheme, community members who protect wetlands will receive financial reward for their efforts. This program ensures that those who contribute to environmental conservation are rewarded, making it possible for you to see direct economic benefits from participating in wetland conservation.”



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